

Monitoring for Inputs to the Biotic Ligand Model—Draft Monitoring Plan

Problem Statement

In 2015, the Idaho Department of Environmental Quality (DEQ) initiated rulemaking to update the existing hardness-dependent copper criteria by using the US Environmental Protection Agency's (EPA's) 2007 304(a) copper criteria, which uses other physicochemical properties of the water (e.g., pH, dissolved organic carbon) to predict water-body specific criteria using the Biotic Ligand Model (BLM). This update is a reasonable and prudent alternative identified in the National Oceanic and Atmospheric Administration's (NOAA's) biological opinion (BiOp) on Idaho's criteria for toxic substances to support aquatic life. To derive copper criteria using the BLM, inputs for the following physical and chemical characteristics of the water must be measured: temperature, pH, alkalinity, and the concentration of copper, dissolved organic carbon (DOC), calcium, magnesium, sodium, potassium, sulfate, and chloride.

While some data are available from state and national monitoring efforts, it is not geographically representative. In addition, there are very little DOC data available in Idaho. Therefore, when evaluating and implementing the BLM, DEQ will need to have some information on basic defaults that can be used when data are unavailable for a site. EPA and Oregon have recommended a regional approach to default inputs based on data collected from other locations. In its BiOp, NOAA recommends using critical default BLM criteria derived from data collected during the critical time period (late summer to early fall).

Like all equation- or model-based criteria, BLM-derived criteria are site and time specific. However, because the BLM is particularly sensitive to DOC and pH, it is possible to identify the critical time period for copper toxicity (i.e., when DOC is expected to be at its lowest concentrations). In the intermountain west, DOC is generally at its lowest during late summer baseflows. Therefore, by monitoring in late summer or early fall, we can identify critical BLM criteria for waters throughout the state.

The goal of this monitoring effort is to inform guidance development by identifying critical BLM criteria for copper that can be used for implementing the copper criteria when site-specific data are not available. The following questions will be addressed:

- What are the current copper and BLM conditions at locations throughout the state?
- Can Idaho waters be classified into regions based on physical and chemical properties, and can existing classifications be used to group waters (e.g., terrestrial ecoregions, freshwater ecoregions, basins and stream order, etc.)?
- Can critical BLM conditions be identified for each classification, and can these be used in place of derived BLM criteria when site-specific data are missing?

Intended Usage of Data

Data will be used to investigate classification of Idaho waters and to derive critical copper concentrations to inform guidance development. Possible classification systems to be explored may include EPA ecoregions, Idaho bioassessment site classes, or hydrological basins.

General Overview of Project

Sites will be monitored for the following physical and chemical parameters:

Physical Parameters	Chemical Parameters		
Temperature (°C)	Ca	Mg	Na
pH	K	SO ₄	Cl
Specific conductance ^a	Alkalinity	DOC	Cu
Dissolved oxygen ^a	TN* (TKN+NO ₃ +NO ₂)	TP*	

^a Not a BLM parameter

Physical parameters will be measured with a calibrated probe. Chemical parameters will be collected as a grab sample from a well-mixed area of the water body. Samples will be analyzed by the contract laboratory.

Project Timetable

All sites will be sampled between August 15 and October 15, 2016. Monitoring results will be available for analysis by November 30, 2016. Reporting will be completed by January 31, 2017.

Selection of Sampling Sites

Site selection will be targeted to address likely data deficiencies in areas where changes to the copper criteria are likely to be implemented.

There are 140 minor dischargers in Idaho. Monitoring will occur downstream and upstream of minor industrial and municipal discharge facilities and upstream and downstream of dischargers with current copper limits. This monitoring will provide DEQ with both ambient and mixed effluent water quality information at each facility, and can be used to provide data necessary for analysis and possible permit development after criteria are updated to the BLM. In addition, upstream ambient data can be used to estimate BLM IWQCs for upstream waters and to provide the basis for site classification.

Downstream monitoring will occur far enough below the outfall to allow for sufficient mixing of effluent with the receiving water.

A table of sites targeted for monitoring is included as an appendix to this monitoring plan.

Sampling Procedure

Do not handle sunscreen, insect repellent, or any other possible contaminant prior to sampling. Be careful not to disturb the area upstream of where sample is to be collected.

Samples must be delivered to the contract laboratory within 48 hours of collection. Crews must make arrangements to have samples either hand delivered or shipped accordingly and must coordinate with the laboratory to receive and preserve samples upon receipt.

