

EXECUTIVE SUMMARY

ES.1 INTRODUCTION

This document presents the Coeur d'Alene Basin Environmental Monitoring Plan (BEMP). Establishment of a Basin-wide environmental monitoring program is required under the 2002 Bunker Hill Mining and Metallurgical Complex Superfund Site Operable Unit 3 Record of Decision (see Section 12-6 of the ROD) for the Coeur d'Alene Basin (EPA 2002). The interim ROD describes the specific cleanup work that will be conducted in the Basin over the next 30 years.

The Basin is a large and diverse geographic area. Given the size and complexity of the Basin and the amount of historical mine waste present, it is clear that the cleanup will take many years. For environmental protection, an adaptive management approach has been adopted. The remedy selected in the ROD consists of approximately 30 years of prioritized actions designed to achieve tangible and measurable human health and environmental benefits. The actions described in the ROD are not expected to provide a full cleanup of the Basin. A key component of the adaptive management approach to cleanup of the Basin is the environmental monitoring program. Monitoring the river system and Basin will provide data to help evaluate cleanup efforts and to make adjustments and modifications where needed.

The ROD, and consequently the BEMP, is focused on the mining-related contamination in the river corridor and floodplain of the Basin. The Basin includes the South Fork of the Coeur d'Alene River and its tributaries (Upper Basin), the lower Coeur d'Alene River and associated lateral lakes area (Lower Basin), Coeur d'Alene Lake, and depositional areas of the Spokane River. A map of the Basin is presented in Figure ES-1.

ES.2 COLLABORATIVE DEVELOPMENT

Beginning in January 2002, the U.S. Environmental Protection Agency (EPA) started working with Basin stakeholders to collaboratively develop a long-term Basin environmental monitoring program. Organizations initially involved with EPA in development of the monitoring program include the Idaho Department of Environmental Quality (IDEQ), Washington Department of Ecology, Coeur d'Alene Tribe, Spokane Tribe, U.S. Fish and Wildlife Service (USFWS), U.S. Geological Survey (USGS), and the Bureau of Land Management (BLM). Media-specific workgroups were also established to focus on the specific monitoring needs regarding surface water, soil/sediment, biota and Coeur d'Alene Lake. The larger group and the smaller working groups had numerous discussions, teleconferences and several meetings to discuss the formulation of the environmental monitoring program.

Since establishment of the Coeur d'Alene Basin Environmental Improvement Project Commission ("the Basin Commission") in August 2002, EPA, together with the above stakeholders, has also been working with parties in the Commission and its support teams to continue development of the monitoring plan. The Monitoring Project Focus Team (PFT) was established to focus on monitoring issues. Members were self-selected but included nearly all of the parties involved in the initial monitoring workgroup established in January 2002, as well as additional participants from the Technical Leadership Group. Members of the Citizens' Coordinating Council (CCC) were invited to attend meetings to stay informed and provide input. Several CCC members indicated particular interest in the monitoring issues and in turn received all subsequent informational emails and conference call/meeting announcements.

ES.3 BEMP GOALS AND OBJECTIVES

The BEMP implements the environmental monitoring program established as part of the ecological component of the Bunker Hill Operable Unit 3 (OU 3) Selected Remedy. While an adequate monitoring program is critical to the successful implementation and evaluation of the remedy, the BEMP is limited to monitoring of ecological conditions in the Basin.

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 will provide 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
- Improve understanding of Basin processes and variability to in turn improve the effectiveness and efficiency of subsequent remedial action implementation

Groundwater monitoring is not included in the BEMP because groundwater cleanup is not specifically addressed in the interim ROD. The importance of the interrelationship between groundwater and surface water is recognized and groundwater is anticipated to be an important component of remedial-action-specific effectiveness monitoring.

ES.4 MONITORING PLAN DESIGN

The BEMP design is founded on several primary “principles” that are intended to enhance the practicality, robustness, and cost-effectiveness while maintaining adequate technical rigor and effectiveness. First, the BEMP is based on the remedy selected in the ROD. The ROD identifies benchmarks that include key indicators of ecological improvement representing the broad range of ecological conditions in the Basin. These key indicators were selected based on the results of the remedial investigation, feasibility study, ecological risk assessment, supporting technical memoranda and stakeholder input.

