BADIN SHORES
RESORT
Badin Shores Resort Owners' Association Inc.
1 Clubhouse Drive
New London, NC 28127

7/22/2021

Christopher Ventaloro
NC DEQ-DWR Planning Section
1611 Mail Service Center
Raleigh, NC 27699-1611

Dear NC DEQ-DWR Planning Department:

We are a Homeowner's Association at Badin Lake that represents over 1,000 homeowners, and a supporter of Protect Badin Lake and Yadkin River Keeper. But, most importantly citizens seriously concerned about water quality.

Hazardous waste disposal sites at Alcoa's Badin Business Park continue to leak cyanide and fluoride, among other chemicals, into Badin Lake and Little Mountain Creek. As recently as April of this year, Alcoa reported exceedances in its monthly average for both cyanide and fluoride at Outfall 005 (the outfall that flows directly into Little Mountain Creek and into Lake Tillery's drinking water) under its current NPDES Storm Water Permit. We are frustrated and confused as to why the Division of Water Resources has not taken enforcement action on what appears to be a clear violation of effluent limitations of Alcoa Badin Business Park's permit. We are also concerned that the proposal in the Triennial Review to allow compliance by measuring EITHER "Free" OR "Total" cyanide will make it easier for Alcoa to comply with its permit limits in the future and provide less protection to the environment.

We are not scientists, but from what we understand, the current proposed changes to the ambient water quality standard for cyanide by measuring either "free" cyanide OR "total" cyanide appears to be another example of how the state is making a rule change just to make it easier for Alcoa to comply with its existing permit limits. Monitoring Badin Lake and Alcoa's discharge should never be about how we can make things easier or even cheaper for the regulated community. Rather it should be about the protection of public health and the environment. Even the states own regulatory analysis admits that allowing for the measurement of free cyanide is less strict.

Specifically, the proposal to allow the use of either a free OR total cyanide should be changed to require the measurement of BOTH F**ree** AND T**otal** cyanide to ensure the greatest level of protection. We support measuring free cyanide in order to make sure we are testing for the most bioavailable and potentially toxic forms of cyanide, which is currently not the case. However, I would ALSO like to see the definition of free cyanide be written to include hydrogen cyanide, cyanide ions, and the "weak acid dissociable" or WADs.

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We hope you will reconsider not making this an "either or" proposition but require that **both free and total cyanide** be measured and used for regulatory permits.

Thank you,

Badin Shores Resort Owners' Association Inc.

Protect Badin Lake

BADIN SHORES RESORT | 1 CLUBHOUSE DRIVE NEW LONDON, NC 28127
336-461-3833 Office 336-461-3800 Fax www.badinshores.org

July 23, 2021

Christopher Ventaloro
NC DEQ-DWR Planning Section
1611 Mail Service Center
Raleigh, NC 27699-1611

Dear NC DEQ-DWR Planning Department:

I am a resident at Badin Lake and a supporter of Protect Badin Lake and Yadkin River Keeper, but mostly importantly a citizen seriously concerned about water quality.

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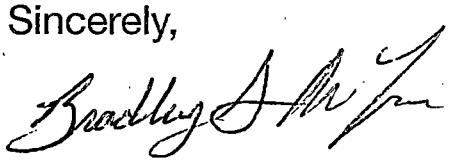
Sincerely,



Bradley McLain
602 Pearl Bay Drive
New London, NC. 28127

7/23/21

Dear NC DEQ-DWR Planning Department:

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Thank you!!

David E. Grein
207 Whisper Lake Drive
New London. NC 28127

David G Grein

July 22, 2021

Dear NC DEQ-DWR Planning Department:

I am a resident at Badin Lake and a supporter of Protect Badin Lake and Yadkin River Keeper, but mostly importantly a citizen seriously concerned about water quality.

Hazardous waste disposal sites at Alcoa's Badin Business Park continue to leak cyanide and fluoride, among other chemicals, into Badin Lake and Little Mountain Creek. As recently as April of this year, Alcoa reported exceedances in its monthly average for both cyanide and fluoride at Outfall 005 (the outfall that flows directly into Little Mountain Creek and into Lake Tillery's drinking water) under its current NPDES Storm Water Permit. We are frustrated and confused as to why the Division of Water Resources has not taken enforcement action on what appears to be a clear violation of effluent limitations of Alcoa Badin Business Park's permit. We are also concerned that the proposal in the Triennial Review to allow compliance by measuring EITHER "Free" OR "Total" cyanide will make it easier for Alcoa to comply with its permit limits in the future and provide less protection to the environment.

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Diane E. Grein

Diane E. Grein
207 Whisper Lake Drive
New London. NC 28127

PWC
Fayetteville's
HOMETOWN UTILITY

FAYETTEVILLE PUBLIC WORKS COMMISSION
955 OLD WILMINGTON RD
P.O. BOX 1089
FAYETTEVILLE, NORTH CAROLINA 28302-1089
TELEPHONE (910) 483-1401
WWW.FAYPWC.COM

August 3, 2021

Christopher Ventaloro
NC DEW-DWR Planning Section
1611 Mail Service Center
Raleigh, NC 27699-1611

Subject: 2020-2022 Triennial Review of Surface Water Quality Standards

Dear Mr. Ventaloro,

Fayetteville Public Works Commission supports the Triennial Review surface water quality standards review and renewal process and appreciates this opportunity to comment.

Specifically, we continue to be concerned about the elevated levels of 1,4-dioxane in the Cape Fear River Basin. 1,4-dioxane is a likely human carcinogen and does not readily biodegrade in the aquatic environment. PWC strongly supports DEQ's efforts through the Triennial Review process to move from a narrative standard for 1,4-dioxane to a quantitative standard. On behalf of our customers, we fully support adoption of the quantitative standard of 0.35 ug/L (or parts per billion) for all water supply watersheds and that standards be established for other surface water classifications that ensure protection of downstream water intakes. PWC continues to invest in monitoring for this contaminant and looks forward to cooperatively working within the Cape Fear River Basin and with DEQ to develop a management strategy to reduce 1,4-dioxane in our primary drinking water source, the Cape Fear River.

We all must work together to develop an effective basin-wide strategy and timeline to reduce loading into our water supply.

Sincerely,

Mick Noland

Mick Noland, PE
Chief Operations Officer
Water Resources Division
Fayetteville Public Works Commission

paper letter - Christopher Ventaloro
NC DEQ-DWR Planning Section
1611 Mail Service Center
Raleigh, NC 27699-1611

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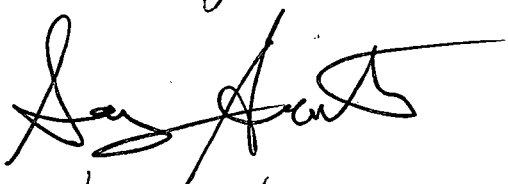

Lakeshore Drive
New London, NC 28127

paper letter - Christopher Ventaloro
NC DEQ-DWR Planning Section
1611 Mail Service Center
Raleigh, NC 27699-1611

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Nancy T. Yow
Jeff R. Yow
7/28/21
466 Shoreline Dr.
New London, NC
28127

James Wells
Vice President
Environmental, Health and Safety
Programs & Environmental Sciences
526 South Church Street
Charlotte, NC 28202
(980) 373-9646

July 30, 2021

Chris Ventalaro
North Carolina Department of Environmental Quality
Division of Water Resources Planning Section
1611 Mail Service Center
Raleigh, NC 27699-1611

Subject: Comments on 2019-2022 surface water triennial review

Dear Mr. Ventalaro:

Duke Energy (Duke) appreciates the opportunity to provide these comments pertaining to the subject matter. Duke is committed to assuring that the waters of our State remain well protected and has reviewed the proposed modifications to regulations found in NCAC 15A 2B .0200 and 15A NCAC 2B .0300. We have comments related to one area of the proposed changes in the rule: the proposed adoption of a fish tissue criteria for selenium.

Duke believes that its generating stations are likely to be the most directly affected, and possibly the only, permitted dischargers with an interest in the selenium criteria changes. It is important to the company that there are clear and scientifically supported requirements with an appropriate level of site-specific flexibility built into the regulation.

The company has several decades of experience monitoring selenium in fish tissue and surface water bodies. This history of intensive oversight and study of selenium bioaccumulation, population recovery and fishery health give the company a unique and knowledgeable position from which to submit these comments.

We offer the following suggestions and comments to assure that appropriate scientific rigor, clarity and site-specific flexibility are components of the modified rule. In addition to the narrative description and support for modifications, Duke has provided a proposed version of 15A NCAC 2B.0211(11)(d) at the end of this submittal.

1. **Duke Energy requests that the NC DEQ evaluate and remove non-peer reviewed data used in the development of the proposed selenium tissue criterion.**

40 CFR 131.11(a)(1) states that:

> *States must adopt those water quality criteria that protect the designated use. Such criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use…*

Duke Energy requests that the State calculate the selenium tissue criterion excluding the White Sturgeon WB EC10 from the national database for certain waterbodies used in calculating a criterion for adoption. This White Sturgeon study used in EPA's recommended criteria is an unpublished/non-peer reviewed PH.D. dissertation that produced only a single partial reproductive toxicity effect (i.e., 27.8 % abnormalities in fish larvae from a mean egg Se concentration of 20.5 mg/kg dry weight in adult sturgeon). USEPA typically models a toxicity dose response curve using the TRAP model. This however could not be done with only this one partial response, so EPA had to do a straight-line interpolation of the WB EC10 between the highest 0% and the 27.8 % effect in order to include it in the SSD generated from the national dataset. This is highly unusual and contrary to previous EPA actions and protocols.

The inclusion of the white sturgeon WB EC10 information led to a Species Sensitivity Distribution (SSD) that in turn generated the very conservative Se criteria of 8.5 mg/kg whole body, 11.3 mg/kg muscle, and 15.1 mg/kg egg/ovary values proposed by the State.

There is a precedence for excluding the White Sturgeon study at the state level. The State of Idaho excluded it from the SSD for those water bodies where the White Sturgeon did not exist (either not naturally occurring or excluded by barriers such as dams) and where habitat for them did not occur.

As the only entity whose operations may be affected by the proposed selenium criterion, Duke Energy believes this exclusion would apply to all the waterbodies around our coal-fired operation facilities except the Cape Fear river in Wilmington. For clarity, while Sutton lake is also in Wilmington, sturgeons (i.e., Atlantic and Shortnose) are excluded from Sutton lake by our 2 mm wedge wire screens at the river intake pumps. We have included a document from the Idaho Department of Environmental Quality of a study they performed justifying these site-specific exclusions entitled "Justification for Site-Specific Selenium Criterion for Aquatic Life in Portions of Idaho" as **Attachment 1**. At the sites in Idaho where this applies, the Se criteria are 9.5 WB, 13.1 M, and 19.0 E/O mg/kg dry weight based on deleting White Sturgeon from the SSD. EPA Region 10 approved the recalculation of the SSD without White Sturgeon data and the site-specific selenium criterion for these locations with where this species does not reside. Duke Energy believes this is the appropriate methodology to be used in North Carolina. Duke Energy staff are available to discuss and aid in this review if requested.

2. **If sturgeon data are not removed, Duke requests the Department authorize site specific standards calculated using the USEPA's "*Revised deletion process for site-specific recalculation for aquatic life criteria"* (**EPA-823-R-13-001 April 2013**) as part of the rule. Fish tissue values calculated using this USEPA process and approved by the Department should not have to seek a separate, lengthy approval process.**

Given the novel nature of the selenium tissue regulation, some site-specific methodology is warranted and appropriate. It is Duke's understanding that this procedure was developed by the EPA lead staff on the 2016 selenium aquatic life tissue criteria development and takes the specifics associated with selenium ecotoxicology into account in the procedure. A copy of this procedure is included as **Attachment 2** for reference. Duke requests that site-specific tissue standards calculated using this procedure may be adopted by reference in the modified rule.

3. **Duke Energy requests the North Carolina selenium criterion more closely align with the EPA National recommended criterion in several areas.**

   a. **Include frequency of allowable water column concentration excursion be**

As currently proposed, in the absence of fish tissue data, the North Carolina criteria would deem monthly average concentrations above 1.5 ug/l (lentic) and 3.1 ug/l (lotic) as violations of the criteria. The national recommended criterion is written such that exceedances of those water column concentrations "more than once in three years on average" would constitute an excursion. Duke Energy requests that the language from the recommended criteria allowing no more than one exceedance in a three-year period on average be included in the North Carolina criterion. This request is made to align the criteria with the national criterion and with the intent of NCGS 150B 19.3(a) which reads:

> *An agency authorized to implement and enforce State and federal environmental laws may not adopt a rule for the protection of the environment or natural resources that imposes a more restrictive standard, limitation, or requirement than those imposed by federal law or rule, if a federal law or rule pertaining to the same subject matter has been adopted, unless adoption of the rule is required by one of the subdivisions of this subsection.*

   b. **Include comments regarding the priority of fish tissues elements.**

Duke Energy requests that the following comments from Table 1 of the national criterion (page xv) and in Part 4 page 98 be included either in the text of 2B.0211(11)(d) or as a footnote to the selenium criteria table.

- *Fish whole body or muscle tissue supersedes water column element when both fish tissue and water concentrations are measured.*

- *recognizing that fish tissue elements supersede the water elements (except in special situations, see footnotes 3 and 4, Table 4.1) and that the egg-ovary tissue element supersedes all other tissue elements*

A copy of this language from the national criterion document is attached with this language highlighted in **Attachment 3**.

c. **Align with the national criterion by addition of a definition of"instantaneous" related to fish tissue measurement duration.**

Duke Energy requests that the regulation include the definition of "instantaneous" found in Table 1 of the national criterion document, which reads:

> *Fish tissue data provide instantaneous point measurements that reflect integrative accumulation of selenium over time and space in fish populations at a given site.*

An excerpt from the document with that language highlighted is included as **Attachment 3** for reference. The inclusion of this language supports the intent that fish tissue values are not intended reflect to a single specimen but to a population.

