

# 2008 ANNUAL REPORT



## *Basin Environmental Improvement Project Commission*

February 2009

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## *Executive Summary*

The Basin Environmental Improvement Project Commission (BEIPC) is a locally based organization responsible for overseeing environmental cleanup to address heavy metal contamination, natural resource restoration and water quality in the Coeur d'Alene Basin (Basin). The BEIPC also participates in securing funding along with guiding and coordinating infrastructure upgrades and improvements to protect the environmental cleanup remedy and enhance living conditions in the communities of the Basin. The Basin is defined as the watersheds of the Coeur d'Alene River, Coeur d'Alene Lake and the Spokane River within the Counties of Shoshone, Kootenai, and Benewah, as well as the Coeur d'Alene Tribal Reservation within Idaho.

During Calendar Year 2008, the BEIPC continued implementation of an updated five-year operating plan; developed annual and updated five-year work plans for work funded through the Superfund, other cleanup appropriations, and Clean Water Act (CWA) grants; and monitored project accomplishments by various implementing entities. CWA work was managed by BEIPC staff from grants made by the U.S. Environmental Protection Agency (EPA) to the State of Idaho Department of Environmental Quality (IDEQ) acting as the BEIPC fiscal agent. The BEIPC continued with development of a consolidated Upper Basin drainage control and infrastructure revitalization plan to deal with potential damage to remediated areas and other infrastructure needs.



**South Fork - CDA River**

## ***BEIPC Overview***

### **Authorization and Duties**

The BEIPC was established by the Idaho State Legislature and implemented through a Memorandum of Agreement (MOA) among implementing parties to direct, and/or coordinate environmental remediation, natural resource restoration, and related measures to address water quality and heavy metal contamination in the Basin.

The Basin is considered to be Operable Unit 3 (OU-3) of the Bunker Hill Mining and Metallurgical Complex Superfund Facility, originally listed on the National Priorities List in 1983. Operable Units 1 and 2 (OU-1&2) are the populated, industrial, and undeveloped areas in what is known as the “Bunker Hill Box.” The EPA and IDEQ are the implementing agencies for OU-1&2.

The BEIPC’s primary purpose is to work with the EPA and IDEQ to implement the Record of Decision (ROD) for OU-3 designed to advance the cleanup of heavy metals contamination throughout the Basin. In addition, the BEIPC is involved in:

- Implementing Phase II of the OU-2 remedy;
- Coeur d’Alene Lake management planning and implementation;
- Heavy metal contamination cleanup efforts at mining sites in the North Fork of the Coeur d’Alene River; and
- Development of a Drainage Control and Infrastructure Revitalization Plan for the Upper Basin.

Legislation creating the BEIPC authorized appointment of a seven-member board comprised of:

- Four members from Idaho, one representing the state, and one each representing the county commissions from Shoshone, Kootenai, and Benewah Counties, appointed by the Governor of Idaho;
- One representative of the state of Washington appointed by the Governor of Washington;
- One tribal council member of the Coeur d’Alene Tribe appointed by the council of the Coeur d’Alene Tribe; and
- One federal representative of the United States appointed by the President.

Implementing language directed the BEIPC to appoint an Executive Director to manage the activities of the BEIPC. The Executive Director is Terry Harwood.

## **Current BEIPC Membership**

<b>Name</b>	<b>Title</b>	<b>Representing</b>
Jon Cantamessa, Chair	Shoshone County Commissioner	Shoshone County
Jack Buell	Benewah County Commissioner	Benewah County
Rick Currie, Vice Chair	Kootenai County Commissioner	Kootenai County
Chief Allan	Chairman, Tribal Council	Coeur d'Alene Tribe
Jay Manning	Director, Washington Department of Ecology	State of Washington
Toni Hardesty	Director, Idaho Department of Environmental Quality	State of Idaho
Elin Miller	Regional Administrator, R-10 EPA	Federal Government

## ***Program Management***

The BEIPC operates in accordance with the Idaho statute and the MOA between the governing entities. It is responsible for coordinating the activities of federal, tribal, state and local government agencies implementing the Record of Decision (ROD) for Operable Unit 3 (OU-3) and is also involved in the coordination of efforts to protect the cleanup remedies, human health, and the environment from the release and migration of contaminants through the implementation of Institutional Controls in the Basin and development of a Drainage Control and Infrastructure Revitalization Plan for the Upper Basin communities. The BEIPC works with these agencies to establish annual work priorities and operating plans and provides project oversight and fiscal management for the Clean Water Act (CWA) research and demonstration project program through the office of its Executive Director and his staff. The office of the Executive Director is also involved in the development of a consolidated infrastructure inventory and revitalization plan for the Upper Basin communities and analysis of the potential for stormwater runoff damage to remediated areas as part of a program to protect and enhance the Superfund remedy in those communities. To assist the Executive Director in program management, planning, and implementation, volunteer staff "on loan" to the BEIPC from the states of Idaho and Washington, the EPA, and the Coeur d'Alene Tribe coordinate with the Executive Director and provide routine intergovernmental input on technical and policy issues. Other support groups include the Technical Leadership Group (TLG) and the Citizens Coordinating Council (CCC).

### **Technical Leadership Group (TLG)**

The TLG with its Project Focus Teams (PFTs) is the BEIPC primary technical advisory group. It is comprised of federal, state, local and tribal representatives as well as interested private citizens on the PFTs who provide expertise in science, engineering, logistics, regulatory aspects, and land management in the Basin. The TLG advises the BEIPC on work planning and implementation while striving toward consensus-based recommendations. In 2008, the PFTs and TLG developed the 2009-2013 Five-Year and Calendar Year 2009



draft work plans, reviewed and approved CWA project changes, final CWA project reports and deliverables, and studied and developed project and program proposals to implement the remedy in OU-2 and 3. The TLG is currently composed of representatives from 23 governmental entities.

### **Citizens Coordinating Council (CCC)**

The CCC serves as an information conduit to and from the BEIPC on citizen, community, and special interest issues, and on environmental cleanup and restoration concerns. It is comprised of politically and geographically diverse members and was established to provide local citizen review and input on Basin related work to the BEIPC.

### **Community Involvement**

During Calendar Year 2008, the BEIPC held meetings and deliberations open to the public and maintained an up-to-date Basin website at: [www.basincommission.com](http://www.basincommission.com). Meetings were held at various locations within the Basin with locations and dates posted in local newspapers and at the BEIPC office in Kellogg, Idaho. In August, the BEIPC held a field tour and provided public transportation to various sites in the Upper Basin where agencies were performing environmental cleanup activities. EPA, IDEQ and the BEIPC held a community open house in July to discuss the continuing development of the East Mission Flats Repository.



**August BEIPC Tour at Rex Mine/Mill Site**

## ***Public Outreach and Citizen Involvement***

To encourage public participation in Basin improvement projects, the BEIPC issues news releases and posts announcements of its upcoming meetings to its website. The public is invited to BEIPC and CCC meetings. General public comment opportunities are scheduled at each meeting.

### **Citizens Coordinating Council Meetings and Communication**

Citizens Coordinating Council (CCC) meetings were held in February, April, and October 2008. (Although the CCC typically meets quarterly, there was no summer meeting because the Basin Commission board met for a tour of the Basin rather than for a regular meeting). All meetings were open to the public. At the CCC meetings, members were updated on ongoing BEIPC and TLG activities and asked to provide input on a variety of issues. The CCC informed the BEIPC of its activities by providing meeting minutes and comments to Commissioners prior to BEIPC meetings and by making presentations at BEIPC meetings. When appropriate, CCC comments were also provided to the TLG.

Once or twice a month, CCC members were provided with email and/or U.S. mail updates on relevant activities in the Basin. CCC members were also routinely provided notes from regular TLG conference calls.

### **Chronology of Selected Citizen Input through the Citizens Coordinating Council to the Technical Leadership Group and the BEIPC in 2008**

#### **January-February**

- CCC members reviewed, discussed, and provided comments on the draft 2008-2012 BEIPC Five-Year Plan and draft 2008 Work Plan.
- The CCC Chair presented the results of the February CCC meeting to the BEIPC.

#### **March-April**

- A number of CCC members joined the newly formed Communications PFT.
- CCC members were invited to attend a Repository PFT meeting as observers (some CCC members are also members of the PFT).

#### **May**

- The CCC Chair presented the results of the April CCC meeting to the BEIPC.

#### **July**

- CCC members participated in the East Mission Flats Repository Community Open House to inform participants about the work of the CCC and Basin Commission and to help interested citizens join the CCC.
- CCC members were encouraged to comment on the draft Lake Management Plan.
- CCC members commented on the design and content of the BEIPC brochure developed by the Communications PFT.



## **August**

- CCC members were encouraged to comment on the East Mission Flats 60% design document and on proposed revisions to the BEIPC meeting guidelines.
- CCC members were invited to attend the BEIPC field tour.

## **October**

- CCC members reviewed, discussed, and provided comments on the draft 2009-2013 BEIPC Five-Year Plan and the draft 2009 BEIPC Work Plan.

## **November**

- The CCC Vice-chair presented the results of the October CCC meeting to the BEIPC.
- CCC members attended free training on “Building Trust and Resolving Differences” provided by the EPA and sponsored by the BEIPC Communications PFT.

## **December**

- CCC members participated in meetings held by EPA to prioritize cleanup activities for the Upper Basin and prepare for a proposed OU2/OU3 ROD amendment.

## **Additional Outreach Activities**

In addition to the activities of the CCC, the various governmental entities represented by the BEIPC continue to support the TLG and CCC by being involved in the activities of those groups. The governmental entities have been involved in outreach activities including meeting with citizen groups, giving technical presentations, participating in Basin events, holding tours of Basin project areas, maintaining information repositories throughout the Basin, and publishing various information documents to provide updates on Basin activities and to give answers to common environmental cleanup and improvement questions.