The following key indicators of ecosystem change are the focus of the monitoring program:

- Dissolved and total metals and nutrients in surface water
- Metals in soil and sediment in riverine and riparian environments in the Upper Basin (Ninemile Creek, Pine Creek, and South Fork); in riverine, riparian, lacustrine, and palustrine environments in the Lower Basin; and selected sediment areas of the Spokane River
- Fish, macroinvertebrates, and aquatic habit in riverine environments
- Songbirds, riparian vegetation, and invertebrates in riparian environments
- Waterfowl in wetland environments
- Waterfowl and fish in lake environments

Second, the monitoring program uses parameters and sampling frequencies that are intended to be sensitive and responsive to the potential rates of relevant environmental changes in the Basin over the period of the remedy implementation. Given the large area of the Basin and the pace of remedy implementation over the 30-year time frame, it is anticipated that relevant changes in environmental media may occur relatively slowly. Consequently, many parameters will be monitored at relatively long intervals (e.g., five or ten years). The monitoring program includes more frequent (e.g., several times per year, annually, or event-triggered) sampling at key locations (e.g., South Fork near confluence with North Fork, Coeur d'Alene River near Coeur d'Alene Lake, etc.). These “sentinel” locations will provide data on potential short-term trends or “trend discontinuities” in the longer-term trends. The sentinel data also will be used to aid interpretation of data from the more spatially comprehensive, but less frequent, sampling events. This approach is anticipated to reduce the expense associated with sample collection and analysis, while maintaining adequate monitoring effectiveness in terms of sensitivity and responsiveness.

ES.5 BEMP MONITORING ACTIVITIES

The environmental monitoring identified in the BEMP includes sampling, testing, and evaluation of three primary media: surface water, soil/sediment, and biological resources. The specific monitoring activities, sample locations and schedules for the BEMP are summarized in the tables at the end of this section.

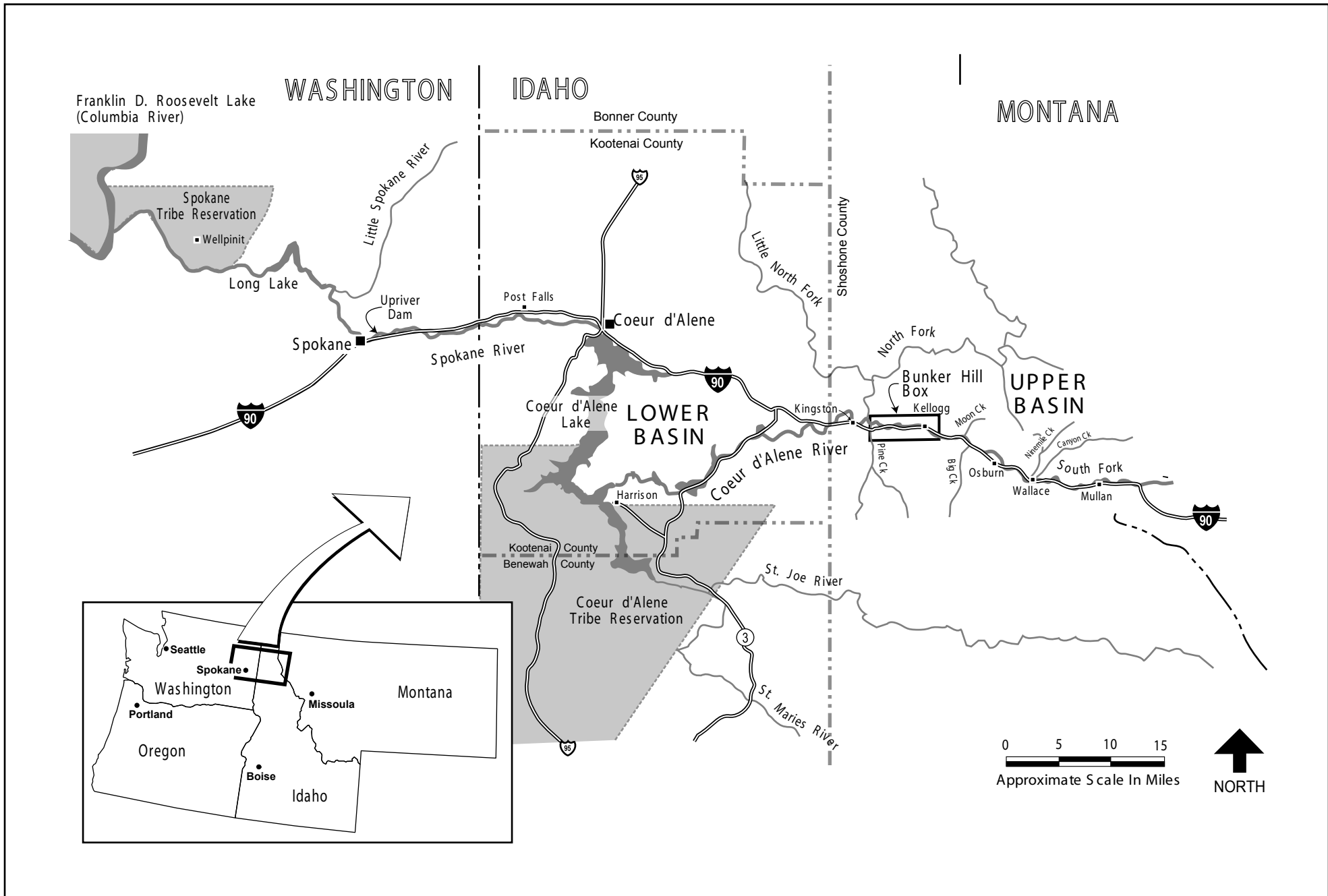
The monitoring effort represented by these tables includes many explicit tradeoffs that were made during development of the BEMP to achieve the goal of an annual monitoring cost of approximately \$300,000 (present worth), as represented in the OU 3 ROD. The BEMP thus assumes that EPA will have an available yearly budget over the 30-year life of the remedy of approximately \$300,000 present worth. EPA will establish Interagency Agreements with the USGS and USFWS to implement the monitoring program.