4. **Duke Energy requests that an implementation policy for selenium (analogous to the permitting policy for Mercury associated with the TMDL) be developed and made available for review and comment prior to any implementation of the selenium criterion and permit development based on the modified rule.**

The fish tissue criterion is unlike any previous criteria implemented through permit issuance so an implementation procedure for the selenium component of the rule should be developed before it is finalized. The way the agency will interpret and administer the provisions of the rule in permits should be clarified prior to adoption as this has significant bearing on compliance and potential costs.

To provide a summary of the suggestions described above, please see suggested edits to 15A NCAC .0211(11)(d).

The highlighted info below provides suggested edits to the DRAFT rule at .0211(11)(d) to accommodate the appropriate site-specific flexibility, regulation clarity and applicability based on fish species presence.

> (d) Selenium, chronic: The standard for chronic selenium has the following components: fish egg/ovary tissue, fish whole body or muscle tissue, and water column (lentic and lotic). These components shall be used in the following order of preference provided data is available:
>
> (i) Fish egg/ovary tissue;
> (ii) Fish whole body or muscle tissue;
> (iii) (iii) Water column.
>
> Fish tissue concentrations are determined as dry weight and water column concentrations are based on the dissolved fraction of selenium. The default chronic selenium standards are as follows:

Component		Magnitude[1]	Duration
Fish Tissue[3]	Fish egg/ovary tissue[1]	15.1	Instantaneous[4]
	Fish whole body or muscle tissue[1]	8.5 mg/kg whole body	Instantaneous[4]
		11.3 mg/kg muscle	Instantaneous[4]
Water Column	Lentic or lotic	1.5[2] ug/l lentic	30-day average
		3.1[2] ug/l lotic	30-day average

[1] Site specific tissue criteria calculated using the **Revised deletion process for site-specific recalculation for aquatic life criteria (**EPA-823-R-13-001 April 2013**)** may be approved by the Department on a case by case basis.

[2] not to be exceeded more than once in three years on average.

[3] Fish whole body or muscle tissue supersedes water column element when both fish tissue and water concentrations are measured. Egg-ovary tissue results, where available, supersede all other tissue elements and water concentrations.

[4] Fish tissue data provide instantaneous point measurements that reflect integrative accumulation of selenium over time and space in fish populations at a given site.

Thank you for the opportunity to submit these comments. If you have any questions or would like to further discuss any of the specifics, please feel free to contact Mr. Shannon Langley at (919) 546-2439 or shannon.langley@duke-energy.com.

Sincerely,

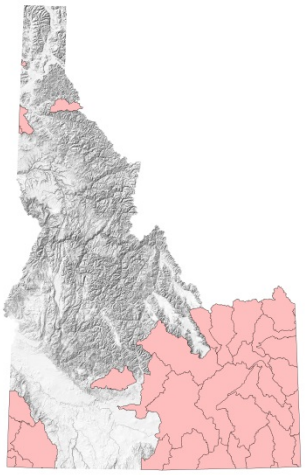
James Wells
Vice President, Environmental, Health and Safety
Programs & Environmental Sciences

Cc: Jessica Bednarcik
Shannon Langley
Zach Hall
Linda Hickok
Maverick Raber
Cyndi Winston

Attachment 1

"Justification for Site-Specific criterion for Aquatic Life in portions of Idaho" by the Idaho Department of Environmental Quality"

Justification for Site-Specific Selenium Criterion for Aquatic Life in Portions of Idaho



State of Idaho
Department of Environmental Quality
Water Quality Division
1410 N. Hilton
Boise, Idaho 83706

November 2017

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Table of Contents

1 Introduction 1
2 Geographic Scope of the SSC 2
2.1 Sturgeon Occurrence and Habitat 2
2.2 Critical Salmonid Habitat 4
2.3 Buffering White Sturgeon Waters 4
2.4 Site Definition 5
3 Determination of Resident Fishes Occurring Within the Site 7
4 Recalculation of the Se Criterion Based on Resident Fishes 8
4.1 Derivation of Fish Tissue Values 9
5 Protectiveness of the SSC 12
5.1 Resident Fishes 12
5.2 Downstream Waters 14
5.3 Beneficial Uses 14
References 16
Appendix A. Phylogeny of Idaho Fishes and Identification of Surrogates in the EPA Selenium National Toxicity Dataset 18
Appendix B. Available Selenium Concentrations in Water and Fish Tissue within Site (Subset from DEQ 2010). 24

List of Tables

Table 1. Subbasins and 4th field HUCs included in the Site. 6
Table 2. Site-specific selenium criterion. 9
Table 3. Calculation of the site-specific egg-ovary criterion element for selenium. 10
Table 4. Calculation of the site-specific whole-body criterion element for selenium. 11
Table 5. Calculation of the site-specific muscle criterion element for selenium. 12

List of Figures

Figure 1. Historical range of White Sturgeon (Acipenser transmontanus). 3
Figure 2. HUCs identified as White Sturgeon waters or critical salmonid habitat. 5
Figure 3. Geographic scope of the SSC. 7
Figure 4. Selenium in water column and fish muscle tissue in Idaho rivers (2008). 13

List of Acronyms

BAF	bioaccumulation factor
CF	conversion factor
DEQ	Idaho Department of Environmental Quality
EPA	United States Environmental Protection Agency
GMCV	genus mean chronic value
HUC	hydrologic unit code
IDFG	Idaho Department of Fish and Game
µg/L	micrograms per liter
mg/g	milligrams per gram
L/g	liter per gram
mg/kg dw	milligrams per kilogram dry weight
Se	selenium
SSC	site-specific selenium criterion

1 Introduction

This document provides the scientific justification and rationale for including a site-specific selenium criterion (SSC) in Idaho Code (Subsection 287.05) for waters within the geographic scope identified in section 2.4 of this document. The proposed SSC and related justification was informed by various stakeholders participating in the negotiated rulemaking process used by the Idaho Department of Environmental Quality (DEQ) to update its statewide selenium (Se) criterion for aquatic life (DEQ Docket No. 58-0102-1701).

This SSC was derived according to the procedures set forth in IDAPA 58.01.02.275.01.h. These procedures allow site-specific aquatic life criteria to be derived using scientifically justifiable approaches consistent with the assumptions and rationale in United States Environmental Protection Agency (EPA) guidance. Specifically, we derived fish tissue criterion elements using current EPA guidance on site-specific species deletion (EPA 2013) and criterion recalculation (EPA 1985) to account for differences in Se sensitivity between resident species within the Site and those species used in deriving the proposed statewide criterion.

Although Se may cause acute toxicity at high concentrations, the most detrimental effect on aquatic organisms is due to its bioaccumulative properties. Aquatic organisms exposed to Se accumulate it primarily through their diets and not directly from the water. In fish, Se toxicity occurs primarily through transfer to the eggs, reducing reproductive success and survival. In aquatic communities, fish are the most sensitive to Se effects (EPA 2016). Aquatic communities are expected to be protected from any potential acute effects of Se by this chronic criterion (EPA 2016).

Consistent with DEQ's proposed statewide Se criterion and the EPA's recommended national Se criterion (EPA 2016), the proposed SSC consists of four elements. They include a (1) fish egg-ovary element; (2) fish whole-body and/or muscle element; (3) water column element, which includes one value for lentic (still water) and one value for lotic (running water) aquatic systems; and (4) water column intermittent element to account for potential chronic effects from short-term exposures, which also includes one value for lentic and one value for lotic aquatic systems.

The proposed SSC elements are derived from the allowable concentration of Se in fish egg-ovary tissue of species or species surrogates that reside within the Site described below in section 2. Like DEQ's proposed statewide criterion and EPA's recommended national criterion, the SSC elements are protective of the Site's entire aquatic community, including fish, amphibians, and invertebrates. Criterion elements for whole-body and muscle tissue are based on ratios of concentrations in egg-ovary to concentrations in other tissues. These fish tissue concentrations, in conjunction with bioaccumulation factors (BAFs), are used to derive the water column elements, representing allowable concentration of Se in ambient water.

Both EPA's recommended national criterion and DEQ's proposed statewide criterion is based on the four most sensitive taxa in the national toxicity dataset. The species most sensitive to Se in the national toxicity dataset is White Sturgeon (*Acipenser transmontanus*)(EPA 2016). In Idaho, however, White Sturgeon have a limited range and are present only in select mainstem rivers (IDFG 2008). In order to protect the resident species assemblage within the Site and follow

Idaho Code stringency requirements, we provide the following scientific rationale for the proposed SSC.

The core steps for developing the proposed SSC include the following:

- Defining the geographic scope of the SSC (i.e., the Site)
- Determining the resident fish species that occur in the Site
- Recalculating the Se criterion based on resident fish species
- Evaluating of protectiveness of the SSC to resident fish species expected to be present in the Site

2 Geographic Scope of the SSC

To identify the Site, we must first identify waters located outside of White Sturgeon's historical range that do not provide required habitat elements to maintain a self-propagating population. Next we consider where White Sturgeon does not serve as a surrogate for another species. Finally, we provide a buffer by excluding from the Site waters that drain to these waters within the historical range of White Sturgeon. Thus the Site for purposes of this SSC is limited to waterbodies outside of the historical range of White Sturgeon, subbasins that do not drain directly into those waterbodies, and waterbodies not designated as critical habitat for Bull Trout or anadromous salmonids.

2.1 Sturgeon Occurrence and Habitat

In Idaho, White Sturgeon presence and historical range is limited to the mainstems of the Kootenai, Snake, and Salmon Rivers (Figure 1).

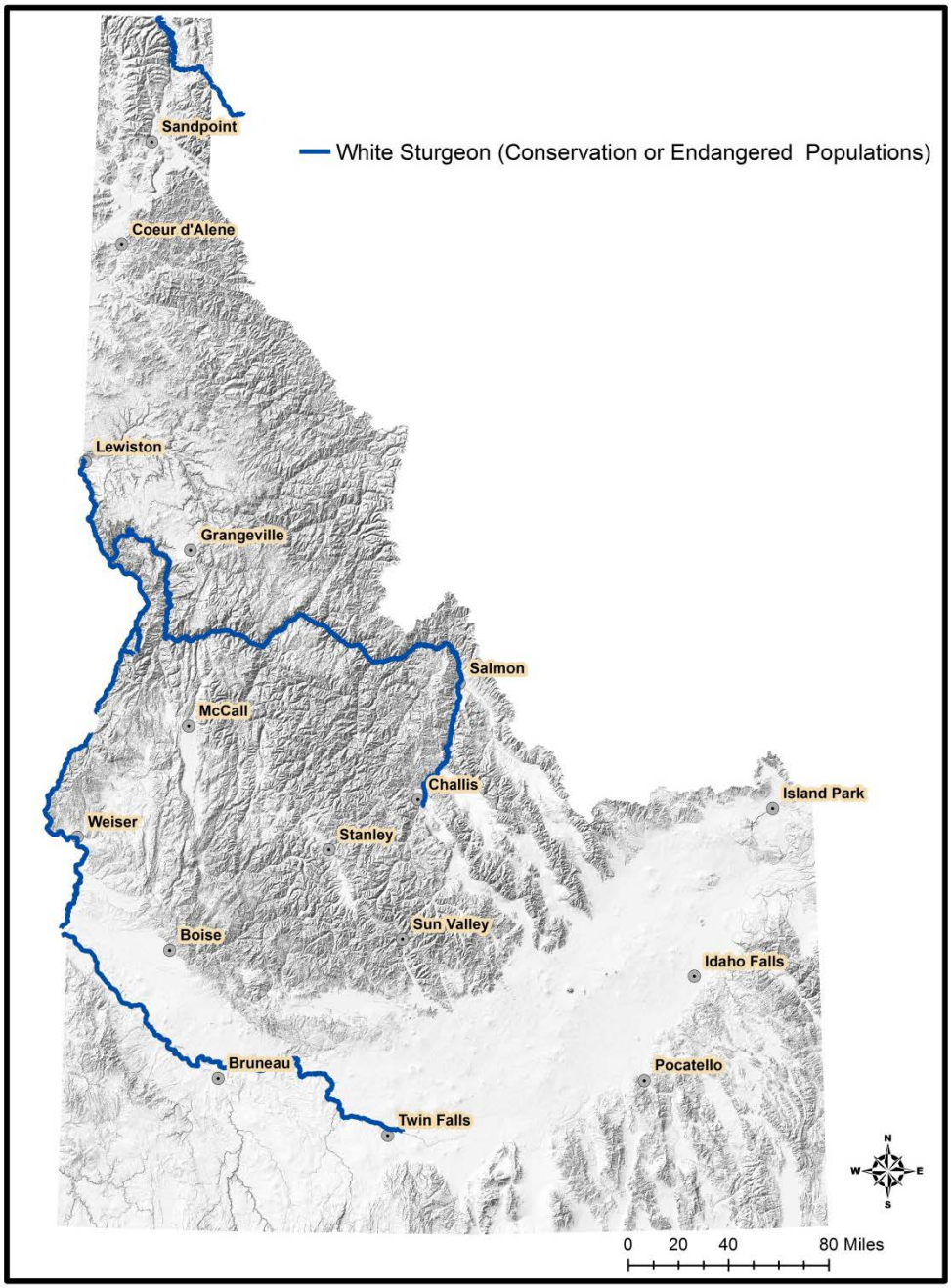

Figure 1. Historical range of White Sturgeon (*Acipenser transmontanus*).

The Kootenai River is habitat for an endangered population of White Sturgeon. The Kootenai River originates in Kootenay National Park in British Columbia, flows south into Montana, northwest into Idaho, then north through the Kootenai Valley back into British Columbia.