As part of the public outreach program, the BEIPC Executive Director continued to make numerous presentations to local business and community groups concerning activities of the BEIPC and planned cleanup actions and activities required to protect the remedy, human health, and the environment. The Executive Director also hosted a number of field reviews by Congressional staff, media and other interested parties.

## ***Calendar Year 2008 Work Accomplishments***

### **Work Funded Through Federal Superfund Or Other Cleanup Funding:**

#### **Blood Lead Screening in Children**

The Basin blood lead testing was conducted in July 2008. Seventy-three children were tested as part of the program. The numbers are comparable to the 71 tested in 2007 and 69 tested in 2006. As in previous years, parents were offered a \$20 incentive for each child tested. The Blood Lead Testing is part of the Panhandle Health District's Health Intervention Program. Parents of children testing high are notified of the results and

offered an in-home health consultation to identify ways to reduce exposures to lead in the home. Results of the blood lead levels from the testing program will be presented to the BEIPC at the February 2009 meeting.

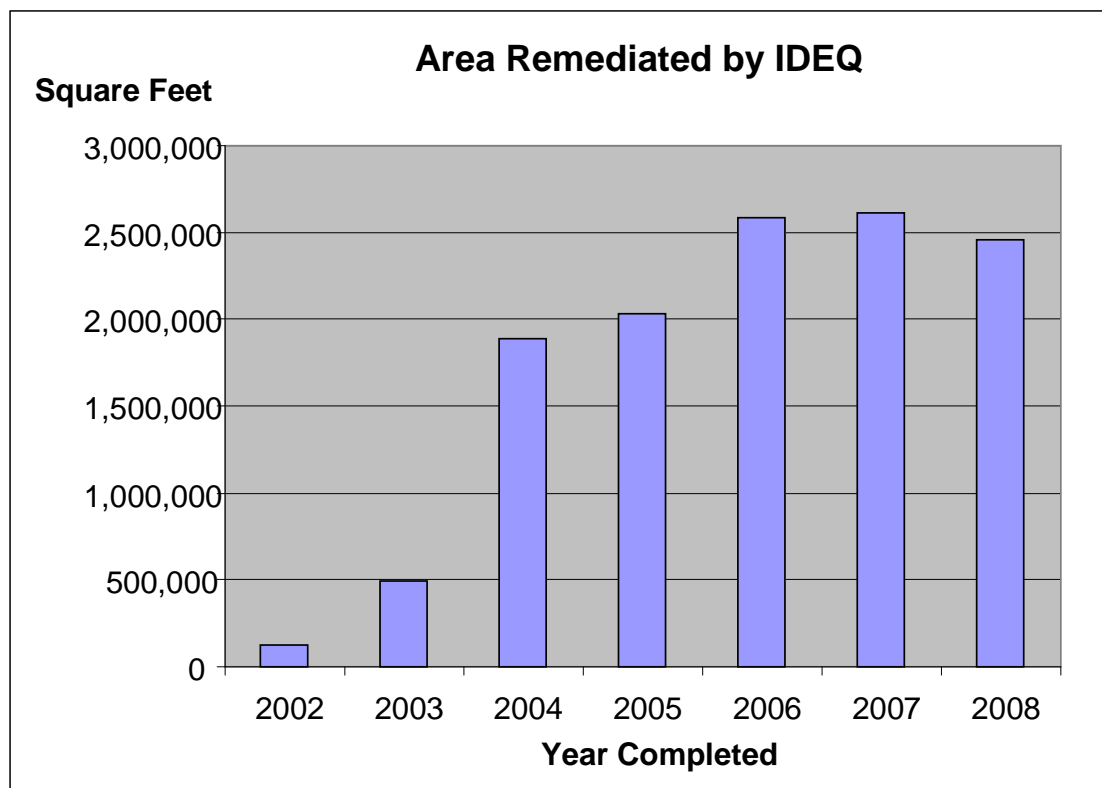
### **Basin Property Remediation Program (BPRP)**

In 2008, IDEQ remediated 524 residential and commercial properties through a cooperative agreement funded by the EPA and the State of Idaho. The two contractors excavated 68,617 cubic yards of waste soils and disposed of them in the Big Creek Repository. Final in-place, compacted volumes in the repository were not available at the time this report was written.

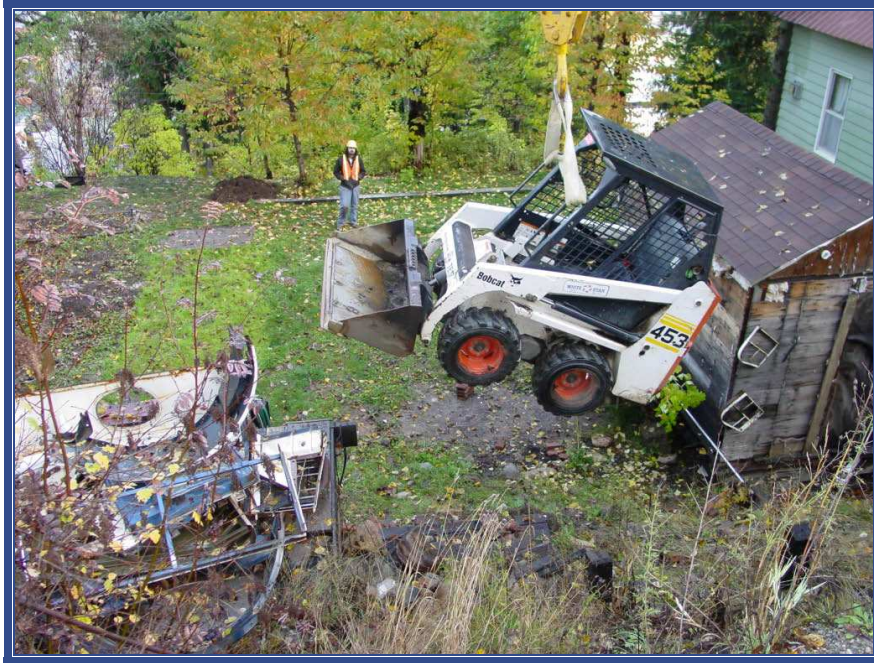
Year	Number Properties	Area Reclaimed (Acres)	Waste Excavated/Disposed (cubic yards)
2007	543	60	76,291
2008	524	57	68,617

\*Note: Disposal volume is derived from property invoices.

Sixty-five (65) of the 2008 remediated sites were considered high risk properties where the exposure risk was elevated because of the presence of small children and/or pregnant women. The Big Creek Repository accepted waste from the BPRP and the Institutional Control Program (ICP). During 2008, the BPRP deposited 8,129 truck loads and the ICP 406 truck loads in the Big Creek Repository. The total cost of the 2008 program was again near \$14,000,000.



Each year, IDEQ consultants collect soil samples and send them in for analysis to determine which properties will require remediation in the future. This sampling is the basis for the out-year BPRP.



**Property Remediation in a Difficult Location**



**Completed Property Remediation at Trailer Park**

## **Repositories**

### **Big Creek Repository**

Disposal of wastes for the Basin cleanup continued during 2008 at the Big Creek Repository (BCR). This repository is being developed on a reclaimed tailings pond near the confluence of Big Creek and the South Fork of the Coeur d'Alene River. While IDEQ and EPA collaboratively manage the site, IDEQ, with funds from EPA, continues to fill the lead role in daily management and construction activities.

During 2008, the Basin Property Remediation Program (BPRP) generated approximately 68,600 cubic yards of excavated contaminated materials from many sites. This material was placed and compacted at the BCR. IDEQ cleanup contractors hauling waste to the BCR are responsible for dumping their waste in designated areas and performing the appropriate decontamination on their haul vehicles. IDEQ's site management contractor oversees these activities. In 2008, the water quality monitoring program at the site found that it had not impacted adjacent surface or ground waters, some of which were previously impacted by historic mining activities.

The Institutional Controls Program (ICP) waste delivery area at the BCR is open 24 hours a day for seven days a week to accept wastes generated from compliance with the ICP. When that area is filled, it is emptied and the material is moved to the repository for final disposition. Large volumes of ICP wastes generated from excavation projects associated with major property development or infrastructure work can be hauled directly to the BCR in coordination with IDEQ and the BPRP.

A preliminary study to evaluate additional storage capacity at the north end of BCR was performed in 2008. The potential additional waste volume was estimated in the range of 25,000 cubic yards. This estimate assumed northward extension of the fill at a 3:1 slope to the existing power lines. Setbacks on the north side for access to monitoring wells MW-01 and MW-02 would reduce this volume. Due to the relatively small anticipated gain and level of effort necessary to survey and engineer the addition, the north side expansion was tabled.

### **New Repositories**

Activity in 2008 centered on design of the East Mission Flats (EMF) repository. This work was a continuation of the 30% Design Report completed in 2007. A summary of the tasks completed in 2008 for the EMF repository is as follows:

- Completion of the Phase I Design Report in February. This design phase was advanced from the overall repository design process to facilitate opening EMF to receive Lower Basin ICP waste in 2008. The repository received the first load of ICP waste in October.
- A Public Open House was hosted at Canyon School near Cataldo on July 31. The Open House presented information on the 60% Design Report, and was staffed by members of IDEQ and its contractor. The Open House commenced a 37-day period for the public to communicate suggestions on the 60% Design Report to IDEQ.
- Completion of the 60% Design Report in August. The 60% Design Report incorporated several changes from the 30% Design Report: (1) reduction in height from 62 feet to 34 feet, thus reducing capacity from 668,000 to 416,000 cubic yards. This change was made due to public input at the 30% Design stage; (2) change in the perimeter protection system design, so the system may be constructed as soon as portions of the repository reach an elevation of 2,152 feet. This will minimize the potential for erosion due to flooding at the site; (3) installation of a key-card gate to control access to the ICP disposal area.