ES.6 RELATIONSHIP TO OTHER BASIN MONITORING

The BEMP will be integrated with remedial action effectiveness monitoring and monitoring conducted under other programs (e.g., Coeur d'Alene Lake Management Plan, State of Idaho Beneficial Use Reconnaissance Program monitoring, etc.). This approach is anticipated to reduce monitoring redundancy and enhance cost effectiveness. Remedial action effectiveness monitoring has been underway in the Bunker Hill Box (OUs 1 and 2) and will be initiated as OU 3 remedial actions are implemented. The monitoring conducted under the BEMP will be coordinated with the other monitoring efforts in the Basin to ensure as much commonality and compatibility as practical, given potentially different authorities, management goals, and jurisdictions.

ES.7 ADAPTIVE MANAGEMENT

The BEMP is anticipated to evolve over the 30-year remedy implementation timeframe. The monitoring program assumes an adaptive management approach will be used to guide that evolution while maintaining a sound scientific and technical basis. The adaptive management approach emphasizes "learning from experience" and is tied to the statutory five-year reviews.



Coeur d'Alene Basin
ENVIRONMENTAL
MONITORING PLAN

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Figure ES-1
Basin Study Area

Table ES-1
Surface Water Monitoring Program

| Location | Station ID | USGS Station ID | IDEQ Station ID | Gaging Station Type | Sentinel Monitoring ^a (Annual) | ROD Benchmark Monitoring ^a (Every 5 years) | Fall Baseflow Monitoring ^b (Every Oct.) | Rationale |
|---|-----------------------|-----------------------|-----------------|-----------------------------------|---|---|--|--|
| SFCDA above Canyon Creek (near Mullan at Deadman Gulch) | SF-208 | 12413040 | None | Misc. | -- | X | X | Supports ROD Benchmark Evaluation |
| Mouth of Canyon Creek | CC-287/ CC-288 | 12413125 | CC-1 | Standard | -- | X | X | Supports ROD Benchmark Evaluation |
| Mouth of Ninemile Creek | NM-305 | 12413130 | NM-1 | Standard | -- | X | X | Supports ROD Benchmark Evaluation |
| Upper E Fork Ninemile Creek (above Success Mine) | NM-295 | 124131265 | ENM-3 | Misc. | -- | X | X | Supports ROD Benchmark Evaluation |
| Lower E Fork Ninemile Creek | NM-298 | 12413127 | ENM-1 | Misc. | -- | X | X | Supports ROD Benchmark Evaluation |
| Elizabeth Park ^c | SF-268 | 12413210 | SF-3 | Standard | X | -- | X | Sentinel Station, Load from SFCDR above Bunker Hill Box, Supports ROD Benchmark Evaluation |
| Smeltonville ^e | SF-270 | 12413300 | SF-2 | Misc. | X | -- | X | Sentinel Station, Load from SFCDR below CIA & Govt. Gulch |
| Pine Creek Below Amy Gulch | PC-339 | 12413445 | None | Standard | -- | X | X | Supports ROD Benchmark Evaluation |