The Snake River population in Idaho is found in the Salmon and Snake Rivers. Although there are no barriers on the Salmon River, the White Sturgeon is rarely seen above the North Fork Salmon River (IDFG 2008). In the Snake River, individuals historically ranged upstream to Shoshone Falls. In 1990 they were introduced below American Falls Dam and at Idaho Falls (IDFG 2008). The Idaho Department of Fish and Game (IDFG) continues to stock hatchery-

produced White Sturgeon at American Falls Dam and Idaho Falls and manages them as a non-propagating sport fish population to expand White Sturgeon fishing opportunity outside its historical range (IDFG 2008). Since these fish are not expected to reproduce (IDFG 2008) and Se primarily affects fish populations through reproduction (EPA 2016), DEQ finds it appropriate to include all of the Snake River above Shoshone Falls as part of the Site for this SSC.

2.2 Critical Salmonid Habitat

Critical habitats of Bull Trout and anadromous salmonids are also excluded from the Site to ensure there is no adverse modification of critical habitats (Figure 2). Both Bull Trout and anadromous salmonid populations are protected from impacts of Se under the proposed statewide Se criterion.

2.3 Buffering White Sturgeon Waters

To further protect water quality where White Sturgeon may be present, we also include certain upstream waters where White Sturgeon is not expected to be found but that contribute to downstream water quality. For this SSC, all 4th field hydrologic unit codes (HUCs) flowing directly into the Kootenai and Salmon Rivers as well as Snake River below Shoshone Falls are excluded from the definition of the Site for this SSC.

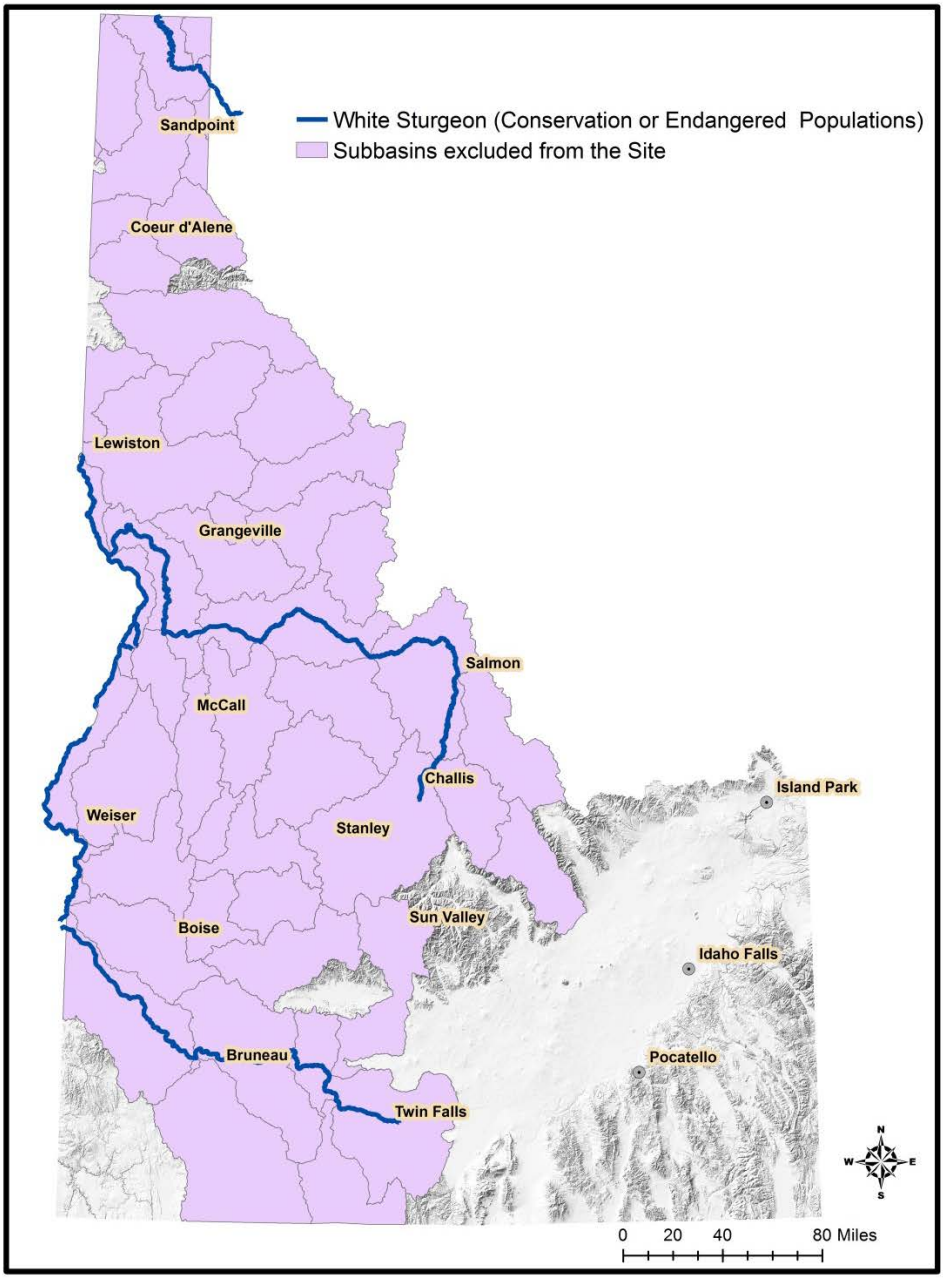

Figure 2. HUCs identified as White Sturgeon waters or critical salmonid habitat.

2.4 Site Definition

Based on the above considerations, the Site for purposes of this SSC is defined as all waters of the state except: (a) the main stems of the Kootenai, Salmon, and Snake Rivers within the historical range of White Sturgeon, (b) 4th field HUCs flowing directly into the historical range of White Sturgeon, and (c) designated critical salmonid habitat or Bull Trout habitat (Table 1, Figure 3).

Table 1. Subbasins and 4th field HUCs included in the Site.

HUC	Subbasin
16010102	Central Bear
16010201	Bear Lake
16010202	Middle Bear
16010203	Little Bear-Logan
16010204	Lower Bear-Malad
16020309	Curlew Valley
17010302	South Fork Coeur d'Alene
17010306	Hangman
17010308	Little Spokane
17040104	Palisades
17040105	Salt
17040201	Idaho Falls
17040202	Upper Henrys
17040203	Lower Henrys
17040204	Teton
17040205	Willow
17040206	American Falls
17040207	Blackfoot
17040208	Portneuf
17040209	Lake Walcott
17040210	Raft
17040211	Goose
17040214	Beaver-Camas
17040215	Medicine Lodge
17040216	Birch
17040218	Big Lost
17040220	Camas
17040221	Little Wood
17050104	Upper Owyhee
17050105	South Fork Owyhee
17050106	East Little Owyhee
17050107	Middle Owyhee
17050108	Jordan
17060109	Rock

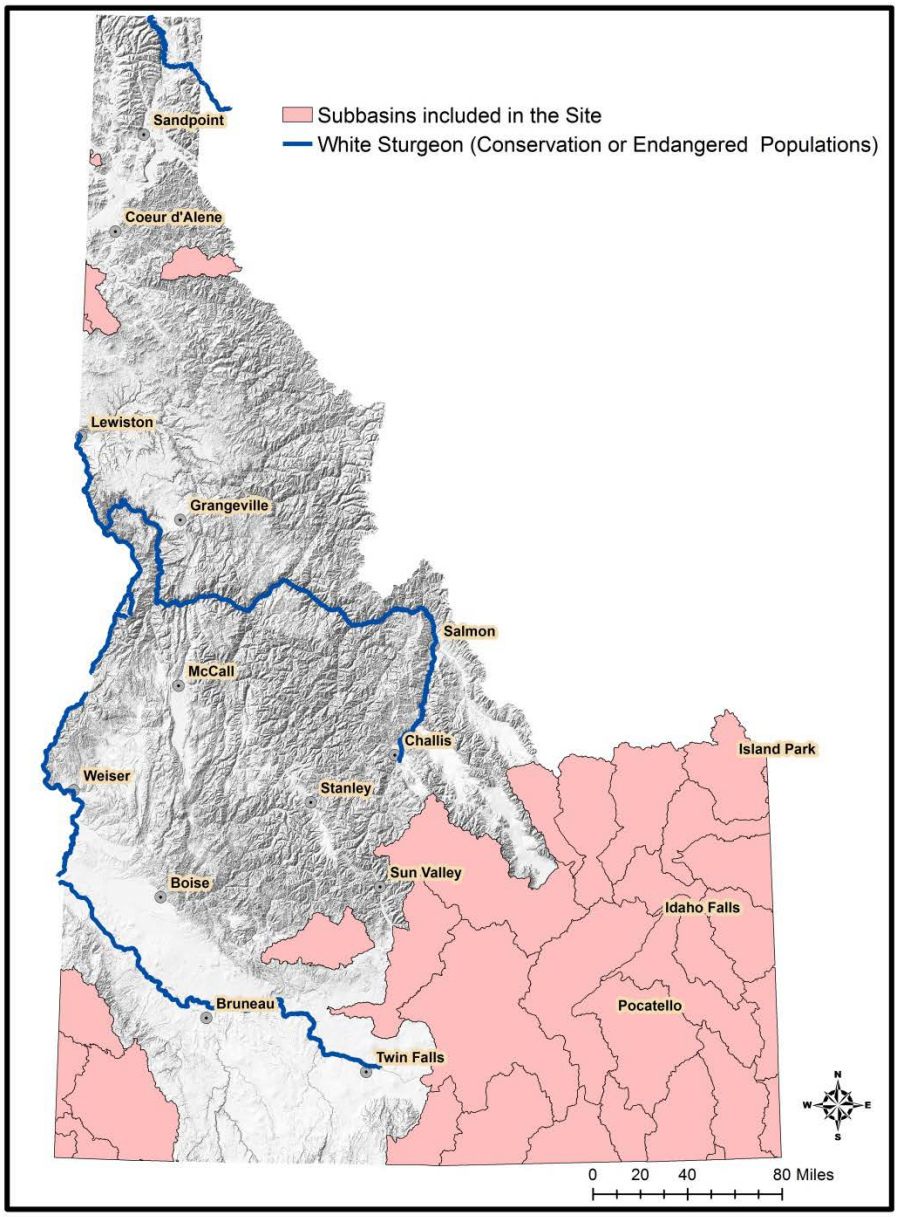

Figure 3. Geographic scope of the SSC.

3 Determination of Resident Fishes Occurring Within the Site

The EPA has developed a recalculation procedure for creating a site-specific toxicity dataset and species sensitivity distribution that is appropriate for deriving a site-specific aquatic life criterion (EPA 2013, 1985). The procedure provides guidance on modifying the national toxicity dataset for Se by correcting, adding, and/or deleting test results for species not relevant to the site in question. Deletion is based on taxonomic composition of the site; tested species most closely related to those occurring at the site are retained as surrogates.

According to the recalculation procedure, a species included in the national toxicity dataset for the pollutant under consideration must be retained in the dataset and used to develop a site-specific criterion if the species occurs within the site. However, if a species in the national toxicity dataset does not occur within the site and does not serve as a surrogate for another species, it may be deleted from the dataset used to calculate the site-specific criterion. Therefore, to use the recalculation procedure, DEQ must determine the resident fish species within the Site and determine whether White Sturgeon serve as a surrogate for any of those species.

The resident fishes found at the Site (Appendix A) were determined from state and federal spatial datasets, scientific literature (Sigler and Zaroban in prep.), biological opinions (FWS 2015, NOAA NMFS 2014), and Federal Register notices regarding critical habitat for threatened and endangered fish species in Idaho.

Although hatchery-stock White Sturgeon have been introduced by IDFG outside of White Sturgeon's historical range at two locations within the Site (section 2.1), we find it appropriate to delete White Sturgeon from the national toxicity dataset used to calculate this SSC. This is for two reasons. First, IDFG stocks White Sturgeon in portions of the Site solely to expand sport fishing opportunity. These individuals are not expected to reproduce, nor do these locations provide required habitat elements to maintain a self-propagating population of White Sturgeon, such as adequate water temperature, water flow, or extended reach length between dams (IDFG 2005, 2008). Therefore, we do not consider the White Sturgeon populations outside of their historical range to be resident fish for purposes of the recalculation procedure.

Second, we used the EPA recommended species deletion process (EPA 2013) to identify whether White Sturgeon is a surrogate for any other species occurring in the Site. White Sturgeon is not a surrogate for other resident species because no other species in the same genus, family, or order occurs at the site. Multiple species in the same class as White Sturgeon (*Actinopterygii*) do occur at the Site; however, they, or their surrogate, are in the national toxicity dataset (Appendix A). Using the process described in (EPA 2013), White Sturgeon can be deleted from a site-specific recalculation for aquatic life criteria (Appendix A).

4 Recalculation of the Se Criterion Based on Resident Fishes

This proposed fish tissue SSC (Table 2) is designed to protect resident fishes and other aquatic organisms within the Site since fish are the most sensitive aquatic organisms to Se (EPA 2016). The approach was developed after considering the fishes that occur at the Site, the fish-centric nature of the EPA 2016 Se criterion, and available regulatory guidance concerning scientifically defensible procedures for developing this SSC.

This SSC includes only fish tissue criterion elements. This SSC does not include site-specific water column criterion elements because we do not have the necessary site-specific bioaccumulation information to calculate them using the empirical bioaccumulation factor (BAF) approach described in EPA's national recommended Se criterion (EPA 2016). The data are too few and variable to adequately describe the mean lotic BAF within the Site (Appendix B). Further, we do not have empirical selenium data for lentic systems and, as a result, have no way

to derive a lentic water column value using data from the site. Therefore, the water column criterion elements set out in the statewide rule (footnote *r* in IDAPA 58.01.02.210.01) are also applicable to the water bodies identified in this SSC (Table 1).

Table 2. Site-specific selenium criterion.