Panhandle Health District (PHD) will manage distribution and tracking of the key-cards; and (4) purchase of an additional four-acre parcel to consolidate land ownership in the repository area.

- Reconfiguration of the EMF entrance in August in response to East Side Highway District (ESHD) concerns. The selected entrance alternative will involve construction of a bridge from the north side of Interstate 90, Exit 39 to the site, thus avoiding excess truck traffic on roads managed by the ESHD.
- Posted the Response to Suggestions (RST) on the 60% Design Report in October. The RST responded to 26 suggestions forwarded by the public and State and Tribal agencies.
- Continuation of the 90% Design process. The Draft 90% Design Report is scheduled for completion on December 31. Construction on the bridge entrance to EMF is forecast for completion in Fall 2009, with full operational capability in late 2009 or 2010.

In addition to the EMF site-work, initial work was undertaken to locate a new repository site in the Upper Basin. The BCR will be at capacity in three to five years, and a new repository will be needed prior to complete filling at BCR. Specific tasks completed in support of this objective included:

- Consolidation of the 2002 and 2005 repository site screening reports prepared by IDEQ contractors;
- Meeting with County officials to discuss repository siting objectives and opportunities to coordinate repository siting with economic development.



**Waste Disposal at Big Creek**

## Recreational Use Areas

The ROD for OU-3 states that developed recreational areas such as boat ramps, picnic areas, and campgrounds with surface soils containing elevated metals concentrations (lead > 700 mg/kg and arsenic > 100 mg/kg) will be remediated. The EPA can use its CERCLA funding to remediate state, county, or local government owned recreational properties. However, EPA CERCLA funding cannot be used for sites on federal land managed by the Forest Service and the BLM. The primary challenge for the Recreational Area Project Focus Team (PFT) is successful identification of properties on which EPA or the State can conduct remedial actions.

In 2008, the agencies that manage and operate recreation areas along the Lower Coeur d'Alene River developed guidelines to address contaminated sediment deposited on remediated sites during high water events. The guidelines focus on the following issues:

- When should a recreation site be closed due to deposition of contaminated sediment;
- What sites/areas are to be cleaned-up after flood water recedes;
- How are sites to be cleaned-up; and
- How to ensure effective coordination and communication among agencies.

At this time, the focus is purposely narrowed along the river corridor knowing this will be a dynamic and iterative process allowing for the expansion of this effort as agreed upon over time. Different guidelines may be developed in the future to address problems from high water events along Coeur d'Alene Lake.

Work continued on the draft Recreation Management Strategy and Guidelines (RMSG). This document will serve as a guide for agencies and organizations that develop and manage recreational use facilities. It will help to better coordinate their activities by maximizing limited resources and avoiding duplication of efforts. As part of this task, a recreation trends use analysis has been completed along with a comprehensive recreation sites inventory. The inventory spreadsheet includes both established and developed sites, as well as dispersed use areas. The inventory information has been incorporated into a GIS data base. A few sample maps have been produced to display potential applications. The PFT is currently working on the draft table of contents and list of appendices for the RMSG.



**Contaminated Sediment Deposition at Remediated Recreation Area**

### **Evaluation of Pre-ROD OU-3 CERCLA Removal Actions**

Various parties have performed CERCLA removal actions in Basin sub-watersheds including Canyon, Ninemile, Pine, Moon, and Grouse Creeks and along the Upper South Fork and Lower Main Coeur d'Alene River to clean up contamination, protect human health and restore ecological systems. In 2008, existing information for these sites was collected and incorporated into a tool for prioritizing the mine and mill site work. This will facilitate the review of existing information and prioritization of these sites for further data collection in order to evaluate the status of these sites in the context of the OU-3 ROD and ROD Amendment, and if warranted, incorporation into the OU-3 remedial action program.

### **Upper Basin Ecological Remedies**

During 2008, additional information was collected in the Upper Basin to support a prioritization effort and development of alternatives for an Upper Basin ROD Amendment. This work included high and low flow synoptic sampling in the Upper Basin, continued remedial action effectiveness monitoring at Mine and Mill sites where cleanup has been completed, focused field work in Osburn to delineate the source(s) in this area including installation of new wells, piezometers, and stream gauges, and initiation of field surveys to consolidate information for Mine and Mill sites.



Monitoring data will be used in a decision tool to prioritize work in the Upper Basin. This tool will prioritize sites initially by Zinc and particulate Lead concentrations. Other additional factors can be used in the decision tool as part of an implementation/bucketing process. Input from the TLG, CCC, and other interested parties is being incorporated into this tool.

During 2009, the Prioritization Process will be completed with sites identified for the ROD Amendment. As funds become available, work at priority sites can move forward. Additional monitoring will be conducted during 2009 to provide information for prioritization and alternative selection.

### **Ecological Actions in Lower Basin**

The ecological work described in the OU-3 ROD for the Lower Basin includes actions for the wetlands and lateral lakes, the river banks, splay areas and river bed. The objectives of remediation in the Lower Basin focus on improving wildlife habitat and reducing particulate lead in the Coeur d'Alene River system.

Many other issues and uncertainties pertaining to the implementation of remedial actions in the Lower Basin have been raised. The lack of some data continues to exist pertaining to the complex ecology of the Lower Basin and the combined effects of mining related contamination. Clean Water Act (CWA) subgrants were approved by the BEIPC to provide site-specific information required to make sound ecological remedial management decisions. All of these studies and demonstration projects are now completed.

In April 2006, EPA used Coeur d'Alene Basin Superfund settlement monies to purchase a 396-acre conservation easement with a willing private property owner. The agreement was established to help meet OU-3 ROD goals in establishing safe waterfowl feeding habitat in the Lower Basin as they pertain to metals of concern. Other parties participating in agreement negotiations included the U.S. Fish and Wildlife Service (USFWS) and Ducks Unlimited. Remedial action construction in ~300 acres of the easement started in September 2006 and was completed in 2007 using Asarco Environmental Trust Fund moneys. EPA anticipates completion of the remedial action in the remaining ~100+ acres in 2009. The Coeur d'Alene Basin Natural Resource Trustees have begun wetland restoration. USFWS and Ducks Unlimited will do the restoration work, and USFWS will coordinate maintenance of the site over the long term under the Trustees' 2007 Coeur d'Alene Basin Final Interim Restoration Plan. The restoration work will use Asarco Trust monies and Natural Resource Damage Assessment (NRDA) settlement funds. Through the Superfund remedial action and NRDA restoration activities, contamination is being addressed and this area is being made into perpetually protected, high quality feeding habitat for both migratory and resident swans, ducks, and other wetland bird species.

Despite the large extent of mining-related contamination, resulting negative ecological effects previously documented, and work described in the ROD, no additional remedial action Superfund money is currently designated for Lower Basin ecological remedies. EPA Region 10 is receiving funding for human health remedies in OU-3, but not for Lower Basin ecological remedies. In order to fully implement the interim ROD, funding from the EPA Superfund program and other sources will be needed. The BEIPC will support EPA Region 10 in an effort to secure Superfund funding from EPA Headquarters.



## **Basin Environmental Monitoring**

### **Basin Environmental Monitoring Plan**

The Basin Environmental Monitoring Plan (BEMP) for OU-3 was issued in March 2004 with BEIPC approval. The monitoring program is required under the OU-3 ROD and is critical to the successful implementation and evaluation of the Selected Remedy. The BEMP is designed to obtain technical data for assessment of long-term project status and trends, evaluate overall effectiveness of the Selected Remedy, and evaluate progress toward cleanup benchmarks and future CERCLA five-year reviews.

The BEMP implements the environmental monitoring program established as part of the ecological component of the OU-3 Selected Remedy. The environmental media of focus in the BEMP are surface water, soil/sediment, and biological resources. The major goal of the BEMP is to monitor and evaluate the progress of the remedy in terms of improving ecosystem conditions. Consistent with that goal, the BEMP provides data relative to the following Basin-wide monitoring objectives:

- Assess long-term status and trends of surface water, soil, sediment, and biological resource conditions in the Basin;
- Evaluate the effectiveness of the Selected Remedy;
- Evaluate progress toward cleanup benchmarks;
- Provide data for CERCLA required five-year reviews of the progress on remedy implementation; and
- Improve understanding of Basin processes and variability to improve the effectiveness and efficiency of subsequent remedial action implementation.

BEMP monitoring activities were initiated in CY 2004 and continued in 2008. The U.S. Geological Survey (USGS) conducted surface water sampling and the U.S. Fish and Wildlife Service (USFWS) implemented the biological resource monitoring under Interagency Agreements with EPA. EPA's contractor conducted the sediment sampling in 2008. Biological resource monitoring activities conducted during 2008 included a waterfowl population survey, waterfowl blood lead and fecal sampling, and avian productivity and survivability monitoring. Results from surface water, soil and sediment sampling are included on EPA's web-based environmental data repository for the site at: [www.storet.org](http://www.storet.org). Annual reports for water quality, sediment and biological resource sampling results are available on EPA's web page at: <http://yosemite.epa.gov/r10/cleanup.nsf/sites/cda>.

### **Remedial Action Effectiveness Monitoring**

Remedial action effectiveness monitoring focuses on areas that have been addressed by remedial actions to assess the success and effect of a given remedial action. By comparison, the BEMP will address Basin-wide status and trends by monitoring a limited number of strategic locations. Both the remedial action effectiveness and long-term monitoring plans will be integrated by coordinating monitoring to generate comparable data (same timeframe or synoptic) and using common sampling locations where possible. Effectiveness monitoring, while not detailed in the BEMP, will incorporate similar monitoring hypotheses as those included in the BEMP. The adaptive management approach will maximize the utility of effectiveness monitoring data through comparison of results to expectations.

