

COEUR D'ALENE BASIN NATURAL RESOURCE DAMAGE ASSESSMENT AND RESTORATION ACCOMPLISHMENTS

RESTORATION ACTIVITIES 2007-2008



Tundra swans in the Lower Coeur d'Alene Basin



Cutthroat trout from the South Fork Coeur d'Alene River



Sherlock Creek, Idaho - Fish Habitat and Stream Channel Restoration

PREPARED OCTOBER 2009 BY THE COEUR D'ALENE BASIN TRUSTEES



INTRODUCTION

OVERVIEW

The Coeur d'Alene Basin Natural Resource Damage Assessment and Restoration (NRDAR) Trustees are beginning to implement several restoration projects within the Coeur d'Alene Basin (CdA Basin).

This report summarizes those restoration activities that were implemented between 2007 through 2008. The CdA Basin Trustees (Trustees) include the Department of Agriculture, represented by the United States Forest Service (USFS), the Department of the Interior, represented by Bureau of Land Management (BLM) and the United States Fish and Wildlife Service (Service), and the Coeur d'Alene Tribe (CdA Tribe).

The purpose of the Trustees' restoration projects is to partially compensate for public losses associated with identified natural resource injuries due to the release of hazardous substances as a result of mining and mining-related activities in the CdA Basin. These projects were planned and authorized through the Coeur d'Alene Basin Final Interim Restoration Plan (Restoration Plan) and Finding of No Significant Impact that was signed in 2007¹.

This report summarizes Trustee restoration accomplishments at five project sites within the CdA Basin including:

- Sherlock Creek
- East Fork (EF) Moon Creek
- Pine Creek
- Lower Coeur d'Alene River wetland restoration site
- Hepton Lake

Individual Trustees are leading each of the projects on behalf of the Trustee Council.

Table 1 summarizes the lead Trustee, project name, and the major project accomplishments to date. Each of these projects is on-going and they range in stage of completion from planning and assessment to post-implementation monitoring. A more detailed description of each project is provided in this report.

TRUSTEE RESTORATION ACCOMPLISHMENTS FOR 2007-2008		
LEAD TRUSTEE	PROJECT NAME	TRUSTEE RESTORATION ACCOMPLISHMENTS
USFS	Sherlock Creek	<ul style="list-style-type: none"> • 4000 ft of new stream channel constructed • 12 acres of floodplain restored • 86 pieces of derelict mining equipment removed • 100 tons of hydrocarbon contaminated soils removed
USFS	EF Moon Creek	<ul style="list-style-type: none"> • Completion of restoration planning • Finalization of design package • Beginning of restoration project monitoring
BLM	Pine Creek Basin	<ul style="list-style-type: none"> • 2 fish passage culverts installed • 2 streamside hillslopes stabilized • 5 rock barb bank stabilization structures installed • 2 flood plain stabilization and riparian planting sites • Woody debris placement at various locations within two tributaries • Road repair and riparian area improvement at one site
USFWS	Wetland Restoration Lower Couer d'Alene River Site	<ul style="list-style-type: none"> • Completion of preliminary restoration plan • 245 acres of wetland enhanced (reed canary grass control and water management to facilitate native plant growth) • 45 acres of upland enhanced (riparian trees, shrubs and native grasses planted) • Vegetation growth and waterfowl use monitoring • Flood water monitoring and dike repair
CdA Tribe	Hepton Lake	<ul style="list-style-type: none"> • Development of a restoration plan • Water quality assessment • Fisheries resources assessment

Table 1: Lead Trustee, project name, and major accomplishment for each project completed between 2007 and 2008.

Project funds presented in this report do not represent final project costs. The funds listed in this report are Trustee settlement funds, including those reimbursed by the Asarco Environmental Trust Fund (AETF); and may not include all funds contributed by federal agencies or CdA Tribe. Funds and work contributed by partners are noted in the individual project descriptions.

¹ A copy of the Restoration Plan is available at: http://www.fws.gov/easternwashington/documents/CdA_INT%20RES%20FINAL.pdf



Fisheries sampling, Hepton Lake.

SHERLOCK CREEK

U.S. FOREST SERVICE

The Sherlock Creek site is in a very remote location in the upper reaches of the St. Joe River Basin nearly at the Idaho-Montana divide southwest of Superior, Montana. This site is a high priority restoration opportunity, because it will restore over a mile of important fisheries habitat in a federally designated Wild and Scenic River Basin, the St. Joe.

It is home to westslope cutthroat trout (*Oncorhynchus clarkii*) and other aquatic species, and is habitat for a bull trout (*Salvelinus confluentus*) population stronghold. Bull trout strongholds are important, because the species is federally listed as threatened

under the Endangered Species Act. Restoration at the site is needed as a result



Bull trout.

of poor mining practices. The Weiss placer mine disturbance encompasses over 20 acres of Sherlock Creek's floodplain which is located in a USFS roadless area. The actual resource extraction practices over the last 30 years at the site can only loosely be described as "mining," and have been destructive to the aquatic ecosystem of Sherlock Creek. Cutthroat trout actively spawn in Sherlock Creek and bull trout still actively spawn below the site as well as in adjacent streams. Any unnatural fine sedimentation that occurs upstream of fish spawning areas can smother eggs laid in streambed gravel nests. Stream sedimentation is a continuing problem originating from this mine site on Sherlock Creek.