Egg-Ovary (mg/kg dw)	Fish Tissue (mg/kg dw)	
Egg-Ovary	Whole Body	Muscle
19.0[a]	9.5[b]	13.1[b]

Notes: mg/kg dw = milligrams per kilogram dry weight; µg/L = micrograms per liter
[a] Egg-ovary supersedes any whole-body, muscle, or water column element when fish egg-ovary concentrations are measured (single measurement of an average or composite sample of at least five individuals of the same species).
[b] Fish whole-body or muscle tissue supersedes water column element when both fish tissue and water concentrations are measured (single measurement of an average or composite sample of at least five individuals of the same species where the smallest individual is no less than 75% of the total length [size] of the largest individual).

4.1 Derivation of Fish Tissue Values

The national toxicity dataset used to derive DEQ's proposed statewide Se criterion (and EPA's 2016 recommended Se criterion) consists of 15 genus mean chronic values (GMCVs). These include ten fish genera (*Acipenser*, *Salmo*, *Lepomis*, *Micropterus*, *Oncorhynchus*, *Pimephales*, *Gambusia*, *Esox*, *Cyprinodon*, and *Salvelinus*), three invertebrate genera (*Centroptilum*, *Brachionus*, and *Lumbriculus*), and two waived crustacean genera. The crustacean genera were waived because acceptable quantitative chronic toxicity values for Se are not available for crustaceans (EPA 2016). However, information available during EPA's derivation process demonstrated that fish species were more sensitive than crustaceans and were acceptable surrogates (EPA 2016).

After deleting the *Acipenser* Genus Mean Chronic Value (GMCV) from the toxicity dataset, we recalculated Se criterion elements based on the remaining resident species or species surrogates found in the national toxicity dataset as described in section 3. We arranged the 14 remaining GMCVs hierarchically by genera based on Se sensitivity. Using this approach, the four most sensitive genera used to calculate the egg-ovary criterion element of 19.0 milligrams per kilogram dry weight (mg/kg dw) are provided in Table 3. Given that there are species-specific conversion factors (CF) for Se bioaccumulation in different tissue types (i.e., egg-ovary, whole-body, muscle), this hierarchy changes depending on the tissue type being analyzed (EPA 2016).

Table 3. Calculation of the site-specific egg-ovary criterion element for selenium.

Genus	Rank	GMCV[a]	ln(GMCV)	ln(GMCV)^2	P=R/(N+1)[b]	sqrt(P)
Micropterus	4	26.3	3.27	10.69	0.27	0.52
Oncorhynchus	3	25.3	3.23	10.44	0.20	0.45
Salmo	2	21	3.04	9.27	0.13	0.37
Lepomis	1	20.6	3.03	9.15	0.07	0.26
		sum	12.57	39.55	0.67	1.59
					N[c]	14
					S^2[d]	1.28
					S	1.13
					L[e]	2.69
					A[f]	2.95
					FCV[g]	**19.0**

Notes:
[a] Se concentration in mg/kg dw
[b] Cumulative probability
[c] Total number of GMCVs in dataset
[d] $S^2 = \frac{\Sigma((\ln GMCV)^2) - ((\sum lnGMAV))^2/4}{\Sigma(F) - ((\Sigma(\sqrt{P}))^2/4)}$
[e] $L = (\Sigma(\ln\mathrm{GMAV}) - S\left(\Sigma(\sqrt{P})\right))/4$
[f] $A = S(\sqrt{0.05}) + L$
[g] Final chronic value (FCV) in mg/kg dw, $FCV = e^A$

The four most sensitive genera used to calculate the whole-body criterion element of 9.5 mg/kg dw are provided in Table 4.

Table 4. Calculation of the site-specific whole-body criterion element for selenium.

Genus	Rank	GMCV[a]	ln(GMCV)	ln(GMCV)^2	P=R/(N+1)[b]	sqrt(P)
Esox	4	14.2	2.65	7.04	0.27	0.52
Salmo	3	13.2	2.58	6.66	0.20	0.45
Oncorhynchus	2	11.6	2.45	6.01	0.13	0.37
Lepomis	1	9.9	2.29	5.26	0.07	0.26
		sum	9.98	24.96	0.67	1.59
					N[c]	14
					S^2[d]	2.03
					S	1.42
					L[e]	1.93
					A[f]	2.25
					FCV[g]	**9.5**

Notes:
[a] Se concentration in mg/kg dw
[b] Cumulative probability
[c] Total number of GMCVs in dataset
[d] $S^2 = \frac{\Sigma((\ln GMCV)^2)-((\sum lnGMAV))^2/4}{\Sigma(F)-((\Sigma(\sqrt{P}))^2/4)}$
[e] $L = (\Sigma(\ln\text{GMAV}) - S\left(\Sigma\left(\sqrt{P}\right)\right))/4$
[f] $A = S(\sqrt{0.05}) + L$
[g] Final chronic value (FCV) in mg/kg dw, $FCV = e^A$

The four most sensitive genera used to calculate the muscle criterion element of 13.1 mg/kg dw are provided in Table 5.

Table 5. Calculation of the site-specific muscle criterion element for selenium.

Genus	Rank	GMCV[a]	ln(GMCV)	ln(GMCV)^2	P=R/(N+1)[b]	sqrt(P)
Esox	4	21.7	3.08	9.47	0.27	0.52
Salmo	3	18.5	2.92	8.51	0.20	0.45
Lepomis	2	15.9	2.77	7.65	0.13	0.37
Oncorhynchus	1	14.3	2.66	7.08	0.07	0.26
		sum	11.42	32.71	0.67	1.59
					N[c]	14
					S^2[d]	2.68
					S	1.64
					L[e]	2.21
					A[f]	2.57
					FCV[g]	**13.1**

Notes:
[a] Se concentration in mg/kg dw
[b] Cumulative probability
[c] Total number of GMCVs in dataset
[d] $S^2 = \frac{\Sigma((\ln GMCV)^2) - ((\sum lnGMAV))^2/4}{\Sigma(F) - ((\Sigma(\sqrt{P}))^2/4)}$
[e] $L = (\Sigma(\text{lnGMAV}) - S\left(\Sigma(\sqrt{P})\right))/4$
[f] $A = S(\sqrt{0.05}) + L$
[g] Final chronic value (FCV) in mg/kg dw, $FCV = e^A$

5 Protectiveness of the SSC

5.1 Resident Fishes

Some important families of fish are not represented in EPA 2016 Se Criterion, such as the sculpin family (*Cottidae*) and catfish family (*Ictaluridae*). Sculpin, in the genus *Cottus*, are the only resident species in the family *Cottidae* that occur within the Site. However, no adverse effects were observed from dietary Se on hatching success, fry survival, deformities, fry length, or fry weight up to 22 mg Se/kg egg-ovary dw in Slimy Sculpin (*Cottus cognatus*) (Lo et al. 2014). In addition to this study, available field data indicate sculpins are generally less sensitive to Se than other fish species. Local sculpin population data collected in the Upper Blackfoot River watershed and the adjacent Salt River watershed (Formation and HabiTech, Inc 2012) also suggest sculpins are not particularly sensitive to Se and population densities were not statistically related to either surface water that contained Se concentrations less than 39 micrograms per liter (µg/L) or Se concentrations in sculpin tissue less than 25 mg/kg whole-body dw.

Additionally, species in the catfish family (*Ictaluridae*) were introduced in Idaho for recreational fishing opportunity and are managed as a sport fish (IDFG 2012). These are warm water species, and the vast majority of their current distribution is not within the Site (IDFG 2012). Phylogenetically, the catfish family is more closely related to other tested families (e.g., *Centrarchidae*) than it is to the sturgeon family (*Acipenseridae*) (Appendix A). The catfish family is not represented in the EPA's effects assessment due to the absence of valid tests yielding an EC10 or chronic value. Due to this, EPA evaluated the potential vulnerability of the taxonomic group that includes catfish by examining comparative fisheries observations of *Ictaluridae* and *Centrarchidae* sharing the same Se-contaminated waterbody. *Ictaluridae* abundances were unrelated to either the Se-sensitive centrarchid abundances or to the Se concentrations in the food chain (EPA 2016) and considered less sensitive to Se. Therefore, *Ictaluridae* occurring within the Site will also be protected by this SSC given that genera within *Centrarchidae* were used in the calculation of this SSC.

Lastly, DEQ collected data to determine ambient Se concentrations in waterbodies throughout Idaho. A total of 34 major river sites were randomly sampled in 2008 and 52 composite samples of fish (by species) were collected (DEQ 2010). Se concentrations in fish tissue throughout the state are predominately lower than the respective elements of the SSC (Figure 4).

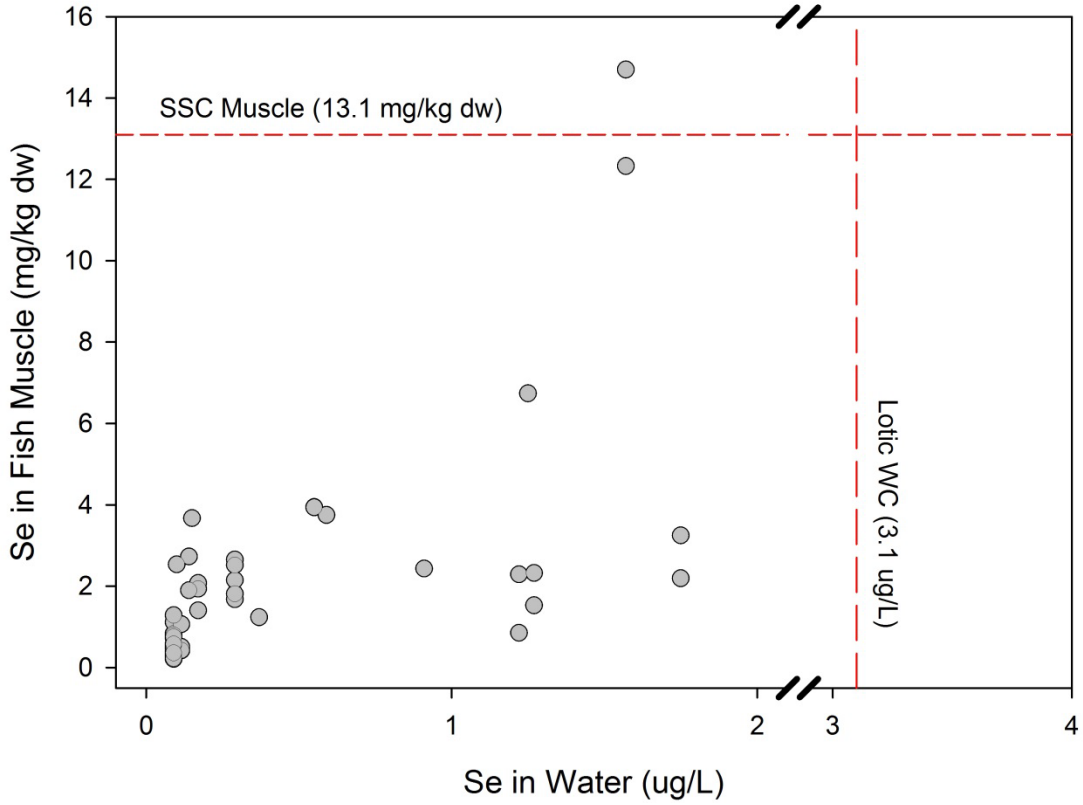

Figure 4. Selenium in water column and fish muscle tissue in Idaho rivers (2008).

Aside from two fish muscle tissue samples collected approximately 10 river miles above the Blackfoot Reservoir in the Blackfoot River (Cutthroat Trout = 14.7 mg/kg dw and Bridgelip Sucker = 12.3 mg/kg dw), all other fish muscle tissue collected were well below the muscle criterion element of 13.1 mg/kg dw proposed in this SSC (DEQ 2010). Se concentrations in the

Blackfoot River are impacted by phosphate mining upstream and this reach of the Blackfoot River is currently impaired for Se (DEQ 2017). The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) provides a framework to address Se pollution and employ remedial actions to reduce Se concentrations in aquatic systems in areas impacted by phosphate mining in southeast Idaho so that they can meet Water Quality Standards. Information on CERCLA investigations and cleanup is available at *http://www.deq.idaho.gov/regional-offices-issues/pocatello/southeast-idaho-phosphate-mining/southeastern-idaho-selenium-investigations/*.

Water column values for rivers throughout the state ranged from 0.1 µg/L to 1.8 µg/L (DEQ 2010) and were significantly lower than the statewide lotic water column value of 3.1 µg/L. The highest Se water column value was 1.75 µg/L at the Snake River near Homedale, Idaho, and subject to the proposed statewide criterion, followed by 1.57 µg/L at a site above Blackfoot Reservoir and close to phosphate mines. Nearly half the water samples analyzed had Se concentrations below the detection limit of 0.09 µg/L (DEQ 2010). These Idaho Se data show that in the vast majority of the state, aside from the limited area in which we already are addressing Se pollution, selenium concentrations are below both the statewide and SSC criterion elements.

This SSC is protective of resident fishes because we used the EPA-developed recalculation procedure for creating a site-specific toxicity dataset and species sensitivity distribution appropriate for deriving a site-specific aquatic life criterion (EPA 1985, 2013). Using this procedure, we found it appropriate to delete White Sturgeon from the national toxicity dataset and to recalculate the Se criterion elements based on the remaining resident species or species surrogates found in the national toxicity dataset as described in section 3. This approach reflects the nature of the pollutant and protects the beneficial uses and most sensitive resident species at the site as required in Idaho (IDAPA 58.01.02.275.01.h.ii.(5)(b)).

5.2 Downstream Waters

Aquatic life criteria must be met where they are applied, thus the statewide aquatic life Se criterion will need to be met in waters downstream of the Site. In the event a waterbody does not meet an aquatic life criterion, additional tools are employed to identify the source of the pollutant and address the issue (e.g., total maximum daily loads, source identification, point-source permit limits) so that aquatic life are protected within the waterbody and in downstream waters.