The following procedure will be followed at each sampling location:

1. Navigate to sample location and identify well-mixed portion of stream for sample collection.
2. Record SiteID, Site Name, Date and Time of Collection, Name of Collector, and GPS Coordinates on field form.
3. Describe location, including directions to site, how to access site, and any other relevant information regarding accessing sampling location (e.g., “waded out from boat launch”).
4. Take photos of sampling location and other important features.
5. Using pencil or indelible marker, pre-label all sample containers with the following:
 - SiteID
 - Site name
 - Date and time of sample collection
 - Preservative (if used)
 - Name or initials of collector
6. Put on nitrile gloves.
7. Facing upstream, hold calibrated multiparameter probe or sonde at 0.5 m depth in well-mixed portion of the stream. Allow measurements to equilibrate (may take over 2 minutes), then record temperature (°C), specific conductance, and pH.
8. Facing upstream, hold labeled copper bottle from the base. Invert bottle, remove cap from sample container, and plunge into water to a depth of approximately 15 cm. Tip mouth upward toward surface. Allow bottle to fill completely, remove from the water, then cap tightly. Place the sample into a zip-sealed plastic bag, then place into cooler with wet ice.
9. Repeat with labeled DOC sample bottle.
10. Pull corners of labeled cubitainer to inflate—**do not blow into cubitainer** to inflate. Rinse three times with stream water. Collect sample from a depth of approximately 15 cm below surface. Fill cubitainer completely, with no headspace. Screw cap tightly into place, then seal with black electrical tape wrapped clockwise around base of cap. Place cubitainer into cooler with wet ice.
11. Decontaminate any wading gear following the decontamination procedure outlined in the BURP field manual for streams (www.deq.idaho.gov/media/60176695/burp-field-manual-streams.pdf). Rinse decontaminated gear with copious amounts of distilled water before sampling at next site.

Quality Assurance/Quality Control

The following table presents the sampling container, parameter, analytical method, preservative, and holding times for water chemistry samples. Raw samples will be delivered to the contract laboratory within 48 hours. The laboratory will filter and preserve aliquots of the raw sample upon receipt.

Sample Container	Parameter	Analytical Method	Preservative	Holding Time
1L Cubitainer	Ca, Mg, Na, K	EPA 200.7	4 °C Filter with 0.45 µm filter within 48 hrs Acidify to pH <2 after filtration	6 months preserved
	Total phosphorus	SM 4500 PF	4 °C Acidify to pH <2	48 hours
	Total nitrogen (TKN+NO ₃ +NO ₂)	SM 4500 NO/F	4 °C	7 days
	SO ₄ , Cl	EPA 300.0	4 °C	28 days
	Alkalinity	SM 2320 B	4 °C	14 days
250-mL amber glass with TFE septa	DOC	SM 5310 B	4 °C Filter with 0.45µm filter within 48 hrs Acidify to pH <2 after filtration	7 days
500-mL plastic bottle	Copper	EPA 200.8	Filter with 0.45µm filter within 48 hrs 4 °C Nitric acid within 2 weeks	6 months preserved

Data quality will be assessed through measurement of accuracy and precision. The following table presents the type, frequency, and data quality objective (DQO) for measures of accuracy and precision.

Measure	Frequency	Type	DQO
Accuracy	10% of all samples	Laboratory control samples or matrix spikes	%Recovery ±25%
Precision	10% of all samples	Field duplicates	Relative Percent Difference ±25%
	10% of all samples	Lab duplicates	Relative Percent Difference ±25%

Appendix. Location of minor permitted dischargers targeted for monitoring.