| South Fork at Pinehurst ^e | SF-271 | 12413470 | SF-1 | Real-time | X | -- | X | Sentinel Station, Load from SFCDR below Bunker Hill Box, supports ROD Benchmark Evaluation |
| Cataldo | LC-50 | 12413500 | Cataldo | Real-time ^e | -- | X | X | Upper Basin/Lower Basin River Character Transition |
| Harrison | L-C60 | 12413860 | Harrison | Real-time (w/ suspended sediment) | X | -- | X | Sentinel Station, Inflow to Lake |
| Spokane River at Outlet (See Note ^d) | See Note ^d | See Note ^d | None | Misc. ^e | X | -- | X | Sentinel Station, Outflow from Lake |
| Spokane River near Stateline | SR-55 | 12419500 | None | Misc. | -- | X | X | Required for WA State |
| NF CDR at Enaville | NF-50 | 12413000 | None | Real-time | X | -- | X | Sentinel Station, Load from North Fork CDR |
| St. Joe River at Mouth (Chatcolet) | SJ-60 | 12415130 | None | Real-time (w/ suspended sediment) | X | -- | X | Sentinel Station, Load from St. Joe River |

Schedule for Sentinel (Annual) and Benchmark (Every 5 Years) Monitoring

Coeur d'Alene River, its Tributaries and St. Joe River

1. Fall Baseflow (early October)
2. Initial Flush after Baseflow (Fall)
3. Rain-on-snow (Winter or Early Spring)
4. Winter Baseflow (January - March)
5. Peak Snowmelt Runoff (late May. - Suspended sediment chemistry)
6. Hydrograph Recession 1 (mid-June)
7. Hydrograph Recession 2 (mid July)
8. Hydrograph Recession 3 (mid-August)

Spokane River

1. Mid-Fall Drawdown (mid-October)
2. Post-Fall Drawdown (late December)
3. Low Pool (mid-Winter)
4. Rain-on-snow (late Winter or early Spring)
5. Lake Filling (late April or early May)
6. Snowmelt Runoff Peak (late May)
7. Full Pool (mid July)
8. Full Pool, Maximum Productivity (late August)

Notes:

^a Sentinel and benchmark station samples collected 8 times per year will be analyzed for total metals, dissolved metals, hardness, and nutrients. Metals analysis will include COECs (Cd, Pb, Zn; ROD Sect. 5.2.2). Nutrient analysis will include total and dissolved nitrogen and total and dissolved phosphorus. Samples collected during high flows (i.e. during peak snowmelt runoff in late May) will also be analyzed for suspended sediment grain size distribution metals.

^b Benchmark stations sampled once a year will be analyzed for dissolved metals and hardness only. Metals analyses will include COECs (Cd, Pb, Zn; ROD Sect. 5.2.2).

^c BEMP monitoring within the Box will be coordinated with ongoing surface water / groundwater monitoring performed for the Box. Coordination of these programs (to the extent practical) will aid in the interpretation of monitoring results from the BEMP and the Box monitoring programs.

^d Discharge measurements to be taken at Post Falls gaging station (USGS Station No. 12419000); surface water sample to be collected at Lake Outlet. EPA Station ID for Lake Outlet is SR-5 and for Post Falls is SR-50.