Protecting downstream waters is further required in IDAPA 58.01.02.070.08, which states that all waters must maintain a level of water quality at their pour point into downstream waters that provides for the attainment and maintenance of the water quality standards of those downstream waters, including waters of another state or tribe.

5.3 Beneficial Uses

Under IDAPA 58.01.02, the waterbodies within the Site have the following designated or presumed beneficial uses:

- Cold water—water quality appropriate for the protection and maintenance of a viable aquatic life community for cold water species.

- Salmonid spawning—waters that provide or could provide a habitat for active self-propagating populations of salmonid fishes.
- Seasonal cold water—water quality appropriate for the protection and maintenance of a viable aquatic life community of cool and cold water species, where cold water aquatic life may be absent during, or tolerant of, seasonally warm temperatures.
- Warm water—water quality appropriate for the protection and maintenance of a viable aquatic life community for warm water species.
- Modified—water quality appropriate for an aquatic life community that is limited due to one or more conditions set forth in 40 CFR 131.10(g), which preclude attainment of reference streams or conditions.

All beneficial uses of waters within the Site are protected by this SSC including salmonid spawning and cold water with no detrimental changes in biological communities of warm water or seasonal cold water since White Sturgeon is a phylogenetic outlier to all other fish species in Idaho and because of the geographical range of the Site. This complies with Idaho rules (IDAPA 58.01.02.275) and EPA guidelines (EPA 1985) for establishing site-specific criteria by not impairing designated or existing beneficial uses where aquatic communities do not vary substantially in sensitivity to pollutant within the specific geographical area described.

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GIS Coverages

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Digital Orthoimagery Series of Idaho (2011, 1-m, Natural Color + IR).

NAIP - ortho_1-1_1n_s_id035_2009_1_1.sid.

Clearwater National Forest Landtypes, Landtype Associations, Landtype Association Groups Land System Inventory completed by Dale Wilson, Soils Scientist, Clearwater NF 1983–1993 Updates and Edits by Jim Mital, Soils Scientist, Clearwater NF 1993–present.

DEQ SDE Feature Classes: ADB Support 2010.

Pathfinder Sites: GPS waypoint transfer by MN DNR-Garmin applications.

Appendix A. Phylogeny of Idaho Fishes and Identification of Surrogates in the EPA Selenium National Toxicity Dataset

Class	Order	Family	Genus	Genus/species/subspecies	Common Name	Site Resident?	Tested?	Note
Actinopterygii	*Acipenseriformes*	*Acipenseridae*	*Acipenser*	*Acipenser transmontanus*	White Sturgeon	NO	YES	1
Actinopterygii	*Cypriniformes*	*Catostomidae*	*Catostomus*	*Catostomus ardens*	Utah Sucker	YES	NO	2
Actinopterygii	*Cypriniformes*	*Catostomidae*	*Catostomus*	*Catostomus catostomus*	Longnose Sucker	YES	NO	2
Actinopterygii	*Cypriniformes*	*Catostomidae*	*Catostomus*	*Catostomus macrocheilus*	Largescale Sucker	YES	NO	2
Actinopterygii	*Cypriniformes*	*Catostomidae*	*Chasmistes*	*Chasmistes muriei*	Snake River Sucker	YES	NO	2
Actinopterygii	*Cypriniformes*	*Catostomidae*	*Pantosteus*	*Pantosteus bondi (Catostomus)*	Cascadian Sucker	YES	NO	2
Actinopterygii	*Cypriniformes*	*Catostomidae*	*Pantosteus*	*Pantosteus columbianus (Catostomus)*	Bridgelip Sucker	YES	NO	2
Actinopterygii	*Cypriniformes*	*Catostomidae*	*Pantosteus*	*Pantosteus platyrhynchus (Catostomus)*	Mountain Sucker	YES	NO	2
Actinopterygii	*Cypriniformes*	*Catostomidae*	*Pantosteus*	*Pantosteus virescens (Catostomus)*	Green Sucker	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cobitidae*	*Misgurnus*	*Misgurnus anguillicaudatus*	Oriental Weatherfish	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Acrocheilus*	*Acrocheilus alutaceus*	Chiselmouth	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Carassius*	*Carassius auratus*	Goldfish	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Couesius*	*Couesius plumbeus*	Lake Chub	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Ctenopharyngodon*	*Ctenopharyngodon idella*	Grass Carp	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Cyprinodon*	*Cyprinodon macularius*	desert pupfish	NO	YES	3,4
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Cyprinus*	*Cyprinus carpio*	Common Carp (including koi)	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Gila*	*Gila atraria*	Utah Chub	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Lepidomeda*	*Lepidomeda copei*	Northern Leatherside Chub	YES	NO	2

Class	Order	Family	Genus	Genus/species/subspecies	Common Name	Site Resident?	Tested?	Note
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Mylocheilus*	*Mylocheilus caurinus*	Peamouth	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Notemigonus*	*Notemigonus crysoleucas*	Golden Shiner	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Notropis*	*Notropis hudsonius*	Spottail Shiner	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Pimephales*	*Pimephales promelas*	Fathead Minnow	YES	YES	3
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Ptychocheilus*	*Ptychocheilus oregonensis*	Northern Pikeminnow	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Rhinichthys*	*Rhinichthys cataractae*	Longnose Dace	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Rhinichthys*	*Rhinichthys falcatus*	Leopard Dace	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Rhinichthys*	*Rhinichthys osculus*	Speckled Dace	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Rhinichthys*	*Rhinichthys umatilla*	Umatilla Dace	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Richardsonius*	*Richardsonius balteatus*	Redside Shiner	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Siphateles*	*Siphateles bicolor*	Tui Chub	YES	NO	2
Actinopterygii	*Cypriniformes*	*Cyprinidae*	*Tinca*	*Tinca tinca*	Tench	YES	NO	2
Actinopterygii	*Cyprinodontiformes*	*Fundulidae*	*Fundulus*	*Fundulus diaphanus*	Banded Killifish	YES	NO	2
Actinopterygii	*Cyprinodontiformes*	*Poeciliidae*	*Gambusia*	*Gambusia affinis*	Western Mosquitofish	YES	YES	3
Actinopterygii	*Cyprinodontiformes*	*Poeciliidae*	*Poecilia*	*Poecilia mexicana*	Shortfin Molly	YES	NO	2
Actinopterygii	*Cyprinodontiformes*	*Poeciliidae*	*Poecilia*	*Poecilia reticulata*	Guppy	YES	NO	2
Actinopterygii	*Cyprinodontiformes*	*Poeciliidae*	*Xiphophorus*	*Xiphophorus hellerii*	Green Swordtail	YES	NO	2
Actinopterygii	*Cyprinodontiformes*	*Poeciliidae*	*Xiphophorus*	*Xiphophorus spp.*	Platy	YES	NO	2
Actinopterygii	*Esociformes*	*Esocidae*	*Esox*	*Esox lucius*	Northern Pike	YES	YES	3,5
Actinopterygii	*Esociformes*	*Esocidae*	*Esox*	*Esox lucius X E. masquinongy*	Tiger Muskellunge	YES	NO	2

Class	Order	Family	Genus	Genus/species/subspecies	Common Name	Site Resident?	Tested?	Note
Actinopterygii	*Gadiformes*	*Gadidae*	*Lota*	*Lota lota*	Burbot	NO	NO	—
Actinopterygii	*Perciformes*	*Centrarchidae*	*Lepomis*	*Lepomis cyanellus*	Green Sunfish	YES	NO	2
Actinopterygii	*Perciformes*	*Centrarchidae*	*Lepomis*	*Lepomis gibbosus*	Pumpkinseed	YES	NO	2
Actinopterygii	*Perciformes*	*Centrarchidae*	*Lepomis*	*Lepomis gulosus*	Warmouth	YES	NO	2
Actinopterygii	*Perciformes*	*Centrarchidae*	*Lepomis*	*Lepomis macrochirus*	Buegill Sunfish	YES	YES	3,6
Actinopterygii	*Perciformes*	*Centrarchidae*	*Micropterus*	*Micropterus dolomieu*	Smallmouth Bass	YES	NO	2
Actinopterygii	*Perciformes*	*Centrarchidae*	*Micropterus*	*Micropterus salmoides*	Largemouth Bass	YES	YES	3,6
Actinopterygii	*Perciformes*	*Centrarchidae*	*Pomoxis*	*Pomoxis annularis*	White Crappie	YES	NO	2
Actinopterygii	*Perciformes*	*Centrarchidae*	*Pomoxis*	*Pomoxis nigromaculatus*	Black Crappie	YES	NO	2
Actinopterygii	*Perciformes*	*Cichlidae*	*Amatitlania*	*Amatitlania nigrofasciatum*	Convict Cichlid	YES	NO	2
Actinopterygii	*Perciformes*	*Cichlidae*	*Astronotus*	*Astronotus ocellatus*	Oscar	YES	NO	2
Actinopterygii	*Perciformes*	*Cichlidae*	*Oreochromis*	*Oreochromis aureus*	Blue Tilapia	YES	NO	2
Actinopterygii	*Perciformes*	*Cichlidae*	*Oreochromis*	*Oreochromis mossambicus*	Mozambique Tilapia	YES	NO	2
Actinopterygii	*Perciformes*	*Cichlidae*	*Tilapia*	*Tilapia zillii*	Redbelly Tilapia	YES	NO	2
Actinopterygii	*Perciformes*	*Percidae*	*Perca*	*Perca flavescens*	Yellow Perch	YES	NO	2
Actinopterygii	*Perciformes*	*Percidae*	*Sander*	*Sander canadensis*	Sauger	YES	NO	2
Actinopterygii	*Perciformes*	*Percidae*	*Sander*	*Sander vitreus*	Walleye	YES	NO	2
Actinopterygii	*Percopsiformes*	*Percopsidae*	*Percopsis*	*Percopsis transmontana*	Sand Roller	NO	NO	—
Actinopterygii	*Salmoniformes*	*Osmeridae*	*Osmerus*	*Osmerus mordax*	Rainbow Smelt	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Coregonus*	*Coregonus clupeaformis*	Lake Whitefish	YES	NO	2

Class	Order	Family	Genus	Genus/species/subspecies	Common Name	Site Resident?	Tested?	Note
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Oncorhynchus*	*Oncorhynchus aquabonita*	Golden Trout	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Oncorhynchus*	*Oncorhynchus clarkii behnkei*	Snake River fine-spotted cutthroat trout	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Oncorhynchus*	*Oncorhynchus clarkii bouvieri*	Yellowstone cutthroat trout	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Oncorhynchus*	*Oncorhynchus clarkii henshawi*	Lahontan Cutthroat Trout	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Oncorhynchus*	*Oncorhynchus clarkii lewisi*	Westslope Cutthroat Trout	YES	YES	3,7
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Oncorhynchus*	*Oncorhynchus clarkii utah*	Bonneville Cutthroat Trout	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Oncorhynchus*	*Oncorhynchus kisutch*	Coho Salmon	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Oncorhynchus*	*Oncorhynchus mykiss*	Rainbow Trout (including redband and steelhead)	YES	YES	3,7
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Oncorhynchus*	*Oncorhynchus mykiss kamloops*	Kamloops trout	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Oncorhynchus*	*Oncorhynchus nerka*	Sockeye Salmon (including kokanee)	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Oncorhynchus*	*Oncorhynchus tshawytscha*	Chinook Salmon	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Prosopium*	*Prosopium abyssicola*	Bear Lake Whitefish	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Prosopium*	*Prosopium coulterii*	Pygmy Whitefish	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Prosopium*	*Prosopium gemmifer*	Bonneville Cisco	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Prosopium*	*Prosopium spilonotus*	Bonneville Whitefish	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Prosopium*	*Prosopium williamsoni*	Mountain Whitefish	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Salmo*	*Salmo trutta*	Brown Trout	YES	YES	3,7
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Salvelinus*	*Salvelinus alpinus oquassa*	Sunapee trout - same as Arctic Char (Linder 1963)	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Salvelinus*	*Salvelinus confluentus*	Bull Trout	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Salvelinus*	*Salvelinus confluentus X S. fontinalis*	bull trout x brook trout hybrid	YES	NO	2

Class	Order	Family	Genus	Genus/species/subspecies	Common Name	Site Resident?	Tested?	Note
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Salvelinus*	*Salvelinus fontinalis*	Brook Trout	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Salvelinus*	*Salvelinus fontinalis X S. namaycush*	Splake	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Salvelinus*	*Salvelinus namaycush*	Lake Trout	YES	NO	2
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Savelinus*	*Salvelinus malma*	Dolly Varden	NO	YES	3,8
Actinopterygii	*Salmoniformes*	*Salmonidae*	*Thymallus*	*Thymallus arcticus*	Arctic Grayling	YES	NO	2
Actinopterygii	*Scorpaeniformes*	*Cottidae*	*Cottus*	*Cottus bairdii*	Mottled Sculpin	YES	NO	9
Actinopterygii	*Scorpaeniformes*	*Cottidae*	*Cottus*	*Cottus beldingii*	Paiute Sculpin	YES	NO	9
Actinopterygii	*Scorpaeniformes*	*Cottidae*	*Cottus*	*Cottus cognatus*	Slimy Sculpin	YES	NO	9
Actinopterygii	*Scorpaeniformes*	*Cottidae*	*Cottus*	*Cottus confusus*	Shorthead Sculpin	YES	NO	9
Actinopterygii	*Scorpaeniformes*	*Cottidae*	*Cottus*	*Cottus extensus*	Bear Lake Sculpin	YES	NO	9
Actinopterygii	*Scorpaeniformes*	*Cottidae*	*Cottus*	*Cottus greenei*	Shoshone Sculpin	YES	NO	9
Actinopterygii	*Scorpaeniformes*	*Cottidae*	*Cottus*	*Cottus hubbsi*	Columbia Sculpin	YES	NO	9
Actinopterygii	*Scorpaeniformes*	*Cottidae*	*Cottus*	*Cottus leiopomus*	Wood River Sculpin	YES	NO	9
Actinopterygii	*Scorpaeniformes*	*Cottidae*	*Cottus*	*Cottus rhotheus*	Torrent Sculpin	YES	NO	9
Actinopterygii	*Scorpaeniformes*	*Cottidae*	*Cottus*	*Cottus schitsuumsh*	Cedar Sculpin	YES	NO	9
Actinopterygii	*Scorpaeniformes*	*Cottidae*	*Cottus*	*Cottus semiscaber*	Bonneville Sculpin	YES	NO	9
Actinopterygii	*Scorpaeniformes*	*Cottidae*	*Cottus*	*Cottus tubulatus*	Snake River Sculpin	YES	NO	9
Actinopterygii	*Siluriformes*	*Ictaluridae*	*Ameiurus*	*Ameiurus melas*	Black Bullhead	YES	NO	9
Actinopterygii	*Siluriformes*	*Ictaluridae*	*Ameiurus*	*Ameiurus natalis*	Yellow Bullhead	YES	NO	9
Actinopterygii	*Siluriformes*	*Ictaluridae*	*Ameiurus*	*Ameiurus nebulosus*	Brown Bullhead	YES	NO	9