Permit ID	Facility Name	Receiving Water	Latitude	Longitude
ID0000019	Potlatch Corp. St. Maries Complex	Saint Joe River	47.329167	-116.591667
ID0000060	Sunshine Mine	South Fork Coeur d'Alene River	47.502549	-116.071223
ID0000159	Sunshine Precious Metals, Inc	South Fork Coeur d'Alene River	47.509185	-116.0243
ID0000167	Hecla Mining Comp. Star Phoenix Unit	South Fork Coeur d'Alene River	47.520808	-115.816986
ID0000213	Seneca Foods Corp.	Payette River	44.074826	-116.938085
ID0000230	Amalgamated Sugar Co. LLC	ID-002666-2 Main Drain	42.508853	-114.433808
ID0000388	Independent Meat Comp.	Rock Creek	42.533855	-114.444842
ID0001058	Orofino (WWTP), City of	Clearwater River	46.473889	-116.252222
ID0001155	Weiser (WWTP), City of	Snake River	44.241803	-116.971628
ID0001198	P4 Production LLC	Soda Creek	42.68416	-111.582215
ID0020001	Salmon (WWTP), City of	Salmon River	45.191944	-113.885556
ID0020010	Rigby, City of	Dry Bed Canal	43.702222	-111.918889
ID0020036	Grangeville (WWTP), City of	Threemile Creek	45.939444	-116.112222
ID0020061	Filer (WWTP), City of	Cedar Draw Creek	42.582556	-114.627778
ID0020087	Council (WWTP), City of	Weiser River	44.720833	-116.449722
ID0020117	Smelterville (WWTP), City of	South Fork Coeur d'Alene River	47.554444	-116.206667
ID0020125	Genesee (WWTP), City of	Cow Creek	46.5425	-116.9413
ID0020133	Shelly (WWTP), City of	Snake River	43.381008	-112.162765
ID0020141	Driggs (WWTP), City of	Woods Creek	43.722222	-111.123611
ID0020150	Orofino, City of	Clearwater River	46.4872	-116.2664
ID0020184	Winchester (WWTP), City of	Lapwai Creek	46.23806	-116.6192
ID0020206	Pierce (WWTP), City of	Orofino Creek	46.492222	-115.800556
ID0020222	Bonnars Ferry (WWTP), City of	Kootenai River	48.697778	-116.3325
ID0020231	McCall (WWTP), City of	North Fork Payette River	44.898333	-116.118611
ID0020249	Inkom (WWTP), City of	Portneuf River	42.7897	-112.24
ID0020265	Wilder (WWTP), City of	Wilder Ditch Drain (N43°40'39" W 116:54:06)	43.6775	-116.9017
ID0020311	Emmett (WWTP), City of	Payette River	43.873139	-116.532278
ID0020338	Fruitland (Snake River WWTP), City of	Snake River (N44:2:20.4 W116:55:25)	44.011861	-116.935083
ID0020354	Weippe (WWTP), City of	Jim Ford Creek	46.391667	-115.945833
ID0020362	Elk River, City of	Elk Creek	46.7847	-116.1725
ID0020389	New Plymouth (WWTP),	Payette River	43.988111	-116.803694

Permit ID	Facility Name	Receiving Water	Latitude	Longitude
	City of			
ID0020397	Nez Perce (WWTP), City of	Long Hollow Creek	46.234994	-116.240453
ID0020401	St. Anthony (WWTP), City of	Henry's Fork	43.951667	-111.714444
ID0020427	Homedale (WWTP), City of	Snake River	43.633889	-116.957222
ID0020451	Bonnars Ferry (WWTP), City of	Kootenai River	48.695556	-116.303611
ID0020532	Bennett Lumber Products, Inc.	Palouse River	46.920685	-116.77141
ID0020567	Central Shoshone County Water Dist.	Big Creek	47.507778	-116.073194
ID0020664	Buhl (WWTP), City of	Drainage ditch (N42:36:55 W 114:46:45)	42.6153	-114.7792
ID0020681	US Army Corps. of Eng. Albeni Falls Dam	Pend Oreille River	48.180639	-116.998361
ID0020699	USFS Red River Ranger Station	Red River	45.71	-115.3459
ID0020711	USFS Fenn Ranger Station	Selway River	46.0948	-115.5405
ID0020737	USFS Slate Creek Ranger Station, WWTP	Salmon River	46.638722	-116.282222
ID0020753	American Falls (WWTP), City of	Snake River	42.778611	-112.870833
ID0020788	Deary (WWTP), City of	Mount Deary Creek to Big Bear Creek	46.134444	-116.569167
ID0020800	Priest River (WWTP), City of	Pend Oreille River	48.180833	-116.893333
ID0020893	Pierce (WWTP), City of	Canal Creek	46.495	-115.796667
ID0020931	Riggins (WWTP), City of	Salmon River	45.416667	-116.3
ID0020940	Heyburn (WWTP), City of	Snake River	42.555058	-113.768105
ID0021016	Notus (WWTP), City of	Conway Gulch	43.7272	-116.8161
ID0021024	Horseshoe Bend (WWTP), City of	Payette River	43.912694	-116.202694
ID0021199	Fruitland (Payette WWTP), City of	Payette River	44.045	-116.930278
ID0021202	Marsing (WWTP), City of	Snake River	43.5517	-116.803333
ID0021211	Richfield (WWTP), City of	Little Wood River	43.04532	-114.16312
ID0021229	Kootenai-Ponderay Sewer Dist. (WWTP)	Boyer Slough	48.435	-116.67139
ID0021237	Riverside Water & Sewer Dist. Muncial Water Plant	Clearwater River	46.479167	-116.254167
ID0021288	Craigmont (WWTP), City of	John Dobbs Creek	46.23083	-116.4575
ID0021296	South Fork Coeur d'Alene River Sewer Dist. Mullan (WWTP)	South Fork Coeur d'Alene River	47.465278	-115.810556