^e Funded by Idaho Water Resources

**Table ES-2
 Sediment Monitoring Program**

| Area | Sampling Description ^a |
|---|---|
| Sentinel Locations: Annual sampling to evaluate time-history trends (Fall) | |
| Upper Basin and Lower Basin : Surficial in-channel sediment from selected locations ^b | Composite surface samples |
| Spokane River : Near Stateline and near eastern boundary of Spokane Reservation | |
| Upper Basin, Lower Basin, and Spokane River: Water-suspended sediment sampling during high-flow conditions ^c | Filter residue from filtration of surface water samples collected during high flow events. |
| Basin-Wide Assessment ("Snapshot") Locations: Sampling every 10 years to evaluate aggregated, area-wide temporal averages (i.e. ratio analysis) (Fall) | |
| Upper Basin : Ninemile Creek, South Fork, Pine Creek | Composite surface sampling of in-channel and riparian sediment and soil. |
| Lower Basin : Floodplain and Harrison Delta ^d | Grid-based, composite surface sampling of riparian, lacustrine, and palustrine sediment deposits. |
| Spokane River: Mid and lower Long Lake ^d | Sediment core sampling |

^a Samples will be analyzed for grain size distributions of COEC metals (arsenic, cadmium, copper, lead, mercury, silver, and zinc). Sampling methods and analytical protocols for grain size distributions, sample digestion, and analysis are presented on BEMP Tables 5-1 and 5-2. (i.e. grain size distributions, sample digestion, and analytical methods). Suspended sediment monitoring locations and frequencies are presented on BEMP Table 4-1 (Surface Water Monitoring Program).

^b In-channel (low water) locations include: 1) South Fork above Canyon Creek, 2) Mouth of Canyon Creek, 3) Upper East Fork Ninemile Creek, 4) Lower East Fork Ninemile Creek, 5) Mouth of Ninemile Creek, 6) Elizabeth Park, 7) Smeltonville, 8) Pine Creek below Amy Gulch, 9) Pinehurst, 10) Enaville, 11) Cataldo, 12) Rose Lake, 13) Medimont, and 14) Harrison.

^c Water-suspended sediment sampling locations and frequencies are presented on BEMP Table 4-1 (Surface Water Monitoring Program).

^d Sampling at the Harrison delta and at Long Lake will be accomplished with a core sampler.

**Table ES-3
Biological Resources Monitoring Program**

| Parameter | Representative Scale | Frequency | Location(s) |
|--|---|---|---|
| Riverine Habitat | | | |
| Fish diversity/ abundance | Representative habitats at segment level (or weir counts of migratory fish) | 5-year | Ninemile Creek Pine Creek South Fork (Wallace to Elizabeth Park) |
| Fish Tissue Metal Levels (Upper Basin and Spokane River) | TBD | 5-year | Ninemile Creek Pine Creek South Fork (Wallace to Elizabeth Park) Spokane River near Stneareline |
| Bull Trout Habitat/ Temp. and Other Aquatic Resources Assessment | TBD | Years 1 and 2, then every 5 years | Mainstem CdA River |
| Bull Trout Population Survey and Assessment of Other Aquatic Resources | TBD | Year 2 only | Areas of cold refuge (bull trout) and representative habitats in Mainstem CdA River (other aquatic resources) |
| Macroinvertebrate diversity/abundance | Quadrants in representative habitats | Twice per 5-years | Elizabeth Park (above Box) SFCdA at Pinehurst (below Box) Lower Basin |
| | | 5- year | Ninemile Creek Pine Creek South Fork (Wallace to Elizabeth Park) Spokane River near Stneareline |
| Macroinvertebrate tissue metal levels | Quadrants in representative habitats | 5-year | Ninemile Creek Pine Creek South Fork (Wallace to Elizabeth Park) Spokane River near Stneareline |
| Aquatic habitat quality | Parameter dependent scale, representative habitats | 5-year | Ninemile Creek Pine Creek South Fork (Wallace to Elizabeth Park) Spokane River near Stneareline |
| Lacustrine / Palustrine Habitat | | | |
| Waterfowl population | Wetland/lake units | 3 Consecutive years @ 5 year intervals | Lower Basin |
| Waterfowl mortality | Mortality rate per unit effort (High use habitats) | 5-year | Lower Basin |
| Waterfowl blood lead | Representative stations, Harrison Slough (sentinel area) | 5-year | 4 Stations (including Harrison Slough) |
| Riparian Habitat | | | |
| Riparian vegetation / invertebrates | Transects in representative locations | 5-year | Ninemile Creek Pine Creek South Fork (Wallace to Elizabeth Park) Lower Basin |
| Songbird diversity/abundance | Point survey technique | 5 Consecutive years @ 10-year intervals | Monitoring Avian Productivity & Survivability survey routes (MAPS) in Pine Creek and Lower Basin |
| Songbird blood lead | Representative stations | 5-year | Ninemile Creek South Fork (Wallace to Elizabeth Park) Pine Creek Lower Basin (2 stations) |