Remedial action effectiveness monitoring is being included in the designs and implementation plans for OU-3

ecological related remedial actions. In 2008, remedial action effectiveness monitoring plans were implemented for several mine and mill sites including Golconda, Rex and Constitution. In addition, monitoring continued at the Canyon Creek water treatment project and the Success Mine which includes the treatment system. The remedial action effectiveness monitoring continued at the human health related remedial actions recently implemented at the East of Rose Lake Boat Launch and Highway 3/Trail of the Coeur d'Alenes Crossing site.

## **Work Funded Through CWA Grants:**

Funding from the appropriations for Federal Fiscal Years (FY) 2002, 2003, and 2004 under the Clean Water Act (CWA) Section 104(b) (3) was made available for BEIPC project work. Under the CWA, these funds are to be used to demonstrate how *"federal, state, and local agencies can cooperatively conduct and promote the coordination and acceleration of research, investigation, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of pollution."*

The FY 2002 Grant work is complete and closed. Funding available for FY 2003 projects totaled \$1,788,300 and FY 2004, \$1,988,200. A listing of completed project final reports along with a short summary of project purpose and conclusions and findings is posted on the BEIPC website. Copies of the final reports can be obtained at the office of the Executive Director. Following is a summary of work accomplished to date on the 2003 and 2004 projects:

### **FY 2003 Grant Projects**

#### **Woodland Park Groundwater Quality Evaluation**

**Purpose of Project** - Canyon Creek is a tributary to the South Fork Coeur d'Alene River (SFCDA) River. Based on probabilistic modeling, it is estimated that the Canyon Creek drainage contributes approximately 456 pounds per day of dissolved zinc to the SFCDA River. The ROD for OU-3 calls for treatment of up to 60 cubic feet per second of Canyon Creek water. In an effort to develop the most effective alternative for the Canyon Creek drainage, it is necessary to look at groundwater and surface water contributions. The Water Treatment Project Focus Team (PFT) requested that additional sampling be conducted to add groundwater data to the database in order to help facilitate treatment option decisions in the future. To address this, a quarterly monitoring program was implemented at selected groundwater sites in the Woodland Park area of the Canyon Creek Drainage.

**Status of Project** - All work complete.

**Conclusions** - The project successfully sampled groundwater. The data will provide valuable information needed to make responsible treatment option decisions.

#### **Meyer Creek Flood Control**

**Purpose of Project** - To assess the condition of the Meyer Creek diversion system and propose possible alternative remedial recommendations and order of magnitude cost estimates to prevent recontamination of the Superfund remedy in the City of Osburn during a flood event.

**Status of Project** - All work complete.

**Conclusions** - The results of this study show that the risk of failure of the Meyer Creek pipe is moderate. Four possible solutions were evaluated. The preferred alternative consists of constructing a combination pipeline and open channel system, partly in the current alignment and partly in a new one. The open channel portions have the added benefit of creating opportunities for linear parks.

### **Upper East Fork Ninemile Creek Water Quality Evaluation**

**Purpose of Project** - Success Mine Passive Water Treatment: 1) reduce plugging in the Success Mine Apatite Barrier by making design modifications to the sediment chamber and injecting air into the Apatite to break up clogging in the media; 2) perform a tracer study to determine hydraulic flow paths and residence times; 3) analyze Apatite to determine forms of metals precipitates and where the reactions occur; and 4) modify the East Reactor and add new media to the barrier

East Fork Ninemile Creek Monitoring: 1) conduct monitoring of the East Fork of Ninemile Creek to assess where metal loadings occur; 2) evaluate how seasonal flows affect metals loading; 3) evaluate overall water chemistry; and 4) determine forms of metal precipitates.

**Status of Project** - All work complete.

**Conclusions** - At the Success Mine and Mill site, a passive reactive barrier has been installed to treat contaminated groundwater passing through the mine and mill tailings. Since completing the system in 2000, the flow through the system continued to deteriorate. In 2004, the Idaho National Laboratory (INL) was contracted to determine if the flow could be increased by replacing the media or changing to a different media. The first step was to make modifications to the sediment chamber upstream of the reactive barrier. This was completed by modifying the current sediment chamber to allow the operators to visually inspect the sediment chamber for plugging. The second task involved injecting air into the Apatite to help break up the compacted media and reduce preferential flow. This resulted in a temporary increase in flow through the reactive barrier. It was more successful in the west side of the reactive barrier where the media consists of only Apatite. The east side of the reactive barrier which is a mixture of Apatite and gravel did not respond as well to the air injection. In November 2005, the old Apatite/gravel mixture was removed from the east side of the reactive barrier. Plastic packing rings were mixed with new Apatite media and placed in the east side of the reactive barrier. This has allowed significantly more water through the east side of the barrier than what has historically been observed.

Currently, the system continues to treat water without experiencing water passing through the overflow. In addition, an alternative treatment approach was suggested by the IDEQ. The new approach involved injecting a carbon source (like molasses) into the groundwater to cause in situ precipitation of inorganic contaminants. In order for this to be successful, groundwater flow rates and potential flow paths were investigated. A tracer study was performed in the groundwater upstream of the reactive barrier. The tracer used in the study was potassium bromide. Both electrical conductivity probes and periodic water samples were used to monitor the flow of the tracer. Although tracer breakthrough was not detected in the monitoring wells using automated electrical conductivity probes, periodic water samples collected during the study did show tracer arrival at 4 of the 10 monitoring stations. Minimum groundwater velocity was estimated from these tracer arrival times at  $1.16\text{E-}03$  ft s<sup>-1</sup>. Golder Associates had previously estimated the hydraulic conductivity for the area to be  $1.7\text{E-}3$  ft s<sup>-1</sup> which agrees closely to the estimate determined in this tracer study (Golder Associates 2000). The flux

of water moving through the saturated zone upstream of the Apatite barrier was estimated to be approximately 50 gpm, based on the minimum groundwater velocity, alluvium porosity, aquifer thickness, and an assumed aquifer width of 15 ft. in the test region. The test was conducted during low flow periods and is expected to be a minimum flow anticipated for the location. Seasonal hydrological changes will impact the groundwater flux and depth to groundwater; therefore, it is anticipated that the aquifer thickness will vary depending on seasonal conditions. The Apatite barrier has been treating about 3 to 5 gallons of water per minute (gpm) during the summer of 2004. When the system was first installed, it treated more than 30 gpm. Based on current tests, it is estimated the barrier is only treating about 1/10 of the water moving through the saturated zone.

This project also included a one-year monitoring project to evaluate the effects of Interstate and Success Mine and Mill sites on the East Fork of Ninemile Creek. The first quarter of monitoring began in November 2004 for the East Fork of Ninemile Creek. The data show that seasonal variations in flow do occur and are significant. The majority of the metal loading that occurs takes place during the spring runoff. Even though concentrations are lower during the runoff period, the overall metal loading is higher. The greatest increase in metal loading occurs near the Success Mine, but there is a detectable increase in metal loading around the Interstate Mine and Mill site also.

### **Metal & Nutrient Removal Pilot Page WWTP**

**Purpose of Project** - Evaluate two emerging technologies for precipitation and/or adsorption for removal of heavy metals (lead, cadmium, zinc, and copper) and phosphorus from point source discharges in the Silver Valley, especially the Page WWTP. Determine if the results of this study can be extended to other dischargers in the Valley including the mining companies.

**Status of Project** - All work complete.

**Conclusions** - Many of the WWTP effluent samples collected prior to the two pilot plants studied under this project satisfied the NPDES Permit concentration based conditions. If not for the load based limits, a “Do Nothing” approach to the WWTP may be feasible. Abandonment of the load based limits is not likely. This may necessitate implementing additional treatment processes. Removal of heavy metals is attainable to Site Specific Criteria as defined in the Page WWTP NPDES permit. Removal to Gold Book Criteria is not consistently possible. Based on the results of the study, the membrane bio-reactor appears to be the most appropriate choice for use at this time. The probable cost of a full scale system installation in 2006 dollars is \$14 million with annual operating and maintenance of 5% to 10% of the capital cost. The study resulted in the following recommendations:

- Investigate the ability to reduce capital expenses by attenuating peak flows at the WWTP by reducing infiltration/inflow to the collection system;
- Evaluate blending options to meet concentration and load based limits;
- Continue to explore methods of simultaneously meeting the metals and phosphorous removal targets;
- Determine an acceptable method for final disposal of the wastes generated from this facility and identify probable construction costs; and
- Revisit the permit conditions to develop more reasonable loading limits during peak flows such as a tiered permit based on actual stream flow.



The results of the study appear to be directly transferable to other dischargers in the Basin utilizing lagoon based wastewater treatment.

### **East Fork Pine Creek Revegetation Pilot Project**

**Purpose of project** - The project will help identify practical and cost-effective methods to accelerate natural revegetation processes. Vegetation is needed to ultimately stabilize many stream reaches within the CDA Basin. The project is intended to help identify and contrast the relative “bang for the buck” of several locally applicable revegetation methods.

**Status of project** - Plantings within the project area in the spring of 2007 included trench planting of 220 nursery-grown cottonwood whips to evaluate effects of two types of backfill. Results will provide a comparison to the 2004 and 2006 test plots that also used nursery- grown cottonwood cuttings. In addition, approximately 700 containerized willow plants were planted with an excavator to evaluate success along a heavily compacted and high-energy stream reach of the project area.

Two test sites were planted with a shipment of approximately 2,000 containerized plants in June of 2008. Despite drought conditions throughout most of the summer, end-of-season monitoring suggests first year survival rate will be good. A completion report will be prepared in spring of 2009 and monitoring will continue through 2010.

