Negotiated Rule Development

Ammonia

*includes corrected equation on p. 25 and 26 and corrected acute criteria table on p. 29

58-0102-2602

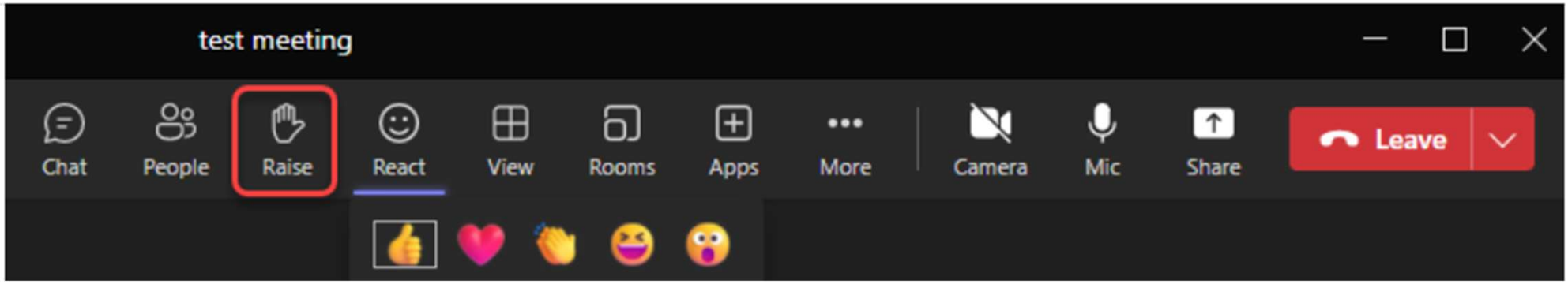
STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

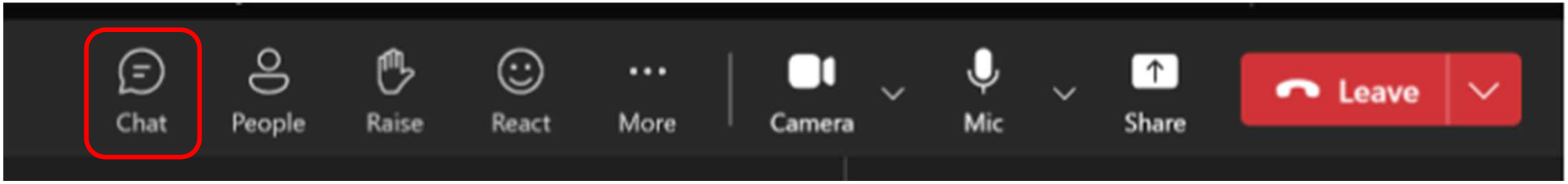
Beth Spelsberg
Senior Water Quality Standards Scientist

Agenda

- Housekeeping/Introductions
- Overview/Timeline of Process
- Background
- Technical Presentation
- Summary of Proposed Rule Language
- Questions

Housekeeping





Introductions

Timeline

58-0102-2602: Water Quality Standards - Ammonia	
	NEGOTIATED RULEMAKING
10-August	First Negotiated Rule Meeting
17-August	End comment period (one week comment period)
6-October	Second Negotiated Rule Meeting
13-October	End comment period (one week comment period)
	DETERMINE IF FURTHER RULE MEETINGS ARE NEEDED
November	Third Negotiated Rule Meeting
November	Comment period
	PROPOSED & PENDING RULE
TBD 2027	Submit proposed Rule Package
TBD 2027	Board Meeting: Present rule docket for approval
TBD 2027	Pending Rule posted in January Bulletin
	LEGISLATIVE APPROVAL
Jan/Feb 2028	Present rule to House and Senate committees for approval

Background

Consistent with the Clean Water Act, states must develop criteria that protect designated beneficial uses and are based on sound science (CWA § 303(c)(2)(A), 40 CFR 131.11(a)).

States have the discretion to adopt the EPA's criteria recommendations, the EPA's recommendations modified to reflect site-specific conditions, or criteria based on other scientifically defensible methods.

State Specific Criteria is best used when you have additional scientific information that more accurately expresses a level/concentration for a water quality parameter to protect a designated use.

LOCAL CONDITIONS



Idaho Water Quality Standards



Follow EPA's Guidelines



Follow EPA's Water Quality Standards Handbook



Other scientifically defensible procedures



Deviations from EPA procedures shall have scientific rationale.



Procedures reflecting the the nature of the pollutant, the beneficial uses, and the most sensitive resident species.

State-Specific Criteria for Ammonia

Gunnar Hilborn
Water Quality Standards Analyst

Technical Presentation Agenda

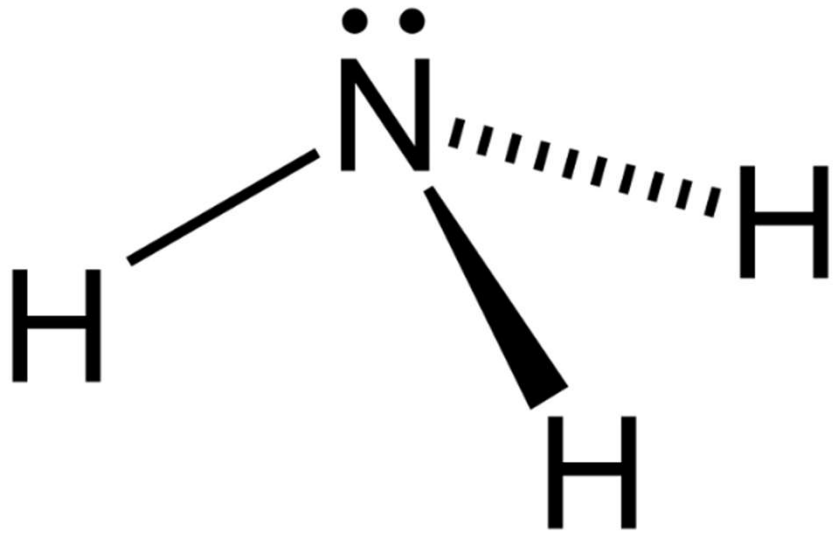
- Background
- EPA's 2013 Ammonia Recommendations
- Idaho's Resident Species
  - Mussels
  - Other Sensitive Species
- New Toxicity Studies
- Recalculation Process
  - Non-Resident Deletion
  - Acute Criteria Equation
  - Chronic Criteria Equation
- Comparison of Criteria



US Fish and Wildlife Service

What is Ammonia?