**Table ES-4
 Monitoring Program Summary**

| Location | Station Type | USGS Gaging Station Type | Biological Resources | | | | | | | | | | | | | | | | | | | | | | |
|--|--------------------|--------------------------|----------------------|----------------------|----------|-------------------------------|---|--|---------|---------------------|----------------------|--|-------------------------------------|---------------------|---------------------|----------------------|------------------------------------|-----------------------|---------|----------|---------------------------------|-----------|---------|---------|---------|
| | | | Surface Water | | | Sediment | | | | | Riverine | | | | | | | Lacustrine/Palustrine | | | Riparian | | | | |
| | | | Sentinel Monitoring | Benchmark Monitoring | Low Flow | Surficial in-channel Sampling | In-channel, lacustrine, palustrine & riparian | Water-suspended Sediment at high flows (part of SW sampling) | | Diversity/Abundance | Tissue Metals Levels | Bull Trout Habitat Assessment ^c and Other Aquatic Resources | Bull Trout Pop. Survey ^c | Diversity/Abundance | Diversity/Abundance | Tissue Metals Levels | Aquatic Habitat Quality Assessment | Waterfowl | | | Habitat Riparian Veg. + Inverts | Songbirds | | | |
| | | | | | | | | Annual | 5 Years | | | | | | | | | Annual | Annual | 10 Years | | Annual | 5 Years | 5 Years | 5 Years |
| Monitoring Frequency | | | Annual | 5 Years | Annual | Annual | 10 Years | Annual | 5 Years | 5 Years | 5 Years | Year 2 only | 2 per 5 years | 5 Years | 5 Years | 5 Years | 3 consec. yrs. every 5 yrs. | 5 Years | 5 Years | 5 Years | 5 consec. yrs. every 10 yrs. | 5 Years | | | |
| SFCDA above Canyon Creek | Benchmark | Misc. | | X | X | X | | | X | | | | | | | | | | | | | | | | |
| Mouth of Canyon Creek | Benchmark | Std. | | X | X | X | | | X | | | | | | | | | | | | | | | | |
| Ninemile Drainage | | | | | | | X | | X | X | | | | X | X | X | | | | | X | | | X | |
| Mouth of Ninemile Creek | Benchmark | Std. | | X | X | X | | | X | | | | | | | | | | | | | | | | |
| Upper E. Fork Ninemile Creek | Benchmark | Misc. | | X | X | X | | | X | | | | | | | | | | | | | | | | |
| Lower E. Fork Ninemile Creek | Benchmark | Misc. | | X | X | X | | | X | | | | | | | | | | | | | | | | |
| SFCDA Drainage (Wallace-Elizabeth Park) | | | | | | | X | | X | X | | | | X | X | X | | | | | X | | | X | |
| Elizabeth Park (above Box) | Sentinel/Benchmark | Std. | X | | X | X | | X | | | | | X | | | | | | | | | | | | |
| Smeltonville | Sentinel | Misc. | X | | X | X | | X | | | | | | | | | | | | | | | | | |
| Pine Creek Drainage | | | | | | | X | | X | X | | | | X | X | X | | | | | X | X | X | X | |
| Pine Creek below Amy Gulch | Benchmark | Real-time | | X | X | X | | | X | | | | | | | | | | | | | | | | |
| SFCDA at Pinehurst (below Box) | Sentinel/Benchmark | Real-time | X | | X | X | | X | | | | | X | | | | | | | | | | | | |
| NFCDA at Enaville | Sentinel | Real-time | X | | X | X | | X | | | | | | | | | | | | | | | | | |
| Lower Basin | | | | | | | X | | | X | X | X | | | | | X | X | X | X | X | X | X | X | |
| Cataldo | | Real-time ^a | | X | X | X | | | X | | | | | | | | | | | | | | | | |
| Rose Lake | | NA | | | | X | | | | | | | | | | | | | | | | | | | |
| Medimont | | NA | | | | X | | | | | | | | | | | | | | | | | | | |
| Harrison | Sentinel/Benchmark | Real-time/SS | X | | X | X | X ^b | X | | | | | | | | | | | | | | | | | |
| Spokane River at Outlet | Sentinel | Misc. | X | | X | | | X | | | | | | | | | | | | | | | | | |
| Spokane River at Post Falls | | Std. ^a | | | | | | | | | | | | | | | | | | | | | | | |
| Spokane River near Stateline | | Misc. | | X | X | X | | | X | | | | | X | X | X | | | | | | | | | |
| Mid and lower Long Lake Near Eastern Boundary of Spokane Reservation | | NA | | | | | X ^b | | | | | | | | | | | | | | | | | | |
| St. Joe River at Mouth near Chatcolet | Sentinel | Real-time/SS | X | | X | | | X | | | | | | | | | | | | | | | | | |