Class	Order	Family	Genus	Genus/species/subspecies	Common Name	Site Resident?	Tested?	Note
Actinopterygii	*Siluriformes*	*Ictaluridae*	*Ictalurus*	*Ictalurus punctatus*	Channel Catfish	YES	NO	9
Actinopterygii	*Siluriformes*	*Ictaluridae*	*Noturus*	*Noturus gyrinus*	Tadpole Madtom	YES	NO	9
Actinopterygii	*Siluriformes*	*Ictaluridae*	*Pylodictus*	*Pylodictus olivaris*	Flathead Catfish	YES	NO	9
Cephala-spidomorphi	*Petromyzontiformes*	*Petromyzontidae*	*Entosphenus*	*Entosphenus tridentatus*	Pacific Lamprey	NO	NO	—

Notes: 1 - Deleted from dataset, 2 - Surrogate species is tested, 3 - Retained in dataset, 4 - Surrogate for Orders *Cypriniformes*, *Cyprinodontiformes,* 5 - Surrogate for Genus *Esox,* 6 - Surrogate for closely related species in Order *Perciformes,* 7 - Surrogate for closely related species in Order *Salmoniformes*, 8 - Surrogate for Genus *Salvelinus*, 9 - See Section Protectiveness of the SSC to Resident Fishes.

Appendix B. Available Selenium Concentrations in Water and Fish Tissue within Site (Subset from DEQ 2010).

Site	Site Name	Water (µg/L)	Date	Common Name	Scientific Name	Quantity	Muscle (mg/kg dw)	BAF (L/g)
17	Bear River	0.91	8/13/2008	Common Carp	*Cyprinus carpio*	10	2.44	2.68
5	Blackfoot	0.59	7/19/2008	Utah Sucker	*Catostomus ardens*	2	3.75	6.36
37	Blackfoot River #2	1.57	8/12/2008	Cutthroat Trout	*Oncorhynchus clarkii*	2	14.69	9.36
37	Blackfoot River #2	1.57	8/12/2008	Bridgelip Sucker	*Catostomus columbianus*	5	12.32	7.85
77	Henry's Fork	~0.14	7/17/2008	Cutthroat Trout	*Oncorhynchus clarki*	2	1.90	13.59
27	NF Big Lost	1.25	7/15/2008	Brook Trout	*Salvelinus fontinalis*	5	~6.74	5.39
85	Portneuf River	0.37	7/20/2008	Utah Sucker	*Catostomus ardens*	6	1.24	3.35
97	SF Snake	~0.29	9/24/2008	Rainbow Trout	*Oncorhynchus mykiss*	2	1.68	5.80
97	SF Snake	~0.29	7/18/2008	Cutthroat Trout	*Oncorhynchus clarkii*	2	2.15	7.42
97	SF Snake	~0.29	7/18/2008	Mountain Whitefish	*Prosopium williamsoni*	10	2.65	9.15
97	SF Snake	~0.29	9/24/2008	Brown Trout	*Salmo trutta*	10	1.81	6.26
97	SF Snake	~0.29	9/24/2008	Cutthroat X Rainbow Trout	*O. clarkii X O. mykiss*	1	2.52	8.69

Attachment 2

Revised deletion process for site-specific recalculation for aquatic life criteria" **(**EPA-823-R-13-001 April 2013**)**

United States Environmental Protection Agency
Office of Water 4304
EPA-823-R-13-001
April 2013

Revised Deletion Process for the Site-Specific Recalculation Procedure for Aquatic Life Criteria

Revised Deletion Process for the Site-Specific Recalculation Procedure for Aquatic Life Criteria

April 2013

U.S. Environmental Protection Agency
Office of Water
Office of Science and Technology
Washington, DC

Foreword

This guidance on deriving water quality criteria provides scientific recommendations to states and tribes authorized to establish water quality standards under the Clean Water Act (CWA). Under the CWA, states and tribes are to establish water quality criteria to protect designated uses. State and tribal decision makers retain the discretion to adopt appropriate approaches that differ from those recommended here. While this updated guidance constitutes United States Environmental Protection Agency (EPA) scientific recommendations regarding one possible approach for deriving site-specific criteria that protect aquatic life, this update does not substitute for the CWA or EPA's regulations; nor is it a regulation itself. Thus, it cannot impose legally binding requirements on EPA, states, tribes, or the regulated community, and might not apply to a particular situation based upon the circumstances. EPA may change this guidance in the future, as new scientific information becomes available This document has been approved for publication by the Office of Science and Technology, Office of Water, U.S. Environmental Protection Agency. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Acknowledgment

This document was prepared by Charles G. Delos, Office of Science and Technology, Office of Water. This was done in consultation with Charles E. Stephan, Midcontinent Ecology Division, Office of Research and Development, who devised the underlying concept of the approach and produced Appendix 2. The document was peer reviewed by Alex M. Barron, Virginia Department of Environmental Quality, Steven P. Canton, GEI Consultants, Inc., and Jerome M. Diamond, Tetra Tech, Inc. Submit questions to Charles Delos at: delos.charles@epa.gov .

Purpose

The Recalculation Procedure involves editing the composition of a Species Sensitivity Distribution of tested species used to derive a site-specific aquatic life criterion in order to allow it to better reflect the taxonomy of species that reside at the site. This document presents a revision of the Deletion Process of the Recalculation Procedure.

Background

U.S. EPA (1984) described three procedures that can be used to derive a site-specific aquatic life water quality criterion: (1) the Recalculation Procedure, a taxonomic composition adjustment, (2) the Indicator Species Procedure, a bioavailability adjustment now called the Water-Effect Ratio Procedure, and (3) the Resident Species Procedure, a little-used approach effectively superseded by combined application of the Recalculation and Water-Effect Ratio procedures.

The Recalculation Procedure is used to edit the taxonomic composition of the toxicity dataset used for the Species Sensitivity Distribution (SSD) upon which a site-specific criterion is based, in order to better match the assemblage that resides at the site. The Recalculation Procedure is intended to provide flexibility to States to derive site-specific criteria that best reflect the species that reside at a site.

The underlying premise of the Recalculation Procedure is that taxonomy has value in predicting sensitivity, such that a site-specific SSD can be adjusted to reflect the taxonomy of species that reside at a site. The core of the procedure is the Deletion Process, which involves removing tested species from the SSD. The recommended procedure allows deletion of nonresident tested species if and only if they are not appropriate surrogates of resident untested species – based on taxonomy.

The use of taxonomy, while reasonable and systematically straightforward, is not the only conceivable basis for weighing how well a tested species represents untested species at a site. Possibly a system could be developed using ecological traits: that is, morphological, behavioral, and functional characteristics of an organism. Although USGS (2013) offers an invertebrate trait database, and U.S. EPA (2013) suggests some uses, no system involving its use for site-specific criteria exists at this time.

Based on taxonomy, U.S. EPA (1994) provided the Recalculation Procedure with a step-by-step protocol for deciding which nonresident tested species to retain or delete. For any particular nonresident tested species, the decision process begins at the genus level: the species is either (a) deleted, (b) retained as a surrogate for resident untested species in the genus, or (c) a decision is postponed. If the decision is postponed, then the next higher taxonomic level is considered. For a nonresident tested species, this hierarchical process stops once the decision to delete or retain is made – that is, the decision to delete or retain is not reconsidered or reversed at a higher taxonomic level.

U.S EPA (1997) modified the procedure in response to issues raised about its behavior with a particular configuration of tested and resident species. Likewise, the current guidance has been prepared in response to apparent conflicts between the results of the step-by-step protocol applied to certain datasets, and the stated goals of the 1997 procedure. Although the 1997 revision had corrected unintended behavior of the 1994 procedure at the genus and family levels, it did not eliminate the possibility that certain data configurations could produce unintended retention of inappropriate potential surrogates at the order, class, or phylum levels.

The purpose of this document is to update and supersede the guidance on applying the Deletion Process of the Recalculation Procedure presented in U.S. EPA (1984, 1994, and 1997). The principles underlying this revised procedure are identical to those applied at the genus and family level in the 1997 revision. It now extends those principles to the order, class, and phylum levels.

Concept of the Procedure

The concept of the Recalculation Procedure remains unchanged: to create a site-specific toxicity dataset (Species Sensitivity Distribution) that is appropriate for deriving a site-specific aquatic life criterion, by modifying the national toxicity dataset for the pollutant of concern by correcting, adding, and/or deleting test results. Deletion is based on taxonomic composition of the site under consideration.

Because some tested species might be needed to represent untested species that occur at the site, the deletion procedure does not provide for simplistic deletion of all species that do not occur at the site. Rather the concept is to consider which tested species are most closely related to those occurring at the site, and delete those for which another tested species would better represent the species occurring at the site.

The Deletion Process is designed to ensure that:

- Each species, genus, family, order, class, and phylum that occurs both at the site and in the national toxicity dataset is retained in the site-specific toxicity dataset.

- Each species, genus, family, order, class, and phylum that occurs at the site but not in the national toxicity dataset is represented in the site-specific dataset by at least one species most closely related to it from the national dataset.

The underlying principle of the Deletion Process has been and continues to be as follows:

1. Looking within a genus, are all of its resident species tested? (That is, are they in the national toxicity dataset?) If so, then delete the nonresident tested species in that genus. If not, retain them as surrogates.

2. Moving up to the family level, does every resident genus in a family contain at least one tested species? (That is, are all of its resident genera tested?) If so, then delete the tested

species in the family's nonresident genera. If not, retain them. (Note that this is not asking whether every resident *species* in the family is tested. Rather it asks whether every resident *genus* in the family appears in the national toxicity dataset.)

3. Moving up each subsequent level, to order, class, and phylum, the concept remains parallel. Does every resident family in an order contain at least one tested species? Does every resident order in a class contain at least one tested species? Does every resident class in a phylum contain at least one tested species? In each case, if so, delete the nonresident. If not, retain as surrogates.

It is at the order, class, and phylum levels that the exact wording of the 1997 step-by-step process did not match the underlying concept. This revision of the guidance corrects that problem.

Review of Several Key Provisions from Previous Guidance

Because the Deletion Process is taxonomy based, it is important that one taxonomic system be used consistently in the derivation of national and site-specific criteria. The system that U.S. EPA uses is the Integrated Taxonomic Information System (ITIS; www.itis.gov). However, the only ITIS taxonomic levels that are used by the Deletion Process are the traditional and universally recognized levels of species, genus, family, order, class, and phylum. (That is, subdivisions such as subclass, infraclass, and superorder are not used.)

Following the 1994 Recalculation Procedure guidance, the equivalent terms "resident" or "occur at the site" includes life stages and species that:

a. are usually present at the site,

b. are present at the site only seasonally due to migration,

c. are present at the site intermittently because they periodically return to or extend their ranges into the site,

d. were present at the site in the past, are not currently present at the site due to degraded conditions, but are expected to return to the site when conditions improve, or

e. are present in nearby bodies of water, are not currently present at the site due to degraded conditions, but are expected to be present at the site when conditions improve.

The terms "resident" or "occur at the site" do *not* include life stages and species that:

a. were once present at the site but cannot exist at the site now due to permanent alterations of the habitat or other conditions that are not likely to change within reasonable planning horizons, or

b. are still-water life stages or species that are found in a flowing-water site solely and exclusively because they are washed through the site by stream flow from a still-water site.

The definition of the "site" is important when the Deletion Process is used. For example, the number of taxa that occur at the site will generally decrease as the size of the site decreases. However, if the site is defined to be very small, a permit limit might be controlled by a criterion that applies outside (e.g., downstream of) the site. Use of the Recalculation Procedure does not sidestep the need to protect downstream uses.

Resident "critical species" merit one special provision, per EPA (1994). A critical species is a resident species that (a) is commercially or recreationally important at the site, or (b) is listed as threatened or endangered under section 4 of the Endangered Species Act, or (c) is a species for which there is firm evidence that its loss would yield an unacceptable impact on the site's commercially or recreationally important species, endangered species, abundances of a variety of other species, or structure or function. The Deletion Process should not be undertaken unless toxicity data are available for at least one species in each *class* of aquatic plants or animals that contains a critical species. Thus for example, if the site has an amphibian that fits the designation of a critical species, the Deletion Process should not be undertaken unless toxicity data for a species in class Amphibia are available (possibly via new testing).

Although the scope of this update is limited – to fulfill a change that was intended by the U.S. EPA (1997) guidance – analysts experienced with application of the procedure have reported some other issues (ERG 2013). The comprehensiveness of the list of resident species is influenced by the quality of the biological survey of the site water body and of comparable water bodies. Although greater or lesser comprehensiveness does not inherently bias a criterion recalculation either upward or downward, lesser comprehensiveness increases the uncertainty in the appropriateness of the recalculated criterion. Uncertainties in the process of identifying species occurring at the site have been reported as impediments to the acceptance of recalculations proposed to states (ERG 2013). It is thus important to fully document the effort put into compiling the list of resident species.