The Sherlock Creek Mine site (located entirely on USFS lands) was originally occupied by Mr. Eugene Weiss in the late 1960s. Legal action against Mr. Weiss due to his unreasonably damaging placer mining practices began in the early 1970s.

A 30-year legal history has since evolved, climaxing in a federal civil case filed in 2003 by the United States Attorney for the District of Idaho. Summary judgment was granted to the United States which included a recent court order allowing the USFS to proceed with restoration of the site.

The Sherlock Creek Mine site restoration is being accomplished through a partnership between the USFS and the Trustees. The USFS is providing project staff and administrative resources, and the Trustees are providing funding. In addition to the Trustee/ASARCO trust contributions, over \$26,000 from the U.S. Fish and Wildlife Service and \$27,000 from the National Fish and Wildlife Foundation supported restoration activities.

The University of Idaho and the North Idaho Fly Casters also provided generous volunteer support for on-site activities.

The natural resource injuries that are being partially addressed by the restoration of Sherlock include riparian resources, surface waters and fish. The restoration would result in direct improvements in riparian resources and indirect improvements in surface waters, and fish. These improvements will contribute to the restoration/replacement of resources injured and the associated services lost due to mining or mining-related activities in the CdA Basin.

The objectives of the Sherlock Creek restoration are to: 1) create a stable stream channel and floodplain, 2) reduce sediment that is entering the stream channel, 3) establish a native vegetation community, 4) create pond habitat for wetland dependent species, and 5) improve instream fish habitat quality.

The restoration project is focused on rebuilding and enhancing over one mile of channelized stream and tributary routes. Total floodplain reconstruction was needed in many areas to improve the site's long-term hydrologic stability.



The result of the project will be of great benefit to a true bull trout stronghold for the St. Joe River/Coeur d'Alene Lake system and represents a very high quality native trout restoration.

In 2007, the USFS completed the National Environmental Policy Act documentation, put the finishing touches on the stream restoration design, and prepared a contract package. The 2007 restoration work included removal of 86 pieces of derelict equipment and machinery parts from the floodplain including multiple bulldozers and a large dredge. The salvageable pieces of machinery were taken to Missoula, Montana and sold at auction for approximately \$14,000. Proceeds from the auction will be used for restoration.



Equipment removal at the Sherlock Creek Site.

SHERLOCK CREEK

U.S. FOREST SERVICE

Nearly 100 tons of contaminated (hydrocarbon) soils and appreciable amounts of trash were removed from the site. In addition, logs and root wads were brought to the site and staged for the next phase of work: stream restoration.

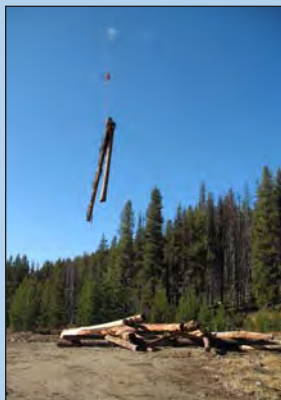
The second phase of the Sherlock Creek restoration project occurred in 2008 and included construction, monitoring, and maintenance. Approximately 4000 feet of new stream channel was constructed with 12 acres of floodplain/channel area restored at the site.

The USFS performed administration and oversight. Northwind Inc., with an office in Kellogg, and headquartered in Idaho Falls, was the primary contractor for the stream restoration phase of the project.

From 2007 to 2008, the Trustees allocated approximately \$1,300,000 from the AETF to the Sherlock Creek project. These are not total project costs and are only those reimbursed by the AETF. The USFS contributed funds that are not reflected here to complete some of the restoration planning and design.

In 2009, the USFS is expecting to use \$50,000 allocated from the Trustees along with \$14,000 received from the sale of on-site mining equipment to complete construction, monitoring, maintenance, and project oversight.

In 2009, restoration will include removing two temporary diversions on reconstructed stream channels that were left in place in 2008 to allow the newly planted vegetation to become established before experiencing full stream flows. Recontouring and revegetation of the old stream channel section will also occur. Monitoring will be focused on assessing effectiveness and stability of the restoration. Significant maintenance in out years at the site is not planned or anticipated.



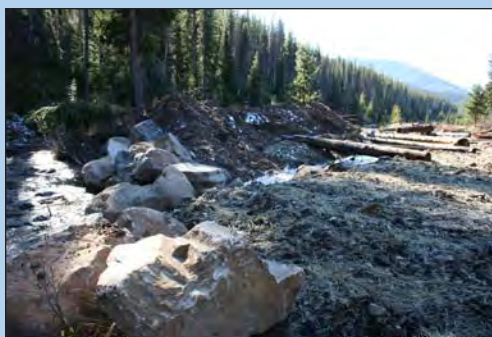
Helicopter long lining logs to the Sherlock site.