^a Funded by Idaho Water Resources
^b Surface sediment sampling of Harrison delta and mid and lower Long Lake using a core sampler
^c Bull trout habitat assessment to be performed years 1 and 2, then every 5 years. Surveying (electroshocking) locations will be identified based on habitat assessment (i.e. areas of cold refuge).

Notes:
 Surface water samples to be analyzed for total and dissolved metals (Cd, Pb, Zn), suspended sediment, and nutrients.
 Gaging station types:
 Standard - recording equipment that needs the data to be physically downloaded
 Real-time - satellite transmission of recording data
 Real-time/SS - satellite transmission of recording data plus suspended sediment data
 Miscellaneous - no actual gaging station but can measure instantaneous flow and estimate hourly flow

**TableES-5
Monitoring Schedule**

| Media/Organism | Activity | Location | Year | 2004 | 2005* | 2006 | 2007 | 2008 | 2009 | 2010* | 2011 | 2012 | 2013 | 2014 | 2015* | 2016 | 2017 | 2018 |
|-----------------------------|--|--------------------------|------|------|-------|------|------|------|------|-------|------|------|------|------|-------|------|------|------|
| | | | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | Y9 | Y10 | Y11 | Y12 | Y13 | Y14 | Y15 | |
| SURFACE WATER | | | | | | | | | | | | | | | | | | |
| | Sentinel stations + annual low flow sampling | 7 stations / 15 stations | | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| | Benchmark stations | 8 stations | | | | | | X | | | | | X | | | | | X |
| SEDIMENT | | | | | | | | | | | | | | | | | | |
| | Surfical sediment sampling + suspended sediment | 16 areas | | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| | Broader sediment sampling + coring | 7 areas | | | | | | | X | | | | | | | | | |
| BIOLOGICAL RESOURCES | | | | | | | | | | | | | | | | | | |
| Waterfowl | Population survey | Lower Basin | | | X | X | X | | | X | X | X | | | X | X | X | |
| Waterfowl | Mortality Survey | Lower Basin | | | | | X | | | | | X | | | | | X | |
| Waterfowl | Blood Lead | 4 stations | | | | | | X | | | | | X | | | | | X |
| Songbird | Blood Lead | 5 stations | | | | | | | | X | | | | X | | | | X |
| Songbird | Population survey | 2 MAPs | | X | X | X | X | X | | | | | | X | X | X | X | X |
| Riparian spp. | Riparian habitat | 5 stations | | | | X | | | | | X | | | | | X | | |
| Aquatic Invertebrate | Diversity/adundance | 3 locations | | X | X | | | | X | X | | | | X | X | | | |
| Aquatic Invertebrate | Diversity/adundance | 4 additional locations | | | X | | | | | X | | | | | X | | | |
| Aquatic Invertebrate | Tissue residues | 4 locations | | | X | | | | | X | | | | | X | | | |
| Fish and invertebrate | Habitat assessment | 3 locations | | | X | | | X | | | | | X | | | | | X |
| Fish | Diversity/abundance | 3 locations | | | | X | | | | | X | | | | | X | | |
| Fish | Tissue residues | 4 locations | | | | X | | | | | X | | | | | X | | |
| Bull trout | Habitat/temperature assessment | S.F.CdA and Mainstem | | X | X | | | | | X | | | | | X | | | |
| Bull trout | Population survey | Areas of cold refuge | | | X | | | | | | | | | | | | | |
| REPORTING | | | | | | | | | | | | | | | | | | |
| | Annual data report/assessment | | | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| | Tech memo to support Five-Year Review report preparation | | | | | | | | | X | | | | | X | | | |