Permit ID	Facility Name	Receiving Water	Latitude	Longitude
ID0021776	Parma, City of	Sand Hollow Creek	43.788889	-116.958333
ID0021806	Cambridge (WWTP), City of	Weiser River	44.568056	-116.672222
ID0021814	Kooskia (WWTP), City of	South Fork Clearwater R	46.1329	-115.9812
ID0021822	Lava Hot Springs (WWTP), City of	Portneuf River	42.623611	-112.029167
ID0021831	Middleton (WWTP), City of	Boise River	43.696694	-116.638
ID0021849	Cottonwood, City of	Cottonwood Creek	46.040556	-116.321944
ID0021997	Harrison (WWTP), City of	Coeur d'Alene River	47.461694	-116.768194
ID0022004	Glenns Ferry (WWTP), City of	Snake River	42.562516	-115.182891
ID0022012	Elk City Water & Sewer Association (WWTP)	Big Elk Creek	45.825	-115.444444
ID0022047	Rockland (WWTP), City of	Rock Creek	42.578571	-112.887302
ID0022071	Central Shoshone County Water Dist.	McFarren Creek	47.502861	-116.005083
ID0022446	Hansen (WWTP), City of	unnamed canal	43.534944	-114.307083
ID0022501	Potlatch (WWTP), City of	Palouse River	46.922778	-116.914167
ID0022713	Worley, City of	Rock Creek	47.405866	-116.918741
ID0022781	Plummer (WWTP), City of	Plummer Creek	47.339897	-116.871752
ID0022799	St. Maries (WWTP), City of	Saint Joe River	47.3292	-116.5919
ID0022845	Santa-Fernwood Sewer Dist. (WWTP)	Saint Maries River	47.176389	-116.491667
ID0022861	Bovill (WWTP), City of	Potlatch River	46.855556	-116.398056
ID0023027	Mackay (WWTP), City of	Big Lost River	43.54791	-113.363986
ID0023159	New Meadows (WWTP), City of	Little Salmon River	44.9772	-116.2906
ID0023167	Cascade (WWTP), City of (WWTP)	North Fork Payette River	44.477778	-116.016111
ID0023591	Star Water & Sewer Dist.	Lawrence Kennedy Canal	43.687111	-116.4975
ID0023604	Troy (WWTP), City of	West Fork Little Bear Creek	46.730833	-116.756944
ID0023710	Ashton (WWTP), City of	Spring Creek Trib to Henrys Fork	44.50424	-111.274065
ID0023728	Shoshone (WWTP), City of	Little Wood River	42.565204	-114.25247
ID0023761	Juliaetta (WWTP), City of	Potlatch River	46.561944	-116.709167
ID0023825	Grace, City of	Grace Dam Impoundment	42.901667	-111.998056
ID0023914	Joint School Dist. #71	Grasshopper Creek	46.434167	-115.887778
ID0024350	Sand Creek (STP)	Little Sand Creek	48.020278	-116.570556
ID0024384	Fairfield (WWTP), City of	Trib to Soldier Creek	42.9416	-112.8375
ID0024422	The Meadows, LLC Mobile Home Park	Big Wood River	43.6331	-114.3497