(10/29/08) Upstream end of project area - stream construction area begins.



(10/29/08) Upper section of new channel - base flow only in stream for winter/spring 09.



(10/29/08) Looking downstream - old channel on the left, new channel on the right, stockpiled soil in the middle for 2009 work. Temporary flow control intersection provides some flow to the new channel to help with revegetation, especially willow staking.



(10/29/08) Lower end of project area near road.

EF MOON CREEK

U.S. FOREST SERVICE

EF Moon Creek is located four miles east of Kellogg, Idaho, and about two miles north of I-90. From 1998 through 2000, the USFS implemented a cleanup action at the abandoned 20-acre Silver Crescent Mine and Mill Complex in EF Moon Creek that cost approximately \$1.9 million dollars.

The mine and mills at the site processed lead, zinc, and silver ore with both an early jig mill and a more recent ball mill with a flotation plant. The main construction phase of the USFS cleanup action moved over 130,000 cubic yards of material contaminated with lead, arsenic, copper and mercury into an on-site capped repository. These remedial actions led to an increase in water quality, which created the opportunity for further natural resource restoration.

An overall goal of the full EF Moon Creek project was to demonstrate the feasibility of taking a mine-impacted area through cleanup to natural resource restoration. Natural resource restoration at this site was desirable, because the site is winter range for big game, and EF Moon Creek provides potential spawning and rearing habitat for westslope cutthroat trout (*Oncorhynchus clarkii*). The USFS built a diverse and effective partnership among the Coeur d'Alene Basin Environmental Improvement Project Commission, the Silver Mountain Ski Area, and the Trustees to provide funding support to the EF Moon Creek project.

The natural resource injuries that are being partially addressed by the restoration of the EF Moon Creek site include riparian resources, surface waters and fish. The restoration would result in direct improvements in riparian resources and indirect improvements in surface waters, and fish. These improvements contribute to the replacement/restoration of resources injured and the associated services lost due to mining in the CdA Basin.



EF Moon Creek.

There are four site-specific objectives for restoration:

- 1) stabilize the stream channel to prevent erosion of the repository and the stream channel;
- 2) improve fish habitat quality and quantity including over-wintering conditions;
- 3) reestablish riparian areas and wetlands;
- 4) revegetate the site to reduce erosion and improve foraging habitat; and
- 5) enhance wildlife habitat.

The USFS decided to make this restoration a demonstration project to study the feasibility of watershed natural resource restoration in areas where the original stream morphology has been severely altered by mining and environmental cleanup activities. As part of the project, innovative high gradient stream restoration techniques were further adapted for the unique circumstances at EF Moon Creek.

Work that was implemented and studied included: creation of a more stable stream morphology, while accounting for site features such as a large on-site repository located in the floodplain; revegetation on and adjacent to the repository, and reestablishment of wildlife and fish habitat through the use of constructed or installed structures.



Remedial actions at Moon Creek created the opportunity for further natural resource restoration.

The planning and design work for the EF Moon Creek restoration occurred from 2005 to 2006. In 2007, materials needed for restoration were stock piled on site. The main construction work at the EF Moon Creek site occurred in 2008. While the entire site was estimated to be 20 acres, the restoration took place on approximately 12 acres. Restoration at the site included vegetative restoration, installation of wildlife and fish habitat structures, stream channel enhancement with grade controls, and treatment of noxious weeds.

EF MOON CREEK

U.S. FOREST SERVICE

Specific restoration statistics include:

- 4,000 ft. of stream channel (450 logs, 1000 boulders, 94 pool forming structures)
- 10,000 cubic yards of top soil
- 18,555 native plants
- 3.7 acres of wetlands
- 12 acres of weed treatment and hydroseeding

Most of the EF Moon Creek construction work was funded by the Coeur d'Alene Basin Environmental Improvement Project Commission (\$316,000), and a grant from the Silver Mountain Ski Area (\$86,000). The Trustees committed \$95,000 to the EF Moon Creek project and transferred \$70,000 to the USFS in 2005 to implement restoration planning, and complete the final design package.

Of the \$70,000 the Trustees allocated in 2005, approximately \$20,000 remain available in the USFS project account. These funds will be used in 2009 for monitoring.

An additional \$25,000 was committed by the Trustees to the EF Moon Creek project. These funds will be requested by the USFS as needed to complete monitoring through 2012. To date, the USFS has contributed approximately \$75,000 to the project.

All restoration construction work at the site has been completed and 2009 represents the second year of monitoring. There is no scheduled or anticipated maintenance work at the site.

Monitoring of the remediation and restoration will be occurring through 2012 and includes:

- Fish tissue and songbird blood lead surveys to evaluate ongoing contaminant exposure (includes upstream and downstream areas);
- Fish population monitoring to evaluate the effectiveness of water quality and habitat improvements;



Moon Creek waste rock.



The 12-acre Moon Creek restoration will enter into a monitoring phase through 2012.