### **Inventory & Evaluation of Private Lands for Potential Restoration of Wetland Habitats**

**Purpose of Project** - The survey was designed to inventory private wetlands and associated agricultural lands within the Coeur d'Alene Basin to determine: 1) their value as wetland habitat; 2) what modifications may be necessary to restore areas to optimal wetland habitat; 3) landowner acceptance of wetland restoration on the property; and 4) level of mining-related metals contamination on the property. The survey will assist in guiding wetland remediation and agriculture-to-wetland conversion under the OU-3 ROD for the protection of waterfowl, one of its remedial action objectives.

**Status of Project** - All work complete.

**Conclusions** - Ten priority areas were identified for conducting initial outreach to private landowners in the project area. Initial efforts to survey interest among landowners in high priority areas were through targeted mailing of an informational letter. Letters were sent to 49 landowners in the ten high priority areas. A second letter was sent to 83 landowners in high priority areas and all other areas of the Basin where suitable sites for wetland restoration were previously identified. An attempt was made to contact all landowners by phone to inquire about interest in wetland restoration. 6 letter respondents were interested in learning more about opportunities to restore wetlands on their land and requested a field evaluation. Phone calls to 36 landowners resulted in three landowners requesting more information and a field evaluation.

Soil testing on three properties determined that due to the high levels of metals in the soil and the depth of contamination, the properties were not suitable for agriculture-wetland conversion activities without substantial remediation. After field evaluation on four properties the landowners indicated that they were not interested in pursuing a project at that time. On the remaining two properties, there is little opportunity for wetland restoration due to their small size.

To help meet the goals of this project over the long-term, the following recommendations were offered:

- Maintain regular contact with landowners who showed initial interest in restoring or protecting wetlands and own parcels with good potential for conservation of wetland habitat. Future opportunities are likely to develop with these individuals sometime in the future.
- Make regular attempts to engage landowners in the Basin with informational letters and phone calls. There was a noticeable increase in the number of landowners that responded to the second informational letter. This may be partially a result of a continued presence in the Basin and landowners there becoming more familiar with the intentions of the agencies and organizations involved in remediation and restoration efforts.
- Coordinate efforts among the various agencies and organizations working with landowners in the Basin to send a consistent message regarding remediation and restoration efforts being undertaken there. Maintaining good relationships with landowners that have desirable parcels, particularly those in high priority areas for wetland restoration is essential.
- Find ways to engage landowners that have not been contacted through these initial efforts. Consider conducting annual tours of remediation and restoration projects under way or completed in the Basin to let prospective landowners see first hand what these projects entail and the benefits they provide.
- Explore wetland restoration opportunities outside of the Basin, such as in the St. Joe River basin. There are abundant drained wetlands in the floodplain of the St. Joe that are free of metal contamination and could fulfill much of the habitat needs of waterfowl that migrate through the area.

### **Monitoring Fish Responses to Bank Stabilization in the Coeur d'Alene River**

**Purpose of Project** - Bank stabilization efforts will likely be proposed to treat more than 20 miles of the CDA River banks in coming years. Resource management agencies will be asked to evaluate the impact of several bank stabilization project proposals for the CDA River. The objectives of this monitoring effort are: 1) establish baseline fish community structures; 2) evaluate variability in fish community structures over time; 3) evaluate the effect of existing bank stabilization projects on fish communities; 4) determine appropriate monitoring strategies for future bank stabilization projects; and 5) recommend bank stabilization techniques that have positive effects or minimal adverse effects on fish communities.

**Status of Project** - All work complete.

**Conclusions** - Salmonid catch in the lower river was greatest during spring when water temperatures were low and juveniles were outmigrating to Coeur d'Alene Lake. Salmonid catches were not statistically different among habitat types although 10 out of 12 juveniles were captured at stabilized sites. Piscivore catch was lowest during spring. The exact whereabouts of the piscivores at this time were unknown, but many were probably in the chain lakes for more optimal ecological conditions (including temperature) and spawning.

Overall, piscivores were not captured in significantly different numbers at stabilized and unstabilized habitats. Northern pike were captured in greater numbers at stabilized habitats, but no individuals were captured in spring. Similarly, northern pikeminnow were abundant at RR sites, but were captured in lower numbers during spring. The highest abundance of salmonids in spring when predators are least abundant may result in some benefit to migrating salmonids.

Based on the data available, season seems more important than habitat in affecting salmonid and piscivore impacts. More information is needed by species, season, and habitat type, season, section, and fish size in the

lower river, chain lakes, and Coeur d'Alene Lake near the river mouth. Information is also needed on the seasonal movements of piscivores in and out of the chain lakes, and the relation of those movements to the movements and upstream and downstream migrations of salmonids. Extra sampling should be focused in spring, during May and June, when the potential for overlap is greatest.

### **Computer Models to Assess Sediment Transport & Bed Evolution in the Lower Coeur d'Alene River - Phase 1**

**Purpose of Project** - See narrative for Phase 2 funded in 2004

### **Simulation Model to Evaluate Coeur d'Alene Lake's Response to Watershed Remediation - Phase 1**

**Purpose of Project** - See narrative for Phase 2 funded in 2004.

### **North Fork Coeur d'Alene River Hydrologic & Sediment Study**

**Purpose of Project** - Provide a watershed assessment in document form that will effectively aid and support the future development of a Sediment TMDL Implementation Plan for the North Fork Coeur d'Alene River subbasin (a plan that will be developed by a Watershed Advisory Group).

**Status of Project** - All work complete.

**Conclusions** - The final report provides an overview of the North Fork Coeur d'Alene River (North Fork) Watershed Analysis which was completed to support the development of a Sediment TMDL Implementation Plan for the North Fork. In order to provide sufficient information to develop an effective Implementation Plan, the IDEQ requested assistance in compiling information on sediment sources, recent watershed improvements, and aquatic habitat conditions in the listed subbasins of the North Fork watershed. This work was completed in two Phases.

Phase I involved compilation and synthesis of existing watershed data and completion of a Watershed History. This information was presented in *Summary of Existing Information and Knowledge within the North Fork Coeur d'Alene River Subbasin (January 2006)*. An initial analysis of the existing information was then completed to identify data gaps and potential field assessment needs. This 'Draft Initial Analysis' included preliminary aerial photo review results and detailed summaries of the existing stream channel data that was obtained from the Forest Service. This initial analysis provided recommendation for field investigations and further analysis recommendations for Sediment Sources, Channel Geomorphic response and Hydrologic Modeling. This information and preliminary analysis is in *North Fork Coeur d'Alene Phase II Report North Fork Coeur d'Alene River Subbasin (July 2006)* and was used to develop a scope of work for Phase II of the assessment.

The actual Phase II Watershed Assessment focused on identifying and quantifying sediment sources and impacts related to the condition of §303(d) listed impaired streams within the North Fork subbasin. This analysis was based on in-depth aerial photo analysis, field surveys in targeted subbasins and detailed hydrologic modeling of targeted subbasins. The hydrologic and sediment source modeling for roads and tributary streams

was focused on two subbasins, the upper Little North Fork CDA River and Big Elk Creek (tributary of Tepee Creek) which represented the range of the past management actions in the watershed. These subbasins were selected because stream segments in both of these basins were listed in the TMDL for sediment and there are several currently-operating stream gages which were critical to the hydrologic modeling.

The next, broader, analysis level was addressing channel response to sediment inputs through time for response reaches of the mainstem North Fork CDA, Tepee and Independence Creeks, plus selected downstream parts of other major tributaries. The Tepee Creek subbasin provided data for burned watersheds with relatively little timber harvest or road-building. The Middle North Fork and some headwater areas of Tepee Creek provided data for harvested and roaded conditions. These analysis results are presented in four reports. The detailed technical analyses for *Sediment Sources*, *Stream Channel Analysis* and *Hydrology Analysis* are in individual reports.

In addition to the technical reports the analysis team created a database of road and stream restoration activities and a database of the data and reports located and reviewed during the course of this analysis. The files are included as appendices to the Final Report.

The Final Overview Report presents a summary of watershed conditions and summarizes the key analysis goals and findings to assist the non-technical Watershed Advisory Group (WAG). The following reports are all part of the final work product:

- ☐ North Fork Coeur d'Alene Watershed Overview & History
- ☐ Appendix A - Technical Appendix: Summary of Existing Information
- ☐ Appendix B - Hydrology Analysis North Fork Coeur d'Alene Subbasin
- ☐ Appendix C - Sediment Source Analysis North Fork Coeur d'Alene Subbasin
- ☐ Appendix D - Stream Channel Analysis North Fork Coeur d'Alene Subbasin
- ☐ Appendix E - Reviewed Reports and Data Sources
- ☐ Appendix F - Stream and Road Project Database

## **Mica Bay Nutrient Reduction Project - Phase 1**

**Purpose of Project** - Demonstration and training project for wetland landowners to restore out-of-bank flows in tributary streams as they enter CDA Lake. Restoration of delta wetland functions will reduce nutrient loading to the Lake and encourage groundwater recharge. Nutrient loading to the Lake must be minimized to insure that metals remain bound to sediment particles rather than dissolving in the water column. A unique combination of conditions exists at the project site that, if overcome, will translate to success at most other sites around the Lake.

**Status of Project** - All work complete.

**Conclusion** - It was decided to conduct a feasibility study to answer some basic questions about the hydrology of the area, design alternatives and the expected benefits of the project. This study titled, *Mica Bay Design Alternatives* was completed and submitted to IDEQ on October 5, 2005. It was reviewed by the BEIPC Executive Director and TLG resulting in a recommended change in the project approach. The BEIPC considered the recommended change and the project was amended by vote of the BEIPC in November 2006. (See narrative of project funded in Phase 2.)