Permit ID	Facility Name	Receiving Water	Latitude	Longitude
ID0024490	Culdesac, City of	Lapwai Creek	46.3741	-116.6807
ID0024503	Riverside Water & Sewer Dist. (WWTP)	Clearwater River	46.5031	-116.3372
ID0024554	Kendrick (WWTP), City of	Potlach River	46.608611	-116.665278
ID0024627	Kootenai County Water Dist #1 (WWTP)	Lake Coeur d'Alene	47.649972	-116.7055
ID0024953	Darigold Westfarm Foods	Boise River	43.877778	-116.6975
ID0024988	Firth, City of	Snake River	43.306061	-112.188208
ID0025071	Clarkia Water & Sewer District	West Fork Saint Maries River	47.00525	-116.254306
ID0025101	Tensed (WWTP), City of	Hangman Creek	47.157154	-116.926137
ID0025143	Georgetown (WWTP), City of	Unnamed spring fed creek	42.4669	-111.3769
ID0025194	Rings Hotel Therapeutic Pool	Portneuf River	42.620004	-112.008796
ID0025224	Ahsahka Water & Sewer Dist.	Clearwater River	46.500833	-116.319722
ID0025259	Noranda Mining Inc. Blackbird Project	Blackbird Creek	45.116389	-114.338333
ID0025267	Paul Housing Authority	Lateral 185	42.598889	-113.742778
ID0025429	Silver Valley Inc., Caladay Mine	Lake Creek	47.47698	-115.942328
ID0025429	Silver Valley Inc., Caladay Mine	South Fork Coeur d'Alene River	47.47698	-115.942328
ID0025453	Caldwell Housing Authority Farmway Village	Farmers Cooperative Sebree Canal	43.7003	-116.7128
ID0025488	Boise, City of	Boise River	43.614667	-116.221278
ID0025569	Franklin (WWTP), City of	Cub River	42.013053	-111.804819
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ID0025585	Montpelier (WWTP), City of	Bear River	42.316944	-111.325556
ID0025607	Twin City Foods, Inc.	Clearwater River	46.426389	-117.030556
ID0025747	Carey, City of	Little Wood River	43.285	-113.93
ID0025887	North Idaho Correctional Institute	Trib to Lawyer Creek	46.080739	-116.434665
ID0025941	Hagerman (WWTP), City of	Snake River	42.807111	-114.903389
ID0026077	Rescue Mine		45.258428	-115.668533
ID0026085	Riverdale Resort	Bear River	42.16456	-111.837749
ID0026174	Ririe (WWTP), City of	Dry Bed Canal and Enterprise Canal	43.63397	-111.7736
ID0026310	Viola Water & Sewer Dist.	Fourmile Creek	46.829444	-117.035278
ID0026531	Lewiston (WWTP), City of	Clearwater River	46.420833	-116.99
ID0026654	Magic Valley Produce Inc.	Main Drain	42.6075	-113.781944
ID0026913	Roberts (WWTP), City of	Roberts Slough	43.713333	-112.119167
ID0026964	Simplot Meat Products, LLC	Indian Creek	43.601139	-116.58803

Permit ID	Facility Name	Receiving Water	Latitude	Longitude
ID0027120	Glanbia Foods, Inc. Gooding Plant	Little Wood River	42.947778	-114.627222
ID0027154	University of Idaho Aquaculture Lab	Paradise Creek	46.729703	-117.028575
ID0027383	Franklin United Oil	Indian Creek	43.670833	-116.670556
ID0027600	Jerome Cheese Comp.	Lateral 12 (N42:42:35 W 114:31:10)	42.709624 7	-114.527367
ID0027642	US Air Force, Mountain Home AFB (WWTP)	Trib to Canyon Creek (N43:3:19 W115:53:28)	43.053111	-115.894222
ID0027707	Clearwater Forest Industries, Inc.	South Fork Clearwater R	46.120833	-115.986111
ID0027901	Henggeler Packing Comp. Inc.	Drainage ditch upstream/Payette River	43.994444	-116.889167
ID0027928	Sun Valley Comp.	Big Wood River	43.670556	-114.366111
ID0027944	Laclede Water Dist. (WWTP)	Pend Oreille River	48.161389	-116.753889
ID0027952	Roaring Springs Water Park	Tenmile Creek	43.591667	-116.4
ID0027979	Elk Vallay Subdivision (WWTP)	South Fork Boise River	43.58706	-115.266624
ID0027995	Cabinet Gorge Power Station	Clark Fork River	48.119215 6	-116.143909
ID0028002	Kamiah (WWTP), City of	Clearwater River	46.237222	-116.028333
ID0028029	Jug Mountain Ranch Comp.	Cold Creek (trib 2 Boulder 2 Cascade Reservoir)	44.837126	-116.040559
ID0028037	Sorrento Lactalis, Inc. Swiss Village	Purdam Drain	43.605056	-116.491861
ID0028266	Epicenter Aquaculture	Warm Springs Hydro- Canal	44.391667	-114.111111
ID0028291	Kootenai River Nutrient Site	Kootenai River	48.620833	-116.049167
ID0028304	Greenleaf (WWTP), City of	Boise River	43.669716	-116.815225
ID0028312	Wilderness Ranch (WTP)	Mores Creek (N43:54:14 W 115:59:18)	43.904	-115.971556
ID0028321	Idaho Cobalt Project	Big Deer Creek	45.1392	-114.352006
ID0028355	Kuna (WWTP), City of	Indian Creek	43.5475	-116.493611