ERG (2013) also reported issues about sites having limited diversity – for example, sites that cannot support fish. For deriving *national* criteria, tests with three families of fish are called for (unless an amphibian is substituted for one of them). For site-specific recalculations, the underlying concept of having tests for a diversity of species is more fundamental than having tests for particular taxonomic groups that may be irrelevant to the site.

Explanatory Example of the Deletion Process

The underlying concept may be illustrated through a hypothetical example. In the following simple case, the class Actinopterygii (ray-finned fishes) has only four species to consider: two are resident at the site, and three are tested.

Phylum	Class	Order	Family	Genus	Species	Resident?	Tested?	Retain?	Why?
Chord.	Actinopterygii	Perciformes	Percidae	Etheostoma	nigrum	Yes	No	No	1
Chord.	Actinopterygii	Perciformes	Centrarchidae	Lepomis	cyanellus	Yes	Yes	Yes	2
Chord.	Actinopterygii	Perciformes	Moronidae	Morone	saxatilis	No	Yes	Yes	3
Chord.	Actinopterygii	Salmoniformes	Salmonidae	Oncorhynchus	mykiss	No	Yes	No	4

(1) The one species in family Percidae, although *resident*, is *not tested* and so obviously cannot be in the site-specific toxicity dataset.

(2) The one species in family Centrarchidae is both *resident and tested* and so is retained in the site-specific dataset.

(3) The one species in family Moronidae is *not resident* but is *tested*. The question is whether it should be retained as a surrogate. Here order Perciformes has two resident families, Percidae and Centrarchidae. Of these two only Centrarchidae is tested. Consequently, family Moronidae is retained so that it can serve along with Centrarchidae as surrogates equally closely related to the untested resident family Percidae.

(4) Order Salmoniformes is *not resident* but has a *tested* species. Again the question is whether to retain it as a surrogate. In this case it is deleted because the site has no resident untested fish order needing a surrogate. That is, the only resident order, Perciformes, is tested (that is, Perciformes contains at least one tested species), making it unnecessary for anything in Salmoniformes to serve as a surrogate. In contrast, if the dataset had contained an untested third order, say Cypriniformes, essentially equally closely related to the tested Perciformes and Salmoniformes, then the tested Salmoniformes would be retained to share the surrogacy.

The Deletion Process itself is presented in Appendix 1 and Appendix 2. These two appendices represent two different ways of setting forth the procedure. Nevertheless, they are logically equivalent such that they yield identical results. Appendix 3 provides a number of examples illustrating the results of applying the Deletion Process.

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Appendix 1. Shorter Statement of the Deletion Process

This version is identical to the EPA 1997 guidance in Steps 1 and 2, and extends the concept of Steps 1 and 2 (genus and family) to Steps 3, 4, and 5 (order, class, and phylum).

In the (possibly updated) national toxicity dataset, circle each species that either satisfies the definition of "occur at the site". Then use the following step-wise process to determine which of the uncircled (i.e., nonresident) species are to be deleted.

1. Does a species in the genus occur at the site?
   - If "No", go to step 2.
   - If "Yes", are there one or more species in the genus that occur at the site but are not in the national toxicity dataset?
     - If "No", delete the uncircled species.*
     - If "Yes", retain the uncircled species.*

2. Does a species in the family occur at the site?
   - If "No", go to step 3.
   - If "Yes", are there one or more genera in the family that occur at the site but are not in the national toxicity dataset?
     - If "No", delete the uncircled species.*
     - If "Yes", retain the uncircled species.*

3. Does a species in the order occur at the site?
   - If "No", go to step 4.
   - If "Yes", are there one or more families in the order that occur at the site but are not in the national toxicity dataset?
     - If "No", delete the uncircled species.*
     - If "Yes", retain the uncircled species.*

4. Does a species in the class occur at the site?
   - If "No", go to step 5.
   - If "Yes", are there one or more orders in the class that occur at the site but are not in the national toxicity dataset?
     - If "No", delete the uncircled species.*
     - If "Yes", retain the uncircled species.*

5. Does a species in the phylum occur at the site?
   - If "No", delete the uncircled species.*
   - If "Yes", are there one or more classes in the phylum that occur at the site but are not in the national toxicity dataset?
     - If "No", delete the uncircled species.*
     - If "Yes", retain the uncircled species.*

* = Continue the deletion process by starting at step 1 for another uncircled species unless all uncircled species in the national toxicity dataset have been addressed.

Appendix 2. Longer Statement of the Deletion Process

In contrast to the Appendix 1 version, which operates on the list of tested species, comparing it to the list of resident species, this version operates on a single combined list. Use of a single list was found to have certain advantages, which furthered the development of an automated spreadsheet for determining retention or deletion of tested species. Appendices 1 and 2 are intended to yield identical results.

Steps A through J are performed sequentially so that the appropriate entry is made in the site-specific toxicity dataset column for each species; the entry indicates whether the species is or is not included in the site-specific toxicity dataset. This version of the Deletion Process is organized so that, beginning with Step D, each species that does not have an entry in the site-specific toxicity dataset column is addressed at the genus level before any species is addressed at the family level. Then, the order, class, and phylum taxonomic levels are addressed sequentially. The number of species that need to be addressed decreases as higher and higher taxonomic levels are addressed.

Step A: Make a table that lists all of the species in the (possibly modified) national toxicity dataset, all of the species that occur at the site, and all surrogates that are used for critical species at the site in taxonomic order by species, genus, family, order, class, and phylum using the current version of ITIS. If a surrogate species is listed in the table, the species that it is a surrogate for should not be listed in the table. Fill in each column for each species, except do not put anything in the last column on the right, which is titled "In site-specific toxicity dataset?"

Step B: For each species that has a "No" in the national toxicity dataset column, enter "N-1" in the site-specific toxicity dataset column.

1. N = "No" and means that the species is not in the site-specific toxicity database.

Step C: For each species that has a "Yes" in the "Occur at the site?" column and a "Yes" in the national toxicity dataset column, enter "Y-2" in the site-specific toxicity dataset column.

Each species that does not yet have an entry in the site-specific toxicity dataset column has a "No" in the "Occur at the site?" column and a "Yes" in the national toxicity dataset column.

Step D: Look down the column titled "Genus" and every time a genus name appears more than once, draw a circle around all of the multiple entries for that one genus. The species in the circled genera are the only species that will be addressed in this Step D. For each species that is in a circled genus and does not already have an entry in the site-specific toxicity dataset column, look at the circled genus that that species is in and do one of the following regarding the site-specific toxicity dataset column:

1. Enter "N-3" if all of the <u>species</u> in that genus that occur at the site are already in the <u>site-specific</u> toxicity dataset.
2. Enter "Y-4" if one or more of the <u>species</u> in that genus that occur at the site are not in the <u>site-specific</u> toxicity dataset.

This step will not result in an entry for tested species in genera having no species occurring at the site.

Step E: Look down the column titled "Family" and every time a family name appears more than once, draw a circle around all of the multiple entries for that one family. The species in the circled families are the only species that will be addressed in this Step E. For each species that is in a circled family and does not already have an entry in the site-specific toxicity dataset column, look at the circled family that that species is in and do one of the following regarding the site-specific toxicity dataset column:

1. Enter "N-5" if all of the genera in that family that occur at the site are already represented in the site-specific toxicity dataset.
2. Enter "Y-6" if one or more of the genera in that family that occur at the site are not represented in the site-specific toxicity dataset.

This step will not result in an entry for tested species in families having no species occurring at the site.

Step F: Look down the column titled "Order" and every time an order name appears more than once, draw a circle around all of the multiple entries for that one order. The species in the circled orders are the only species that will be addressed in this Step F. For each species that is in a circled order and does not already have an entry in the site-specific toxicity dataset column, look at the circled order that that species is in and do one of the following regarding the site-specific toxicity dataset column:

1. Enter "N-7" if all of the families in that order that occur at the site are already represented in the site-specific toxicity dataset.
2. Enter "Y-8" if one or more of the families in that order that occur at the site are not represented in the site-specific toxicity dataset.

This step will not result in an entry for tested species in orders having no species occurring at the site.

Step G: Look down the column titled "Class" and every time a class name appears more than once, draw a circle around all of the multiple entries for that one class. The species in the circled classes are the only species that will be addressed in this Step G. For each species that is in a circled class and does not already have an entry in the site-specific toxicity dataset column, look at the circled class that that species is in and do one of the following regarding the site-specific toxicity dataset column:

1. Enter "N-9" if all of the orders in that class that occur at the site are already represented in the site-specific toxicity dataset.
2. Enter "Y-10" if one or more of the orders in that class that occur at the site are not represented in the site-specific toxicity dataset.

This step will not result in an entry for tested species in classes having no species occurring at the site.

Step H: Look down the column titled "Phylum" and every time a phylum name appears more than once, draw a circle around all of the multiple entries for that one phylum. The species in the circled phyla are the only species that will be addressed in this Step H. For each species that is in a circled phylum and does not already have an entry in the

site-specific toxicity dataset column, look at the circled phylum that that species is in and do one of the following regarding the site-specific toxicity dataset column:

1. Enter "N-11" if all of the classes in that phylum that occur at the site are already represented in the site-specific toxicity dataset.
2. Enter "Y-12" if one or more of the classes in that phylum that occur at the site are not represented in the site-specific toxicity dataset.

Step I: For each species for which no entry has been made in the site-specific toxicity dataset column, enter "N-13" because the phylum does not occur at the site.

Aspects of a completed table that are easy to review.

a. Every "N" should have an odd number after it.
b. Every "Y" should have an even number after it.
c. Every species that has "No" in the national toxicity database column should have "N-1" in the site-specific database column.
d. Every species that has "Y-2" in the site-specific toxicity database column should have "Yes" in the "Occur at the site?" column and in the national toxicity dataset column.

Appendix 3. Table of Hypothetical Examples Illustrating Results of the Deletion Process

The hypothetical *input* data constitute all but the last column (Phyla Pa – Pi, Classes Ca – Cq, …, Species Sa – Sbk), as would be arranged for the procedure's "Longer Statement" (Appendix 2). The last column shows the result of applying the Deletion Process; its numeric codes correspond to those of Appendix 2, thereby indicating the step at which the decision was made to include (Y) or not include (N) the species in the site-specific Species Sensitivity Distribution (SSD).

The table is intended to represent numerous individual examples rather than a single complete dataset. It begins by examining behavior at the genus through family levels. Later portions of the table illustrate decisions made at higher taxonomic levels. The table illustrates various cases where tested species that do not occur at the site are either retained as surrogates for untested species that do occur at the site, or are deleted as less representative than the tested species retained.

Phylum	Class	Order	Family	Genus	Species	Occurs at the site?	In national SSD?	Include in site SSD?
Pa	Ca	Oa	Fa	Ga	Sa	Yes	Yes	Y-2
Pa	Ca	Oa	Fb	Gb	Sb	Yes	No	N-1
Pa	Ca	Oa	Fb	Gb	Sc	Yes	No	N-1
Pa	Ca	Oa	Fc	Gc	Sd	No	Yes	N-3
Pa	Ca	Oa	Fc	Gc	Se	Yes	Yes	Y-2
Pa	Ca	Oa	Fd	Gd	Sf	Yes	No	N-1
Pa	Ca	Oa	Fd	Gd	Sg	No	Yes	Y-4
Pa	Ca	Oa	Fd	Gd	Sh	Yes	Yes	Y-2
Pa	Ca	Oa	Fe	Ge	Si	No	Yes	Y-4
Pa	Ca	Oa	Fe	Ge	Sj	Yes	No	N-1
Pa	Ca	Oa	Fe	Ge	Sk	No	Yes	Y-4
Pa	Ca	Oa	Fe	Ge	Sl	Yes	No	N-1
Pa	Ca	Oa	Ff	Gf	Sm	No	Yes	N-3
Pa	Ca	Oa	Ff	Gf	Sn	Yes	Yes	Y-2
Pa	Ca	Oa	Ff	Gf	So	No	Yes	N-3
Pa	Ca	Oa	Ff	Gf	Sp	No	Yes	N-3
Pa	Ca	Oa	Fg	Gg	Sq	Yes	Yes	Y-2
Pa	Ca	Oa	Fg	Gg	Sr	No	Yes	N-3
Pa	Ca	Oa	Fg	Gh	Ss	Yes	No	N-1
Pa	Ca	Oa	Fg	Gi	St	No	Yes	Y-6
Pa	Ca	Oa	Fh	Gj	Su	No	Yes	N-5
Pa	Ca	Oa	Fh	Gk	Sv	No	Yes	N-5
Pa	Ca	Oa	Fh	Gl	Sw	Yes	Yes	Y-2
Pa	Ca	Oa	Fi	Gm	Sx	No	Yes	Y-6
Pa	Ca	Oa	Fi	Gn	Sy	No	Yes	Y-6
Pa	Ca	Oa	Fi	Go	Sz	Yes	No	N-1