## Lower Lakes Aquatic Vegetation Survey Project

**Purpose of Project** - The primary purpose of this study is to develop baseline data on submersed aquatic plant species distribution and biomass in Benewah, Chatcolet and Round Lakes. The secondary purpose is to estimate nutrient (primarily phosphorus) release from the existing plant beds into the water column of these lakes and subsequently into CDA Lake. The tertiary purpose is to inspect these lakes for the presence of invasive, noxious aquatic species.

**Status of Project** - All work complete.

**Conclusions** - The overall conclusion offered from this baseline assessment of submersed aquatic vegetation in the Lower Lakes area of Coeur d'Alene Lake is that this growth is healthy, very productive and reasonably diverse. The plants that were identified in the Lower Lakes transects and grid point sampling were all native species with the exception of *Myriophyllum spicatum* (Eurasian watermilfoil) which was found widely distributed throughout this area with limited dense growth areas in Chatcolet and Round Lakes. It is expected that this presence will increase significantly in the coming years, absent implementation of control measures. However, harvesting of aquatic vegetation as a means of controlling nutrient inputs to the lake must be further evaluated to determine its cost effectiveness. The loading of the nutrients from aquatic vegetation to the Coeur d'Alene Lake system was higher from the Lower Lakes area than from Coeur d'Alene proper, indicating the importance of these shallow water habitats.

## Canyon Creek Groundwater Metals Source Characterization

**Purpose of Project** - This project is designed to determine how (in practical terms) zinc and other metals are distributed between different physical and chemical states in the Canyon Creek alluvium. This information will be used to help understand how natural processes can affect the movement of contaminant metals through Canyon Creek and how engineered processes can impact contaminant metal mobility or sequestration.

**Status of Project** - All work complete.

**Conclusions** - Based on the results of this preliminary study, several recommendations can be made with respect to estimating metal leaching from Canyon Creek alluvium, predicting the impact on metal concentrations and fluxes into Canyon Creek, and evaluating proposed mitigation approaches.

### 1. Determine the spatial variability of metal fractions in the alluvium.

The cores in this study were obtained from a relatively small area of alluvium downstream of Woodland Park. Samples from a wider area are needed to establish that the results obtained in this study are representative of the quantity and distribution of metals in the alluvial sediments downstream of the Woodland Park area. To be cost effective, analyses of these additional samples should focus on the easily leachable fractions (fraction 1 + fraction 2).

### 2. Develop better measurements and models for groundwater/surface water interactions.

Existing studies of Canyon Creek (Barton, 2002) have provided initial estimates of groundwater flow and metal fluxes into the stream under low-flow conditions. This study needs to be expanded to better understand the seasonal variations of these flows and how they impact stream quality and metal transport.

In particular, information on metal fluxes under high-flow conditions is needed.

### 3. Establish a sound conceptual/quantitative model for the groundwater hydrology.

A sound conceptual model should be established so that relevant hydrological processes can be estimated. Such a model would necessarily be based on data from tests and field measurements to obtain the necessary hydrological parameters. The groundwater model should provide an understanding of the groundwater flow paths and their response to seasonal variations in water input into the system. The model should be used to provide groundwater residence times that are needed to estimate the metal concentrations in the groundwater and the time scales for flushing the alluvial sediments. The model could then be used to identify hydrogeochemical zones that could be selectively targeted for specific mitigation activities.

## **FY 2004 Grant Projects**

### **Mica Bay Nutrient Reduction Project - Phase 2**

**Purpose of Work** - The original work planned was intended to be a demonstration and training project for use by wetland delta landowners. It was intended to encourage them to consider altering management of unusable lands for the purpose of providing public benefits by lowering nutrient delivery to near shore areas of CDA Lake. The feasibility study resulting from the first phase of this project indicated that more land and considerable more funding was needed than originally anticipated to implement a meaningful project. IDEQ and the U.S. Fish and Wildlife Service (USFWS) were unsuccessful in their attempts to secure cooperation from enough landowners to implement the project as originally planned.

In August 2006, a willing landowner upstream from the Mica Creek Delta on the lower North Fork Mica Creek contacted the USFWS and IDEQ indicating interest in a streambank and bed stabilization project to control sediment and nutrient impacts to the Mica Creek Delta. Field investigation confirmed that there was significant and active streambank mass failure and erosion on sections of the North Fork Mica Creek located on the landowner's property. IDEQ confirmed that a meaningful stream stabilization project could be completed with the funds available. IDEQ drafted an amended project proposal for Mica Creek that was presented to the BEIPC on November 29, 2006. The BEIPC approved the amended Mica Creek project. As amended, this project will serve as demonstration and training to acreage property owners within the Coeur d'Alene Lake Basin who have streams on their property, on the costs and effectiveness of various streambank and streambed rehabilitation methods to reduce fine sediment/nutrient erosion and export into Coeur d'Alene Lake.

**Status of Project** - During the fall of 2008, the following project components were completed: 1) stabilization of selected stream bank segments on the Mica Creek system which runs through the Mundt property, 2) a 10-minute DVD showing components of the project, and 3) a demonstration tour of the project site offered to farmers and ranchers who have streams running through their property which are tributaries to CDA Lake (including CDA, St. Joe, and St. Maries Rivers). Ranchers and farmers will also be given a copy of the 10-minute DVD. All work was completed by December 31, 2008. In 2009, the Kootenai/Shoshone Soil & Water Conservation Service will coordinate a presentation of this project to be given at a Basin Commission meeting. The presentation will include showing the 10-minute DVD.



### Mica Creek Rehab

### Plummer Wastewater Treatment Pilot

**Purpose of Project** - The objective of this project is to show the viability of a wastewater infiltration treatment wetland in Plummer. A successful wetland would benefit water quality in Chatcolet and CDA Lakes by reducing nutrients that now flow into Plummer Creek from the Plummer Wastewater Treatment Facility.

**Status of Project** - All work complete.

**Conclusions** - At the onset of this project, the design flow rate was set at 3,000 gpm; however, it became apparent in December 2005 that this was unattainable. The flow rate was then set at 1,000 gpm and has remained constant since that time; the one exception being the time period January 6 and February 10, 2006 when flow had to be halted due to extraordinary high rainfall.

The pilot wetland sample data shows over the course of the study that it is, for the most part, effective at treating the influent levels of phosphorus and nitrate. However, due to the projected flows that will be involved in the full build out, the 200 acres of land needed makes this a less than ideal treatment alternative for the City of Plummer.

## **Plummer Creek Watershed Nutrient Load Assessment, Modeling and Management Plan Development**

**Purpose of Project** - The purpose of this project is to develop a Watershed Nutrient Management Plan which will include appropriate and specific point nutrient source control efforts for the Plummer Creek watershed.

To accomplish the project purpose, the specific objectives of the proposed project are:

- To characterize nutrient (nitrogen and phosphorus) and sediment concentrations and transport throughout the Plummer Creek watershed and into Chatcolet Lake through a two-year monitoring effort.
- To use the Generalized Watershed Loading Function (GWLF) or similar model to establish nutrient loadings from sources and land uses throughout the watershed.
- To review previously developed nutrient control project options and develop an updated set of recommended projects.
- To prepare a Watershed Nutrient Management Plan for use by the Tribe, the City of Plummer, Benewah County and other environmental resource agencies.

**Methodology** - Field water quality and constituent concentration data will be collected at key “nodes” and potential pollutant sources in the Plummer Creek watershed. The data will be used for input to an appropriate hydrologically-based constituent concentration and transport model that will be useful for developing Total Maximum Daily Loads (TMDLs) for key constituents, and for evaluating wastewater treatment and other pollution abatement technologies in the Plummer Creek watershed. Modeling and a final Management Plan report will be completed by the end of the project’s third year. The modeling results will support development of the management plan through characterizing existing nutrient source loads and evaluating management alternatives.

**Status of Project** - The planned two years of field data collection has been completed and data has been tabulated. A contractor has been hired to perform the desired modeling work. Modeling work is underway and an initial assessment of the Plummer Creek watershed using the model ‘SWAT 2.0’ has been completed. The modeling contractor is also proceeding to establish nutrient loadings from sources and land uses throughout the watershed, to review previously developed nutrient control project options and develop an updated set of recommended projects, and to prepare a Watershed Nutrient Management Plan. Work is currently about 60% complete.

## **Pinehurst Flood Impact Study**

**Purpose of Project** - Develop hydrologic models for Pine Creek and Little Pine Creek to predict flood impacts to Pinehurst, including contamination of remediated properties. Construct selected drainage infrastructure improvements to a portion of Little Pine Creek to allow calibration of the models.

**Status of Project** - Data was collected to create the models and infrastructure improvement designs. In 2007, a bridge was constructed on Fairview Avenue to replace a badly undersized culvert and the toe of the General Mine waste dump that was eroding into Little Pine Creek was armored. In 2008, the Little Pine Creek channel was enlarged and stabilized, and bridges and culverts were replaced on the Avista and Pinehurst Golf Course properties. The project is 95% complete.





### Little Pine Creek Drainage Improvement

### Silver Crescent Complex Habitat Restoration

**Purpose of Project** - This project is a demonstration project to study the feasibility and economics of watershed restoration in areas where the original stream type has been severely altered by mining and environmental cleanup activities. Innovative high gradient stream restoration techniques were further adapted for the unique circumstances in the East Fork Moon Creek. Work that was implemented and studied includes actions converting stream types from unstable to more stable types while accounting for site features such as a large mine waste repository located in the floodplain. Various revegetation approaches on and adjacent to the waste repository as well as the reestablishment of wildlife and fish habitat through the use of constructed or installed structures will be applied.