Notes:

* Indicates the year that five-year reviews will need to be completed.

Table ES-5 (Continued)
Monitoring Schedule

| Media/Organism | Activity | Location | Year | | | | | | | | | | | | | | | | |
|-----------------------------|--|--------------------------|-------------|--------------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|---|---|
| | | | 2019 Y16 | 2020* Y17 | 2021 Y18 | 2022 Y19 | 2023 Y20 | 2024 Y21 | 2025* Y22 | 2026 Y23 | 2027 Y24 | 2028 Y25 | 2029 Y26 | 2030* Y27 | 2031 Y28 | 2032 Y29 | 2033 Y30 | | |
| SURFACE WATER | | | | | | | | | | | | | | | | | | | |
| | Sentinel stations + annual low flow sampling | 7 stations / 15 stations | X | X | X | X | X | | X | X | X | X | X | | X | X | X | X | |
| | Benchmark stations | 8 stations | | | | | X | | | | | X | | | | | | X | |
| SEDIMENT | | | | | | | | | | | | | | | | | | | |
| | Surficial sediment sampling + suspended sediment | 16 areas | X | X | X | X | X | | X | X | X | X | X | | X | X | X | X | |
| | Broader sediment sampling + coring | 7 areas | X | | | | | | | | | | | | X | | | | |
| BIOLOGICAL RESOURCES | | | | | | | | | | | | | | | | | | | |
| Waterfowl | Population survey | Lower Basin | | X | X | X | | | | X | X | X | | | X | X | X | | |
| Waterfowl | Mortality Survey | Lower Basin | | | | X | | | | | | X | | | | | X | | |
| Waterfowl | Blood Lead | 4 stations | | | | | X | | | | | | X | | | | | X | |
| Songbird | Blood Lead | 5 stations | | | | | | | X | | | | | X | | | | | |
| Songbird | Population survey | 2 MAPs | | | | | | | X | X | X | X | X | | | | | | |
| Riparian spp. | Riparian habitat | 5 stations | | | X | | | | | | X | | | | | X | | | |
| Aquatic Invertebrate | Diversity/adundance | 3 locations | X | X | | | | | X | X | | | | X | X | | | | |
| Aquatic Invertebrate | Diversity/adundance | 4 additional locations | | X | | | | | | X | | | | | | X | | | |
| Aquatic Invertebrate | Tissue residues | 4 locations | | X | | | | | | X | | | | | X | | | | |
| Fish and invertebrate | Habitat assessment | 3 locations | | | | | X | | | | | | X | | | | | X | |
| Fish | Diversity/abundance | 4 locations | | | X | | | | | | X | | | | | | X | | |
| Fish | Tissue residues | 4 locations | | | X | | | | | | X | | | | | | X | | |
| Bull trout | Habitat/temperature assessment | S.F.CdA and Mainstem | | X | | | | | | | X | | | | X | | | | |
| Bull trout | Population survey | Areas of cold refuge | | | | | | | | | | | | | | | | | |
| REPORTING | | | | | | | | | | | | | | | | | | | |
| | Annual data report/assessment | | X | X | X | X | X | | X | X | X | X | X | | X | X | X | X | X |
| | Tech memo to support Five-Year Review report preparation | | | X | | | | | | X | | | | | X | | | | |

Notes:

* Indicates the year that five-year reviews will need to be completed.