Phylum	Class	Order	Family	Genus	Species	Occurs at the site?	In national SSD?	Include in site SSD?
Pb	Cb	Ob	Fj	Gp	Saa	Yes	No	N-1
Pb	Cc	Oc	Fk	Gq	Sab	No	Yes	Y-12
Pc	Cd	Od	Fl	Gr	Sac	No	Yes	N-13
Pd	Ce	Oe	Fm	Gs	Sad	No	Yes	N-11
Pd	Cf	Of	Fn	Gt	Sae	Yes	Yes	Y-2
Pd	Cf	Of	Fn	Gu	Saf	Yes	No	N-1
Pd	Cf	Of	Fn	Gu	Sag	No	Yes	Y-4
Pd	Cf	Of	Fn	Gu	Sah	No	Yes	Y-4
Pd	Cf	Of	Fn	Gv	Sai	Yes	Yes	Y-2
Pd	Cf	Of	Fn	Gv	Saj	No	Yes	N-3
Pd	Cf	Of	Fn	Gw	Sak	No	Yes	N-5
Pd	Cf	Of	Fo	Gx	Sal	Yes	No	N-1
Pd	Cf	Of	Fo	Gy	Sam	No	Yes	Y-6
Pd	Cf	Og	Fp	Gz	San	Yes	No	N-1
Pd	Cf	Og	Fq	Gaa	Sao	No	Yes	Y-8
Pd	Cf	Oh	Fr	Gab	Sap	Yes	Yes	Y-2
Pd	Cf	Oh	Fr	Gab	Saq	Yes	No	N-1
Pd	Cf	Oh	Fr	Gab	Sar	No	Yes	Y-4
Pd	Cf	Oh	Fs	Gac	Sas	No	Yes	N-7
Pd	Cg	Oi	Ft	Gad	Sat	Yes	No	N-1
Pd	Cg	Oj	Fu	Gae	Sau	No	Yes	Y-10
Pe	Ch	Ok	Fv	Gaf	Sav	Yes	Yes	Y-2
Pe	Ci	Ol	Fw	Gag	Saw	No	Yes	N-11
Pf	Cj	Om	Fx	Gah	Sax	Yes	Yes	Y-2
Pf	Cj	On	Fy	Gai	Say	No	Yes	N-9
Pg	Ck	Oo	Fz	Gaj	Saz	Yes	Yes	Y-2
Pg	Ck	Oo	Fz	Gaj	Sba	No	Yes	N-3
Pg	Ck	Oo	Fz	Gak	Sbb	No	Yes	N-5
Pg	Ck	Op	Faa	Gal	Sbc	No	Yes	N-9
Pg	Cl	Oq	Fab	Gam	Sbd	No	Yes	Y-12
Pg	Cm	Or	Fac	Gan	Sbe	Yes	No	N-1
Ph	Cn	Os	Fad	Gao	Sbf	No	Yes	Y-12
Ph	Cn	Os	Fad	Gao	Sbg	No	Yes	Y-12
Ph	Cn	Os	Fad	Gap	Sbh	No	Yes	Y-12
Ph	Co	Ot	Fae	Gaq	Sbi	Yes	No	N-1
Pi	Cp	Ou	Faf	Gar	Sbj	No	Yes	N-13
Pi	Cq	Ov	Fag	Gas	Sbk	No	No	N-1

Attachment 3

Selected excerpts from
Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater 2016 (EPA 822-R-16-006)

Table 1. Summary of the Recommended Freshwater Selenium Ambient Chronic Water Quality Criterion for Protection of Aquatic Life.

Media Type	Fish Tissue[1]		Water Column[4]	
Criterion Element	**Egg/Ovary [2]**	**Fish Whole Body or Muscle [3]**	**Monthly Average Exposure**	**Intermittent Exposure[5]**
Magnitude	15.1 mg/kg dw	8.5 mg/kg dw whole body or 11.3 mg/kg dw muscle (skinless, boneless filet)	1.5 µg/L in lentic aquatic systems 3.1 µg/L in lotic aquatic systems	$WQC_{int} = \frac{WQC_{30-day} - C_{bkgrnd}(1 - f_{int})}{f_{int}}$
Duration	Instantaneous measurement[6]	Instantaneous measurement[6]	30 days	Number of days/month with an elevated concentration
Frequency	Not to be exceeded	Not to be exceeded	Not more than once in three years on average	Not more than once in three years on average

1. Fish tissue elements are expressed as steady-state.
2. Egg/Ovary supersedes any whole-body, muscle, or water column element when fish egg/ovary concentrations are measured.
3. Fish whole-body or muscle tissue supersedes water column element when both fish tissue and water concentrations are measured.
4. Water column values are based on dissolved total selenium in water and are derived from fish tissue values via bioaccumulation modeling. Water column values are the applicable criterion element in the absence of steady-state condition fish tissue data.
5. Where WQC30-day is the water column monthly element, for either a lentic or lotic waters; C_{bkgrnd} is the average background selenium concentration, and fint is the fraction of any 30-day period during which elevated selenium concentrations occur, with f_{int} assigned a value ≥0.033 (corresponding to 1 day).
6. Fish tissue data provide instantaneous point measurements that reflect integrative accumulation of selenium over time and space in fish population(s) at a given site.

The recommended chronic selenium criterion is expected to protect the entire aquatic community, including fish, amphibians, and invertebrates, based on available data. Because fish are the most sensitive to selenium effects, EPA recommends that selenium water quality criterion elements based on fish tissue (egg-ovary, whole body, and/or muscle) data take precedence over the criterion elements based on water column selenium data due to the fact, noted above, that fish tissue concentrations provide a more robust and direct indication of potential selenium effects in fish. However, because selenium concentrations in fish tissue are a result of selenium

4 National Criterion for Selenium in Fresh Waters

The available data indicate that freshwater aquatic life would be protected from the toxic effects of selenium by applying the following four-part criterion, recognizing that fish tissue elements supersede the water elements (except in special situations, see footnotes 3 and 4, Table 4.1) and that the egg-ovary tissue element supersedes all other tissue elements:

1. The concentration of selenium in the eggs or ovaries of fish does not exceed 15.1 mg/kg, dry weight; [1]
2. The concentration of selenium (a) in whole-body of fish does not exceed 8.5 mg/kg dry weight, or (b) in muscle tissue of fish (skinless, boneless fillet) does not exceed 11.3 mg/kg dry weight; [2]
3. The 30-day average concentration of selenium in water does not exceed 3.1 µg/L in lotic (flowing) waters and 1.5 µg/L in lentic (standing) waters more than once in three years on average;
4. The intermittent concentration of selenium in either a lentic or lotic water, as appropriate, does not exceed $WQC_{int} = \frac{WQC_{30-day} - C_{bkgrnd}(1-f_{int})}{f_{int}}$ more than once in three years on average.[3]

paper letter - Christopher Ventaloro
NC DEQ-DWR Planning Section
1611 Mail Service Center
Raleigh, NC 27699-1611

Dear NC DEQ-DWR Planning Department:

I am a resident at Badin Lake and a supporter of Protect Badin Lake and Yadkin River Keeper, but mostly importantly a citizen seriously concerned about water quality.

Hazardous waste disposal sites at Alcoa's Badin Business Park continue to leak cyanide and fluoride, among other chemicals, into Badin Lake and Little Mountain Creek. As recently as April of this year, Alcoa reported exceedances in its monthly average for both cyanide and fluoride at Outfall 005 (the outfall that flows directly into Little Mountain Creek and into Lake Tillery's drinking water) under its current NPDES Storm Water Permit. We are frustrated and confused as to why the Division of Water Resources has not taken enforcement action on what appears to be a clear violation of effluent limitations of Alcoa Badin Business Park's permit. We are al: concerned that the proposal in the Triennial Review to allow compliance by measuring EITHER "Free" OR "Total" cyanide will make it easier for Alcoa to comply with its permit limits in the future and provide less protection to the environment.

I am not a scientist, but from what I understand, the current proposed changes to the ambient water quality standard for cyanide by measuring either "free" cyanid OR "total" cyanide appears to be another example of how the state is making a rule change just to make it easier for Alcoa to comply with its existing permit limits. Monitoring Badin Lake and Alcoa's discharge should never be about how we can make things easier or even cheaper for the regulated community. Rather it should be about the protection of public health and the environment. Even the state's own regulatory analysis admits that allowing for the measurement of free cyanide is less strict.

Specifically, the proposal to allow the use of either a free OR total cyanide should be changed to require the measurement of BOTH Free AND Total cyanide to ensu the greatest level of protection. We support measuring free cyanide in order to make sure we are testing for the most bioavailable and potentially toxic forms of cyanide, which is currently not the case. However, I would ALSO like to see the definition of free cyanide be written to include hydrogen cyanide, cyanide ions, and the "weak acid dissociable" or WADs.

At the same time, I feel it is important to maintain the TOTAL cyanide measurements since TOTAL cyanide is what has been used under existing permit requirement and the rules should not change midterm. How would anyone be able to compare results when now "apples wouldn't be compared to apples"?

I hope you will reconsider not making this an "either or" proposition but require that both free and total cyanide be measured and used for regulatory permits.

Yours Truly,

Karen Houston

10574 Lakeshore Dr.

New London NC 28127

paper letter - Christopher Ventaloro
NC DEQ-DWR Planning Section
1611 Mail Service Center
Raleigh, NC 27699-1611

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Allie Cheney
1052 Lakeshore Drive
New London, NC

336-816-7017

July 22, 2021

Christopher Ventaloro

NC DEQ-DWR Planning Section

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Raleigh, NC 27699-1611

Dear Mr. Ventaloro,

I am a fulltime resident in the Dixie Shores neighborhood on Badin Lake in Montgomery Co, NC. Our immediate family of 10 people (2 elderly, 4 middle aged, and 4 middle schoolers) is very concerned about water quality. We all swim in Badin Lake on a regular basis and do not want to suffer current and long-term health problems due to cyanide and other chemicals present in Badin Lake. We are unable to feel confident that the Badin Lake water is currently truly safe. Looking to the future, will you ensure through all of the authority you may possess that the water quality of Badin Lake will improve and certainly not get worse? Please help us protect our health, community and secondarily our property values.

Is the Division of Water Resources taking all needed and available enforcement action on all violations of effluent limitations of Alcoa Badin Business Park's permit? Holding industry accountable is essential.

Please do not support the proposal in the Triennial Review to allow compliance by measuring either "Free" OR "Total" cyanide! We need maximum (not less) protection to the environment. Please do everything in your power to ensure strict monitoring of both "Total" and "Free" cyanide to protect our health and the environment. Simply put, it is essential that you require that both free and total cyanide be measured and used for regulatory permits.

Thank you,

Patricia Zeabart
532 Shoreline Road
New London, NC 28127
pzeabart@gmail.com

Dear Hearing Officer Chris Venteloro and members of the Environmental Management Commission,

My name is Tara Smith. I'm the mother of Jenna, age 13, and Brooke, age 10. We have lived in Pittsboro for 7 years. Our main source of drinking water is surface water drawn from the Haw River, which has a long history of being polluted by upstream textile industries and sludge land application from Greensboro, Burlington and Reidsville.

For 7 years my family and I have been ingesting 1,4 dioxane and PFAS via our drinking water supply, both of which regularly exceed health advisory limits. I work very hard at keeping my children healthy. We consume a clean, healthy diet and limit exposure to toxins when possible (cleaning supplies, personal products, etc...) It is sickening to know that I have encouraged our children to drink lots of water and to soak in long Epsom salt baths now that I know how awful our water supply is.

To keep my children safe they should have been drinking water with a limit of 0.35 ug/L for 1,4-dioxane, putting them at a risk of 1:1,000,000 of developing cancer per the Clean Water Act. Instead they fall between 1:10,000 and 1:1000 risk categories. **They have been exposed, so far, their entire lives to this carcinogen due to the lack of drinking water regulations North Carolina so desperately needs.**

This July the Pittsboro water supply battled, yet again, another chemical dump of 1,4-dioxane into our drinking water supply by way of the Greensboro region where preliminary sampling results showed levels of the likely carcinogen ranged from 543 ug/L to 687 ug/L in the wastewater discharge into the Haw River. These concentrations moved downstream to Pittsboro where we were forced to turn off our supply. It has been over three weeks since this incident and the concentrations have yet to reach safe levels. In the meantime our entire town is being exposed to 1,4-dioxane and we have no idea what health effects this will have on us.

We need all surface water in North Carolina to be set to the same standards in order to eliminate the threat of industries discharging high concentrations upstream of water users like us. To reiterate, I am demanding that the 0.35ug/L limit apply to all surface waters.

Secondly, I am shocked that the EMC has left off PFAS for this review process. I want to encourage you to set PFAS limits we desperately need as a contaminated community. For years, our water samples have been used as a positive control in research studies and it has to stop now. We are a community suffering from many health complications that range from infertility, thyroid disease to rare cancers.

In a recent study, Pittsboro blood serum samples, (including my very own) maintained higher than the national average and showed a direct correlation to the Haw river water concentrations. In 2018, NC state sampling revealed our collective PFAS levels were 1000 ppt. Currently, the EPA health advisory limit of 70 ppt for PFOS and PFOA does not apply to our population when any given day our water exceeds those limits and includes multiple PFAS chemicals, not just PFOS and PFOA. PFAS is a family of Flourinated compounds that range from 5000-8000 different types. Many of the PFAS compounds behave similarly, pose the same risk as PFOS and PFOA, and

bioaccumulate. Based on collaborative research of 16 scientists, from June 2020- PFAS regulations should be managed at the class level to safeguard our water. We are a community overexposed, our blood serums are continually building up and our risks of developing cancer and other health risks are increasing. I desperately urge the EMC for PFAS to be regulated collectively as a class and to not exceed 10 ppt.

We urge you to consider our community, who has experienced decades of exceeding minimal exposure limits, and are at risk of overexposure multiple times every day. Your "lifetime of minimal exposure limit" does not apply to us. We are a vulnerable population. We deserve the safest standards possible. Set the standards with the most vulnerable communities in mind.

In closing, the cost to remove these compounds is far more than our small town can handle- 1,4 dioxane can only be eliminated with UV advanced oxidation and PFAS compounds are only completely removed with reverse osmosis. These systems are costly to install and maintain, and should not be the burden of our small town and its taxpayers. We needed action years ago. This is our call to action for your agency to set standards that will protect us, our town, and our state by preventing industry from dumping volatile organic carcinogens into our waterway.

Sincerely,

Tara Smith

Contaminated Pittsboro Resident