**Status of Project** - All funds from the Basin Commission have been expended and construction is now complete. The USFS had successfully gained an additional partnership with the Silver Mountain Corporation on the project. Additional wetland creation and enhancement was accomplished using funding provided by Silver Mountain. This work in turn will satisfy Silver Mountain's mitigation requirements under their current 404 permit for new development at the ski area and village. This added wetland work will further enhance the overall restoration effort at the site. Additions to the design for the project were integrated into the USFS contract(s).

In 2009, we will finish preparing the post construction report which will outline the entire project and any changes that were made. This report will include an evaluation of successes and a section dedicated to “lessons learned.” Site maintenance and a 5-year monitoring effort are underway.



### Silver Crescent Restoration

### Canyon Creek Treatability Study

**Purpose of Project** - Develop an alkaline precipitation design as a low cost method of achieving a substantial improvement toward ROD goals and determine if the proposed water treatment technology is implementable in the South fork CDA River.

**Status of Project** - All work complete.

**Conclusions** - A lime lagoon treatment system is a viable alternative for zinc removal at Canyon Creek. Similar systems have shown that lime lagoon technology can be successful and cost effective. Construction of a lime lagoon treatment system is estimated to cost approximately 52% of the \$8.8 million estimate in the OU-3 ROD. Annual operation of a lime lagoon system is estimated to cost approximately 55% of the \$600,000 estimate in the OU-3 ROD. A full scale treatment system would occupy about 25 acres in the Woodland Park floodplain.



To complete a detailed final design, a number of data needs such as detailed topography, detailed geotechnical soils characteristics, and detailed regulatory discharge standards will need to be obtained. The project created three documents:

- 1) 100% Conceptual Design for the Canyon Creek Pilot-Scale Lime Lagoon Treatment System;
- 2) Pilot-Scale Lime Lagoon Treatment System Operation, Maintenance, and Monitoring Plan; and
- 3) Conceptual Design for the Canyon Creek Full-Scale Lime Lagoon Treatment System.

## **South Fork Sewer District Toxicity Reduction**

**Purpose of Project** - A Toxicity Reduction Evaluation (TRE) is a stepwise process or plan by which a wastewater treatment plant (WWTP) investigates and identifies agents of toxicity in its effluent, and evaluates the effectiveness of toxicity control options. The South Fork Sewer District (SFSD), Page WWTP has failed previous Whole Effluent Toxicity (WET) testing. The effluent characteristics of the Page WWTP are similar to effluents from other treatment plants with the exception of the high metals concentrations. As a result, it is believed that the metals in the influent stream are directly responsible for the effluent toxicity which impairs receiving water quality. As an example, *daphnia magna* sp. exhibits chronic effects from 0.15 µg/l of cadmium based on data from EPA's Quality Criteria for Water 1986 (EPA 440/5-86-001); while the Page WWTP has historically discharged 2.6 µg/l. Currently, limited data exist presenting the concentrations of metals, especially in combination, that are likely to cause chronic effects in *ceriodaphnia dubia* sp. This problem also impacts other discharges in the basin including the active mining companies and inactive mining claims that will also have difficulty meeting the new limits. Understanding the impact of metals on chronic toxicity is of keen interest to all of the dischargers in the Upper Basin.

**Status of Project** - As a result of Whole Effluent Toxicity (WET) testing in 2006 and 2007, chlorine, ammonia, and heavy metals were suspected toxicants in the Page wastewater treatment plant (WWTP) effluent. A Phase I Toxicity Identification Evaluation (TIE) following the WET testing established heavy metals as the likely group of toxicants, while a subsequent Phase III TIE isolated the toxicant to zinc. Further WET testing may be conducted in 2009 to correlate metals levels to WET test results.

The remaining step in the TRE process is completion of a Toxicity Control Evaluation (TCE), which will identify potential options for reducing zinc toxicity in the District's effluent. Alternatives will be screened for effectiveness and feasibility for removing zinc toxicity from the receiving stream, including previous work completed through funding from the BEIPC for the Mullan Sanitary Sewer Collection System Demonstration Project and Page Metals Removal Pilot Study.

A draft report will be issued in the winter of 2009, with a final report expected in the summer of 2009 following agency review.

## Simulation Model to Evaluate CDA Lake Response to Watershed Remediation - Phase 2

**Purpose of Project** - Provide the entities responsible for management of CDA Lake with a sophisticated computer modeling system with which to simulate the lake's long-term responses to a wide range of remediation strategies to be implemented under the ROD and the Lake Management Plan.

**Status of Project** - All work complete.

**Conclusions** - Using the validated lake models, the processes controlling zinc fate and transport within CDA Lake were explored. Algae play a large role in zinc cycling throughout the lake. Roughly the same amount of dissolved zinc that is released from lakebed sediments into the overlying water column is incorporated into algal biomass in the euphotic zone (the sunlit zone above the summer thermocline), which is then redeposited on the lake bed as the algae dies and sinks to the lake bottom.

The validated models also were used to examine the response of the Lake to a range of long-term scenarios to provide insights into the effects of remedial actions. A combination of low phosphorus concentrations and zinc toxicity is currently keeping the lake's algal biomass at an acceptable level. Efforts to reduce zinc loading from the CDA River are unlikely to result in a significant reduction in zinc toxicity to algal growth in the near term. The Kuwabara *et al* data (2006) suggest that even if zinc concentrations were reduced by an order of magnitude, continued loading from the watershed (although reduced) and also from the lakebed sediment will continue to cause toxicity to non-diatom species.

Decision makers should pay careful attention to nutrient loading to the Lake as it may respond significantly to increased phosphorus input – with or without zinc toxicity. The shallow southern portion of the Lake is already showing signs of this and if the phosphorus loading is not effectively managed, there is potential for the symptoms of eutrophication to progress farther into the deep northern body of the Lake. The model simulations suggest that increased phosphorus loading will either produce increased diatom biomass should zinc toxicity remain, or increased biomass of a mixed assemblage including more green and blue-green algal species should the zinc concentrations within the water decrease considerably. However, the overall algal biomass in the Lake should remain below 5 micrograms per liter of chlorophyll-a if phosphorus loading is appropriately managed.

## Lower River Sediment Transport Model and Bed Evolution - Phase 2

**Purpose of Project** - Develop a set of tools that can be used by resource managers for evaluating proposed projects designed to minimize the transport of metal contaminated sediments in the Lower CDA River. Objectives include the utilization of existing data and collection of additional data to develop and calibrate computer models of the river between Cataldo and CDA Lake. These models would be capable of simulating the hydraulic and sediment transport characteristics of the River over a wide range of stream flow and lake elevation conditions. The models would be used to test proposed projects prior to implementation with the goal of improving their design and avoiding unanticipated and costly mistakes.

**Status of Project** - All work complete.

**Conclusions** - A computer sediment transport model, HEC-6 was used to simulate water surface and streambed elevations, erosion and deposition of the streambed, and sediment transport. The calibrated model was used to evaluate the feasibility and potential effects of management alternatives on the streambed. Four alternatives



were simulated to understand the effects from dredging the streambed and reducing sediment discharge input. Management alternatives 1 and 3 used river discharge data from 2000, and 2 and 4 used data from 1997. Before start of the simulations, seven cross sections in the Dudley reach of the river were deepened 20 feet to simulate dredging about 296,000 cu. yd. of sediments. Simulations indicated that it would take between 24 to 45 years of various flows to fill up the dredged area. It may take many years or even decades for the river to reach equilibrium conditions after incoming total sediment discharge is decreased. Effects from extreme flood events on the channel and flood plain are unknown.

The FASTMECH computer model was used to increase understanding of the two-dimensional flow hydraulics as they vary across the channel and in river beds and simulated bed shear stresses covering a 5.3 mile reach near Dudley. The model showed that flow depths increased as river discharges increased except where high lake elevations cause water-surface elevations to be high due to backwater conditions. The model also showed several areas where reverse flow (back-eddies) occurred and that the potential of sediment mobility occurs when bed shear stress exceeds the critical shear stress of the particle. Simulated sediment mobility indicated the transport of very coarse sand to fine gravel in these simulations.



**Typical Sediment Deposition Area - CDA River**

## **Assessment of Economics and Effectiveness of Alluvium Sorting as a Mine Waste Removal Strategy**

**Purpose of Project** - The pilot work was implemented to answer a number of questions concerning the alluvium sorting approach to mine waste removal and disposal from watersheds in the Basin: 1) is the additional

cost of sorting stream bed materials contaminated with mine wastes balanced by savings in transportation and repository volume costs; and 2) is there an added benefit because sorting results in a more homogeneous waste material that reacts to compaction better and ultimately results in lower permeability of compacted waste in the repository. The project also includes a monitoring component. Using a gravel quality monitoring approach, the amount of mine waste contamination will be assessed in the gravels of Prichard Creek at the removal sites pre- and post-project implementation.

**Status of the Project** - All work complete.

**Conclusions** - The economic and physical (density/permeability) consequences of sorting alluvium demonstrated that the sorting strategy for alluvium-tailings material resulted in a small savings in transportation costs and a large savings in repository construction costs. These savings far offset the added expense of sorting. Large cost savings were obtained despite some inefficiency in the project that could be rectified in subsequent projects. Having a commercial outlet for the oversize material would save additional funds, even if the material was donated. Disposal in the aggregate market will also remove a material from the floodplain that, if not handled properly, will negatively affect revegetation efforts. Sorted material compacted in the repository achieved significantly lower permeability (20 times) than the bulk material with equal compaction treatment. The result was a waste deposit less prone to groundwater percolation independent of the capping system employed.

## **CDA Lake Management Plan Implementation**

**Purpose of Project** - As a joint project between IDEQ and the Coeur d'Alene Tribe, conduct a survey audit of measures taken by various agencies, organizations, and industries to fulfill the management actions recommended and specified in the 1996 Coeur d'Alene Lake Management Plan (LMP). IDEQ and the Coeur d'Alene Tribe are in the process of conducting an extensive evaluation of all activities within the Coeur d'Alene Lake Basin that relate to water quality, and more extensively within one mile of the Lake shore to evaluate what Best Management Practices (BMPs) are in place, how effective they are, what BMPs are required but not in place, and to establish specific BMP audit procedures.