- Fish habitat surveys to evaluate the quality and dynamics of restored fish habitat;
- Cross section/longitudinal stream profile monitoring using permanent bench marks set up during contract preparation to evaluate stream channel stability and morphology;
- Vegetation and riparian habitat monitoring using stationary photo points to evaluate erosion control and wildlife forage suitability; and
- Water quality monitoring to evaluate overall success in reducing input of hazardous substances and sediment into the stream.

PINE CREEK

BUREAU OF LAND MANAGEMENT

Pine Creek joins the South Fork Coeur d'Alene River at Pinehurst in Shoshone County, Idaho; its watershed covers approximately 79 square miles. Hard rock mining began in the catchment of Pine Creek near the end of the 19th century, and has contributed to increased stream sedimentation, resulting in an increase in tributary bedload sediment. Increased bedload migrating to the channel, combined with removal of large cedar trees on the floodplain, resulted in channel instability, which propagated downstream over a period of decades. On many reaches of Pine Creek, active channel width has increased by over 50 percent since 1933. Stream restoration with increased channel stability and floodplain vegetation and reduced sedimentation will benefit the fish populations in Pine Creek. Pine Creek supports a variety of fish species including sculpin (*Cottus spp.*), brook trout (*Salvelinus fontinalis*) and westslope cutthroat trout (*Oncorhynchus clarkii*).

The Pine Creek restoration is based on investigations and reports commissioned by the BLM to develop a conceptual restoration plan that balances two goals: 1) to protect existing infrastructure, and 2) to conduct stream restoration that incorporates the stream's natural process. The BLM has conducted remedial and restoration activities along Pine Creek since 1996 including: floodplain tailings removal, installation of off-channel water treatment projects, construction of temporary tailings storage areas, floodplain grading/channel realignment, armoring of road sides, and revegetation of stream banks.

Most of the Pine Creek restoration projects that are described in this report are being accomplished through a partnership between the BLM and the Trustees. BLM provides staff and administrative resources and the Trustees

provide funding for contracts, materials and supplies. At several of the culvert restoration sites, Shoshone County has contributed to project completion.

The natural resource injuries that are being partially addressed by the restoration of Pine Creek include; riparian resources, surface waters, and fish. The restoration will result in direct improvements in riparian resources and indirect improvements in surface waters, and fish. These improvements will contribute to the replacement/restoration of resources injured and the associated services lost due to mining and mining-related activities in the CdA Basin.

The objectives of the Pine Creek restoration are to: control sediment sources, stabilize channel deposits in place to the degree possible, and reestablish a riparian forest. In 2007, the BLM conducted restoration at seven specific locations within the West Fork, East Fork, and mainstem Pine Creek, including: 1) installation of two culverts; 2) treatment of two major streamside sediment sources; and 3) treatment of several stream reaches and floodplains to increase their stability.

LANGLOIS SITE: The largest culvert installation was on Langlois Creek. The pipe was undersized and improperly sloped causing bedload deposition within the culvert. It was also a fish passage barrier and Shoshone County needed to cleanout and maintain the culvert even after moderate runoff events. Following the 1996 flood, the BLM invested flood restoration dollars in Langlois Creek, both up and downstream of this culvert, in part to restore fish passage from the West Fork of Pine Creek.

A bottomless arch pipe with pre-cast concrete footings was installed at the Langlois site in the fall of 2007. The new pipe's capacity is sized to better match the existing channel width, and the installation more closely matches the natural slope and width of the channel. Riprap was used to armor the inlet, and to construct buried rock grade controls to prevent channel incision within and downstream of the culvert. Shoshone County joined BLM and the Trustees in accomplishing this project by providing dump trucks to haul needed materials.



Undersized culvert at Langlois Creek Road Crossing, 2007.



Brook trout.



Installing replacement culvert at Langlois Creek, November 2007.

PINE CREEK

BUREAU OF LAND MANAGEMENT



Constructing slope protection along Trapper Creek, 2007.



Highland Creek floodplain stabilization, October, 2008.



Constructing toe slope protection with onsite materials, near Calusa Creek, August, 2007.

RED CLOUD CREEK: Numerous culverts have failed at the Red Cloud Creek culvert restoration site during past flood events. Since at least 1996, the crossing had been a rocked ford that was a constant source of fine sediment into Red Cloud and Highland Creeks, as well as a driving hazard under icy conditions and high flows.

A new culvert was installed at the stream crossing, together with an armored, drive-able dip for overflow. The culvert was sized to accommodate up to a two-year event, with excess flows directed across the rocked, overflow dip. Upstream of the culvert inlet, several rock grade controls were installed to improve inlet efficiency.

CALUSA AND TRAPPER CREEKS: At a site on Calusa Creek near its confluence Pine Creek, and at another site on Trapper Creek, steep hillslopes were eroding into the stream. These eroding hillslopes were treated using onsite materials, primarily trees, with some boulders added for ballast. An excavator was used to install large diameter tree

stems vertically. The stems were buried well below the estimated scour depth (similar to wooden pilings). Additional trees were positioned between the pilings to trap debris, provide fish habitat, and to reduce high flow velocities and prevent scour along the base of the hillslopes. Other stream work along Trapper and Calusa Creeks includes flood plain stabilization using large woody debris, rock, and riparian plantings.