**Status of Project** - Work performed in calendar year 2008

1. Work continued on conducting interviews with respective jurisdictions throughout the Coeur d'Alene Basin on how agency programs relate to water quality issues within the Basin.
2. IDEQ and Tribal staff coordinated with Basin stakeholders on water quality related issues as they pertain to the Management Action Tables in the draft LMP. Staff researched Federal, State, and Tribal laws as well as local government's rules, regulations, and ordinances. This research is being used to update the Management Action Tables.
3. IDEQ and Tribal staff are in the process of compiling photos, field observations, and GPS coordinates in order to create the final report and product. Once completed, presentations will be made to the BEIPC (including the TLG and CCC) as well as any interested parties.
4. Subgrantees drafted a first round of recommended changes/revisions to LMP management action tables and provided to stakeholders in the Basin.

5. As per request, gave update presentations to the CCC, TLG, BEIPC, Stormwater and Erosion Education Program (SEEP), Regional Lakes Conference, and local environmental groups.
6. Worked with Panhandle Health District and Tribe's GIS Department to produce an updated wastewater treatment system inventory/mapping around the perimeter of Coeur d'Alene Lake.

**Other related work:**

- Worked with Kootenai County, Idaho Department of Lands (IDL), and Idaho Fish and Game (IDFG) during lake management plan activity implementation (i.e. water quality monitoring during a debris removal demonstration on Coeur d'Alene Lake).
- Attended Planning and Zoning Commission public hearings on Comprehensive Plan development and inclusion of water quality protection strategies and lake management implementation being incorporated within the new County Comprehensive Plan.
- Took tour and participated in site planning for public use around the Lake.
- Continued participation in Panhandle Stormwater and Erosion Education Program.
- Attended U of I Extension Water Series seminars.
- Members of the Panhandle-wide Lake\* A\* Syst Steering Committee.
- Worked with 2008 draft LMP writing team to incorporate updated management action tables into plan.



**Mica Bay - Coeur d'Alene Lake**



## Other BEIPC Activities and Responsibilities:

### Implementation of the Phase II Component of OU-2 Remedy

As part of the State Superfund Contract (SSC) for OU-2, a Comprehensive Cleanup Plan (CCP) was developed to define a path forward for remedy implementation in OU-2. The CCP calls for a phased approach to implementing the OU-2 remedy. In Phase I, the focus was on remedial actions aimed at removing and consolidating extensive contamination from various site areas, demolition of structures, development and implementation of an ICP for OU-1 and OU-2, future land use development, and public health response actions. Phase I work also included support studies for long-term water quality improvement and evaluation of Phase I remedial action effectiveness.

Phase II considers the effectiveness of Phase I in meeting water quality improvement objectives and specifically addresses long-term water quality, ecological, and environmental management issues. Both ROD and State Superfund contract (SSC) amendments will be required prior to implementation of any Phase II remedial actions. EPA and IDEQ are the responsible parties for modifying the ROD and negotiating a SSC. The BEIPC will participate in Phase II activities in OU-2 by providing technical input into the remedy alternative development and selection (including evaluation of technical reports, pilot studies, and feasibility study documents), providing input into the public processes associated with ROD modifications and educating the community and legislative bodies of the need for funding for this work.

In 2008, the focus of EPA and IDEQ work was on filling data gaps. These data gaps are primarily related to delineation of source areas and their characteristics to support remedial design and remedial action. Specifically, we need a better understanding of contaminant nature and extent, contaminant release mechanisms, groundwater flow and preferential pathways, and groundwater/surface water interactions. Major activities conducted to collect and interpret appropriate data included:

- EPA geoprobe borings, core collection, and piezometer installation;
- Installation of level-loggers in wells;
- Low-flow groundwater/surface water interaction studies;
- A study of the impact of removing the treated CTP flow from Bunker Creek;
- Analyzed water samples for additional elements; and
- Developed a groundwater flow model for OU-2.

The results from the above activities are being analyzed to identify and rank source areas and evaluate remedial alternatives. The criteria will include relative contaminant metal loading, impacts on environmental receptors and other factors determined to be relevant.

Based on the results of the identification and relative ranking of source areas identified within OU-2, conceptual remedial actions will be developed to address the sources, and evaluated based on overall protectiveness of human health and the environment, compliance with applicable or relevant and appropriate requirements, implementability, effectiveness, and cost of supplemental remedial actions and other relevant considerations. EPA, with IDEQ input, will identify and select additional cleanup activities for inclusion in the ROD Amendment that is currently being developed to guide OU-2 Phase II and cleanup efforts in the Upper Basin.



## **Infrastructure and Funding Source Evaluation**

In 2006, the BEIPC began a process to address infrastructure deficiencies and revitalization needs to protect the environmental cleanup remedies, preserve public and private property, and revitalize local economies within the Upper Basin. That year, the BEIPC completed an inventory of Upper Basin community infrastructure including streets and roads, drinking water and waste water systems, and natural gas systems, and developed base maps including the inventoried information. The BEIPC also completed a flood control structure inventory and developed maps that indicate the potential for flood damage to remediated areas in the Basin upstream from Harrison, Idaho. This was the first phase of a four phase project to develop a Drainage Control and Infrastructure Revitalization Plan (DCIRP) for the Upper Basin.

During 2007, the second phase of the project was completed including flood and stormwater runoff drainage assessments and reports for Mullan, Osburn, Wallace, Woodland Park, and Silverton, and additional infrastructure work including:

- Preparation and presentation of the Basin DCIRP kickoff workshop to introduce the basis of the DCIRP to community, utility, and agency leaders.
- Holding meetings with communities and utilities to discuss funding public works projects, infrastructure needs, and priorities; to mark up a set of the base maps to show the high priority projects and infrastructure issues; and to develop an infrastructure report card for the communities and utility districts. The report card provides a qualitative assessment of the Upper Basin infrastructure.

In 2008, the infrastructure needs assessment and funding source evaluations were completed. In spring 2009, the project will be completed including the drainage control and infrastructure needs and priorities in the Box and rest of the Upper Basin.

## **Lake Management Activities**

The original Coeur d'Alene Lake Management Plan (LMP) was prepared by the CDA Tribe, Clean Lakes Coordinating Council and Idaho Division (Department) of Environmental Quality and accepted by the CDA Tribe, Kootenai and Shoshone Counties in 1996. In February 2004, the BEIPC voted to coordinate and be involved in implementing the LMP and any future modifications to the plan. The BEIPC funded a LMP Implementation Review under a Clean Water Act subgrant in 2005 to determine how well the original LMP is being implemented and this study will be completed in 2009. In addition to this work, the following work was accomplished during 2008 by the BEIPC and Clean Water Act subgrant implementing agencies:

- Continued construction of a pilot project to reduce nutrients entering the Lake from Mica Bay; and
- Continued a project to perform a nutrient load assessment and modeling to develop a management plan for the Plummer Creek tributary to the Lake.

The OU-3 ROD anticipates that the State and Tribe, coordinating with federal agencies and local governments, will prepare and implement an updated LMP outside the Superfund process using separate regulatory authorities.

During 2008, the State and Tribe completed negotiations and drafting of the 2008 draft Lake Management Plan. The State and Tribe anticipate approving the LMP and coordinating the implementation with other stakeholders, including local governments and the BEIPC beginning in 2009.



**City of Coeur d'Alene from Cougar Bay - CDA Lake**

## *Challenges Ahead*

The cleanup effort to date has been mostly focused on human health risks resulting from contaminated residential and commercial properties. More than 5,200 properties have been remediated and IDEQ expects to complete most of the property cleanup in the Basin from Harrison to Mullan over the next 5 to 6 years. While human health remains a priority, EPA has begun new efforts to focus on cleanup work in fish and wildlife habitat areas, surface and ground water, and old mine and mill sites, working with the BEIPC, IDEQ, other cooperating agencies and stakeholders. To accomplish this work, the Superfund Records-of-Decision (RODs) for the Upper Basin (Cataldo to Mullan) and the Bunker Hill Box will need to be amended or modified. EPA has started the process and hopes to finish an amendment in 2010.

Besides the ROD amendment work for the Upper Basin, the Lower Basin (Cataldo to Harrison) PFT will be working on Lower Basin ecological issues and project planning. Because the Coeur d'Alene River system contains millions of tons of contaminated sediments, a portion of which is moving downstream every year, recontamination from annual flooding will be a major focus for the team.

In addition to cleanup and restoration, the BEIPC is involved in developing a program to protect remediated areas from stormwater runoff and local drainage problems as well as an infrastructure revitalization program for the communities in the Upper Basin.

Fundamental to the success of the BEIPC process as well as the environmental remediation and restoration efforts is a continuing stream of funding from a number of sources. Securing long-term federal and state funding is necessary to ensure implementation of the remedy objectives for the entire Basin. EPA cannot provide funding for natural resource damage restoration work which is the responsibility of the Natural Resource Trustees. Assuring sustainable funding intended to advance cleanup as planned in the RODs, along with operation and maintenance of the implemented remedies and restoration of damaged natural resources represents a significant challenge.

Other major challenges include: managing the Institutional Controls Program (ICP); locating and developing waste repositories for disposal of remedial action and ICP wastes; implementing methods to deal with contaminated groundwater; implementing an infrastructure revitalization and stormwater drainage control program in the Upper Basin to ensure protection of the remedy; and continued coordination of BEIPC Lake related projects with the CDA Tribe and State's efforts to complete the development and implementation of the updated Lake Management Plan.



**Upper Basin ROD Amendment Meeting**