Rock bars on West Fork of Pine Creek, November, 2007.



Flow deflection from rock bars at high flow, West Fork of Pine Creek, May, 2008.

WEST FORK FLOW DEFLECTORS (STREAM BARBS):

A series of five rock bars were constructed to reduce bank erosion adjacent to the county road along the West Fork of Pine Creek. Onsite materials were used, including re-setting of boulders that had eroded away from the bank during previous floods.

In 2008, numerous locations within the Pine Creek watershed were treated. The treatments included: 1) stabilization and enhancement of critical sites through flood-plain placement of large wood and riparian revegetation; and 2) erosion reduction and drainage improvement along streamside roads, particularly along Highland Creek. The wood placement sites were disbursed along Highland Creek and the East Fork of Pine Creek, focusing on locations where a source of dead or dying trees was available, equipment access was feasible, and the area was suitable for restoration.

HIGHLAND CREEK ROAD: Debris jams in Highland Creek diverted overbank flows down portions of Highland Creek road, resulting in extensive road surface erosion and sediment delivery to Highland Creek. The wood in the debris jam was redistributed and stabilized. Road drainage features were re-established with a grader, and additional rolling dips were installed at appropriate locations. Crushed rock was also applied to raise the road and reduce future erosion. Stream restoration work occurred in

several specific locations along a two-mile stretch of riparian road.

PINE CREEK

BUREAU OF LAND MANAGEMENT

From 2007 to 2008, the Trustees allocated approximately \$129,000 from the AETF to the Pine Creek projects. These are not total project costs and are only those reimbursed by the AETF. The BLM contributed funds that are not reflected here for completing some of the restoration design and contracting. Shoshone County also contributed equipment and personnel time to help complete one of the Pine Creek projects as noted above.

BLM personnel visited the sites during and after peak flow events to assess how well the culverts, barbs, and other measures are functioning. After above-normal flows in 2007 and 2008, the restoration measures appear to be functioning well and maintaining stable channel elevations. Monitoring includes photo documentation and surveyed cross-sections or channel profiles where appropriate.



Installing logs and riparian plantings to enhance bank stability on the East Fork of Pine Creek, fall, 2008.

LOWER COEUR D'ALENE RIVER WETLAND RESTORATION

U.S. FISH AND WILDLIFE SERVICE

Thousands of waterfowl use the CdA Basin's wetland habitats for feeding, resting and nesting. These include tundra swans (*Cygnus columbianus*), which primarily use the CdA Basin during spring and fall migrations. Mining practices within the CdA Basin included a history of releases of mining-related metals into the ecosystem. Releases resulted in high concentrations of metals in surface sediments in approximately 95 percent of the palustrine (wetland) habitat in the lower CdA Basin.

Tundra swans using the CdA Basin are exposed to these metals through ingestion of lead-contaminated sediment while feeding. Metals concentrations that swans are exposed to in the CdA Basin are sufficient to cause sickness and death. Tundra swan mortality has been recorded in the CdA Basin since 1929, with some of the highest recorded mortality events occurring in recent years. Yearly mortalities are expected to continue, but at a reduced rate as remediation and restoration activities are implemented to address palustrine habitat contamination.

Within the CdA Basin, the best way to reduce tundra swan mortality due to exposure to metals-contaminated sediment is to provide clean wetland habitat with metals concentrations below those known to cause injury.

Providing clean wetland habitat in the CdA Basin could include actions such as cleaning up and restoring existing contaminated wetland habitat and re-establishing clean wetlands in areas that were converted for agricultural use. The U.S. Environmental Protection Agency (EPA) Basin Operable Unit 3 Record of Decision (ROD) uses these methods to aid in achieving the goal of protection of waterfowl. The ROD outlines cleanup actions within the CdA Basin that would provide 4,500 acres of safe waterfowl feeding areas, including cleaning up approximately 3,000 acres of contaminated palustrine and lacustrine (lake) habitat and clean-up and conversion of 1,500



acres of agricultural lands to wetlands. Supplementing EPA's ROD wetland activities with Trustee restoration of remediated wetlands is an efficient approach for partially addressing injuries to tundra swans caused by mining-related contamination. The natural resource restoration would result in improvements to clean waterfowl feeding habitat in the CdA Basin. These improvements would contribute to the replacement/restoration of resources injured and the associated services lost due to mining and mining-related activities in the CdA Basin.

The U.S. Fish and Wildlife Service (Service) used this approach to work with EPA, private landowners and other stakeholders to identify land parcels within the CdA Basin that would be ideal for clean-up and restoration actions benefitting tundra swans.

A portion of an agricultural property near Lane, Idaho, in the central lower CdA Basin was identified as one such parcel. EPA purchased a 396-acre conservation easement from the land owner in 2006 with Superfund settlement monies as the first step to remediate and convert the easement area into a protected, functioning wetland. EPA has since involved stakeholders in remedial planning for the site, which includes, but is not limited to, soils remediation and installation of infrastructure allowing the easement area to be managed as wetlands. EPA's remedial costs from 2006 through 2008 were approximately \$2,915,000. These EPA estimated costs



The Service recently recorded thousands of waterfowl using the new Coeur d'Alene Basin wetland restoration site.

are not the total project costs as remedial activities at the site are continuing.

The Service has two main roles at the site. The first is to provide technical assistance to EPA during the remedial design process. The involvement of restoration planners in the remedial design process will help expedite implementation of the restoration. The second is to plan and implement wetland restoration and maintenance activities on behalf of the Trustees. These activities include, for example, developing short and long-term management plans for the property, identifying a long-term easement holder and operations and maintenance manager, and restoring and managing vegetation and the hydrologic cycle. The Trustees, led by the Service, have been using Natural Resource Damage Assessment settlement funds to work with EPA, Ducks Unlimited (DU) and the land owner to conduct restoration planning and activities following EPA remediation.

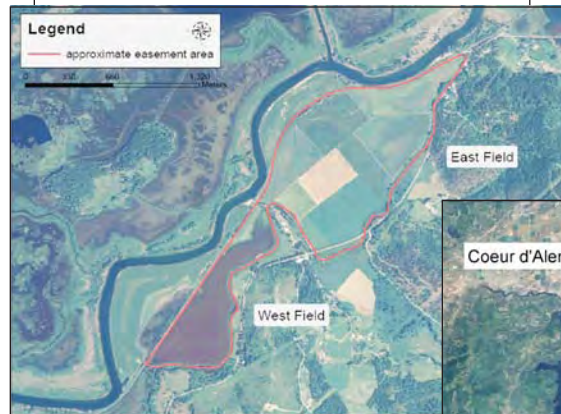
LOWER COEUR D'ALENE RIVER WETLAND RESTORATION

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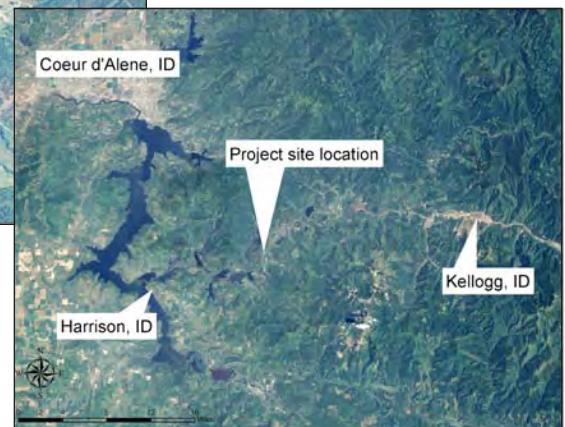
The easement area consists of two large adjacent fields (east and west Field). The remediation and restoration to convert the agricultural area to high-quality wetlands is a multi-year process that requires finding solutions to complex challenges.

The natural resource restoration objectives of this project include: 1) restoration of shallow, semi-permanent, palustrine, emergent wetland habitat that will provide high quality foraging habitat for waterfowl, particularly tundra swans; and 2) restoration of vegetation in adjacent upland meadow and riparian forest habitat.

To guide restoration activities at the site between 2007 and 2009, a preliminary restoration plan (Plan) was developed by the Service and others to outline project objectives, activities, partner responsibilities, and to estimate project costs. A baseline vegetation survey of the east field was completed by Service with the assistance of DU. The purpose of this survey was to identify areas where native plants predominated and areas in need of noxious weed treatment. The east field was mostly a monotypic stand of reed canary grass with several patches of predominately native species. The native species patches were located and documented using GPS coordinates. To begin native plant restoration, the east field was mowed to a height of four to six inches, mainly to improve the effectiveness of herbicide application in killing reed canary grass. In the fall of 2007, about 300 acres of the east field were sprayed with the herbicide, RT Master II, at a rate of 60 oz/acre under an approved Service Pesticide Use Proposal. A surfactant, Class Act Next Generation, was also used. Areas with predominantly native wetland plants were not mowed or sprayed.



Coeur d'Alene Basin wetland restoration, project site location and easement area.



Within two weeks of spraying, much of the sprayed vegetation appeared to be dead. Riparian planting and fencing materials were purchased in December of 2007 for installation in 2008 along the east field site of the Trail of the Coeur d'Alenes.

The Plan developed in 2007 continued to guide restoration of the east field in 2008. The Coeur d'Alene River flood events in April and May of 2008, however, caused damage to project infrastructure, which required completion of unanticipated tasks. Flood response and repair work included: monitoring flooding at the site, adjusting water intake and outlet structures to manage flood levels, raising the dike elevation in selected areas to protect water management infrastructure, and repair of the Canary Creek levee breach and the damage to the Robinson Creek levee caused by wave action and high flood water levels.

In 2008, water management and monitoring activities included inspecting, cleaning, and operating inlet and outlet structures, monitoring water levels in the Coeur d'Alene River, Robinson Creek and Canary Creek, and regular inspection of the levees during high river flows. As part of the effort to control reed canary grass and other undesirable

vegetation in the east field, 100 acres were sprayed with the same herbicide and surfactant used in 2007. Areas with desirable native species were not sprayed. Approximately 100 acres of the field was also rototilled as part of the attempt to eradicate reed canary grass.

During the fall, riparian trees and shrubs were planted in clusters within four designated riparian zones along the northern boundary of the east field. Trees and shrubs were planted in clusters, a portion of which were enclosed in wire mesh for protection from large herbivores. Scheduled levee plantings for 2008 were postponed to 2009 so that flood repair work on the Robinson Creek levee could be completed.

Separate native grass seed mixes were developed for upland and wet meadow areas and planted. Upland seeding was completed in all of the riparian zones where treatment for the control of weedy species had been completed. Wild rice seed was also spread by hand in several locations around the east field. Vegetation monitoring was conducted throughout the growing season to

LOWER COEUR D'ALENE RIVER WETLAND RESTORATION

U.S. FISH AND WILDLIFE SERVICE

document vegetative response. The purpose of the monitoring was to refine the timing and extent of scheduled treatments and to move toward the desired plant communities outlined in the Plan.

Maintenance tasks on a constructed island and an area with improper drainage were also conducted in 2008. As part of remedial work, an island was constructed within the east field to make the site more attractive to swans and other waterfowl. The top elevation of the island within the east field was several feet higher than the maximum operating level waterline. This created a condition where swans had a restricted view of the area near the island, possibly making it less desirable habitat for them. To create conditions more attractive to waterfowl, the elevation of the island was lowered. Two shallow depressions located on the north side of the east field were enhanced by improving the capability to manage water levels. The contour of the land did not allow these depressions to drain, and they retained substantial standing water well into summer. This lack of drainage prevented effective use of the planned control measures for reed canary grass in these areas. To remedy this situation, a swale system and water control structure were designed and installed to allow nearly complete drainage of these areas when desired.

Remediation of the 100-acre west field by EPA is expected to take place in 2009. The Service obtained soil chemistry data in 2007 to characterize the nature and extent of contamination present in the west field. This information is helping to guide EPA toward efficient remediation at the site.

The Trustees continue to engage restoration planning partners in the development of an interim restoration plan for the west field. The Trustees expect to engage in full-scale restoration

of the west field beginning in 2010. Restoration activities in the west field will result in the enhancement and management of approximately 85 wetland and 15 upland acres directly benefitting tundra swans. Major restoration activities within the east and west field are expected to occur through 2011 or 2012.

From 2007 to 2008, the Trustees allocated approximately \$400,000 from the AETF to this wetland restoration project. These are not total project restoration cost. These costs also do not include the funds that have or will be spent by EPA to complete remediation. The restoration at the site is on-going and future funding will also be needed to complete easement and restoration project monitoring and maintenance. The Trustees have discussed using a portion of NRDA settlement funding to set up an interest bearing operation, maintenance and monitoring fund. These funds would be used to monitor the easement and ensure that it is being continually managed as a high quality wetland complex.

As of December 2008, 245 acres of wetland, and 45 acres of upland in the east field have been enhanced through NRDAR activities.

Enhancement continues through vegetation and water management. The Service is monitoring waterfowl use, which is expected to increase as restoration progresses. During the spring 2008 migration, the Service counted 2,867 waterfowl in the west field, including 499 tundra swan counts. As with the east field, restoration enhancements are expected to increase the use of the west field by tundra swans and other waterfowl. Vegetation management and waterfowl use monitoring will continue in the future to help evaluate the success of remediation and restoration in providing services to tundra swans.



East field agricultural ditchfilling, summer, 2007.



East field swale construction, August, 2007.



East field water control structure construction, September, 2007.

HEPTON LAKE

COEUR D'ALENE TRIBE

The Hepton Lake property lies within the St. Joe River Valley approximately three miles west of the town of St. Maries, Idaho. The property is tribally owned and is within the exterior boundaries of the CdA Tribe Reservation.

The property consists of 1,350 acres, 1,187 of which are enrolled in the Natural Resource Conservation Service's (NRCS) Wetland Reserve Program (WRP). The area was once lowland pasture, as can be seen from aerial photos from as early as 1933.

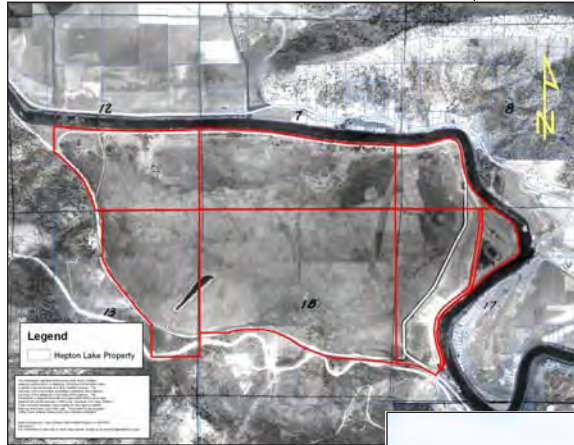
The lake was created when the dike between the St. Joe River and the lowland pasture was breached during heavy flooding in 1996. Most of the property is currently flooded pasture lands, consisting of large expanses of open water intermixed with emergent wetlands.

The CdA Tribe will continue to work with other NRDA Trustees throughout the life of this project. Other partners include: Nature Resource Conservation Service, private land-owner adjacent to the property, and Benewah County Planning and Zoning Department.

The natural resource injuries that are being partially addressed by the restoration of Hepton Lake include: migratory waterfowl, riparian resources, surface waters, adfluvial fish, and benthic macroinvertebrates. The restoration would result in direct improvements in riparian resources and indirect improvements in surface waters, adfluvial fish, tundra swans, and benthic macroinvertebrates. These improvements would contribute to the replacement/restoration of resources injured and the associated services lost due to mining and mining-related activities in the CdA Basin.

Objectives for the property are to:

- 1) Restore seasonal hydrology that more closely mimics the natural flood pulse;
- 2) increase wetland diversity and maximize



1933 aerial view of the Hepton Lake property.

wildlife habitat; 3) reestablish native plant communities; 4) reduce higher water temperature inputs from Hepton Lake into the St. Joe River; and 5) separate warm water fish species within Hepton Lake from the cold water fish species of the St. Joe River.

Accomplishment of these objectives would likely require constructing a water control structure, possible excavation or island construction, and planting of wetland and riparian species to restore emergent, scrub-shrub and forested wetlands.

In 2007 the following work was completed: cleanup of eastern portion of property including removal of old machinery, buildings, farm equipment; wetland delineation (performed by a consultant); bathymetry survey performed on the lake bottom; and preliminary fisheries assessment of Hepton Lake. Species found during the survey included black crappie, largemouth bass, yellow perch, pumpkinseed sunfish, brown bullhead, and tench.



Current view of the Hepton Lake property.

The following reports were submitted by the consultant for work that was conducted in 2007.

- Wetland Delineation and Preliminary Jurisdictional Determination, 10/2007
- Wetland Lake Hydrology, 10/2007
- Wetland Functional Assessment, 11/2007
- Hepton Lake Wetland Restoration Conceptual Design Alternatives, 11/2007

HEPTON LAKE

COEUR D'ALENE TRIBE



Eastern portion of property.

DEVELOPMENT OF MANAGEMENT PLAN:

Most of the work accomplished in 2008 centered on the development of the Management Plan for the property. An assessment was performed to gather more information on existing conditions of the property in 2007 and 2008. An additional analysis of levee system and a hydrologic assessment of the property will be conducted in 2009 before the management plan is finalized.

FISHERIES ASSESSMENT: Fish were sampled to determine species composition and relative abundance in late July and early August 2008. Data collected included estimated depth of capture, total length, and weight. Similar species were found during the 2007 and 2008 sampling efforts. Preliminary results of the 2008 length/weight data indicate there are annual differences in the size of the fish. Once the drawdown of Coeur d'Alene Lake begins in the fall, the depth of water in Hepton Lake appears to be insufficient to support mature fish. Larger fish most likely move into the St. Joe River and lower Coeur d'Alene Lake in September, and then move back into Hepton Lake when water levels begin to rise in the spring.



Fisheries sampling.

WATER QUALITY ASSESSMENT: A water level logger was deployed in the lake in early spring 2008. It recorded the water elevation during the spring flooding and through the fall drawdown. Temperature loggers and a hydrolab were also deployed throughout the summer of 2008. The water temperature data show that daytime temperatures climbed to near 27 degrees Celsius in mid-August. These temperatures would be too warm to support native salmonids. Dissolved oxygen (DO) levels did appear to remain high enough throughout the summer to support fish. As the summer progresses turbidity and temperature increases while DO declines. These combined water quality conditions can result in fish mortality.

From 2007 to 2008, the Trustees allocated approximately \$310,000 from the AETF to the Hepton Lake wetland restoration project. These are not total project cost and are only those funded by the AETF.

The Tribe has contributed funds that are not reflected here to complete some of the tasks associated with lake condition assessments and project design.

Water quality monitoring of DO, temperature, turbidity will occur throughout the life of the project. Monitoring of restoration work (e.g., vegetative planting) will be determined during the planning process after the 2009 field season.

REFERENCES

Department of Interior, Fish and Wildlife Service and Bureau of Land Management; Department of Agriculture, Forest Service; Coeur d'Alene Tribe. 2007. Coeur d'Alene Basin Final Interim Restoration Plan and Environmental Assessment; and Finding of No Significant Impact Under the National Environmental Policy Act. United States Department of the Interior, U.S. Fish and Wildlife Service, Upper Columbia Fish and Wildlife Office, Spokane, WA.

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U.S. Department of the Interior, Fish and Wildlife Service, U.S. Department of Agriculture, Forest Service, and the Coeur d'Alene Tribe. 2007. Coeur d'Alene Basin Final Interim Restoration Plan and Environmental Assessment. Portland, Oregon.

The *Coeur d'Alene Basin Natural Resource Damage Assessment and Restoration Accomplishments: Restoration Activities 2007-2008 Report* is also available online at: <http://www.fws.gov/pacific/ecoservices/envicon/nrda/restoration.html>.

Adobe Acrobat Reader is required to view or download this 12 MB file.