- A form of nitrogen that occurs naturally in the environment as a waste product from animal and bacterial digestive processes.
- It is also produced via industry for fertilizer and chemical uses.
- Ammonia can be toxic to aquatic life even at low concentrations.
  - Effects vary with environmental conditions (pH and temperature)



History of Ammonia Criteria

- EPA first published ammonia limits in 1976, with revisions in 1985, 1999, and 2013.
- The 1985 criteria (for unionized ammonia) included pH and temperature dependance
  - Acute Criteria (CMC): *19 mg NH_3/L
  - Chronic Criteria (CCC): *1.2 mg NH_3/L
- In 1999, the criteria were revised to assess toxicity of total ammonia nitrogen (TAN)
  - CMC: *24 mg TAN/L – Salmonids Present
  - CCC: *4.5 mg TAN/L – Early life stages present

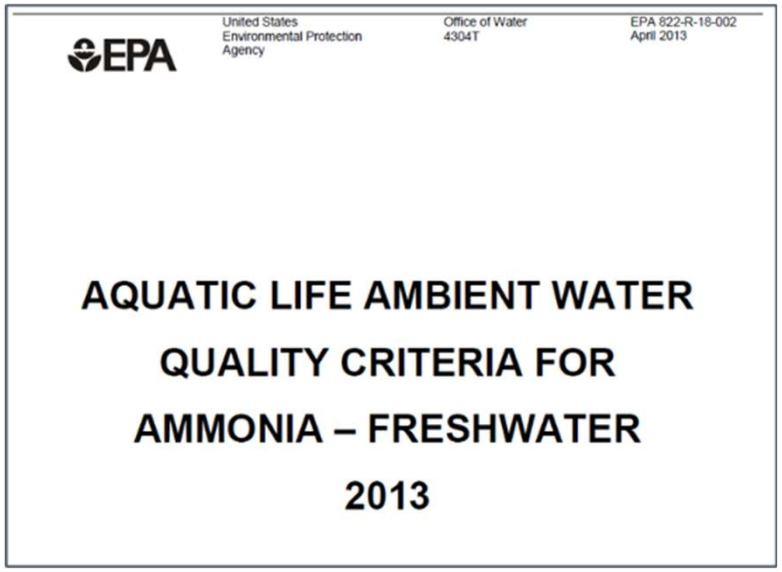


US Fish and Wildlife Service

*at pH 7 and 20°C

EPA's 2013 Ammonia Criteria

- New toxicity data on sensitive freshwater mussels and snails was compiled in 2009
- pH and temperature relationships are maintained
- No longer ELS dependent
- Provides technical support for adopting and/or modifying the criteria


United States Environmental Protection Agency
Office of Water 4304T
EPA 822-R-18-002 April 2013
EPA

AQUATIC LIFE AMBIENT WATER QUALITY CRITERIA FOR AMMONIA – FRESHWATER 2013

*at pH 7 and 20°C	EPA 1999/ID Current	EPA 2013
Acute (1-hr average)	24.0 mg TAN/L	17.0 mg TAN/L
Chronic (30-d rolling average)	4.5 mg TAN/L	1.9 mg TAN/L

Idaho's Current Ammonia Criteria

ID adopted EPA's 1999 recommendations for acute and chronic ammonia criteria in 2002

- Acute Criteria equation:

$$CMC = \frac{0.275}{1 + 10^{7.204 - pH}} + \frac{39.0}{1 + 10^{pH - 7.204}}$$

- Chronic Criteria equations:
  - DEQ presumes ELS presence unless provided evidence of absence

(a) When fish early life stages are likely present:

$$CCC = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) \bullet MIN(2.85, 1.45 \cdot 10^{0.028 \cdot (25-T)})$$

(b) When fish early life stages are likely absent:

$$CCC = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) \bullet 1.45 \cdot 10^{0.028 \cdot (25-T)})$$

EPA's Toxicity Dataset

- Assessing the species included in the database for Idaho residents
- 41 species included are not Idaho residents (100 total)
- 17 species of unionid mussels included, none of which are ID-residents
  - Unionids in dataset are by far the most sensitive group



USGS

Other species, such as the Lost River Sucker, are sensitive to ammonia as well, but are not residents of Idaho.

Idaho's Mussels



IDFG

Invasive Dreissenids
*Zebra and Quagga

Unionids

- **Western Ridged Mussel (*Gonidea angulata*)**
- **Western Pearlshell (*Margaritifera falcata*)**
- **Floaters**
  - **California (*Anodonta californiensis*)**
  - **Oregon (*Anodonta oregonensis*)**
  - **Winged (*Anodonta nuttaliana* FKA *idahoensis*)**

Sphaeriida

- Fingernail and Pea clams (*Musculium sp., Psidium sp., Sphaerium sp.*)

Veneroida

- Asian Clam (*Corbicula fluminea*) – Invasive



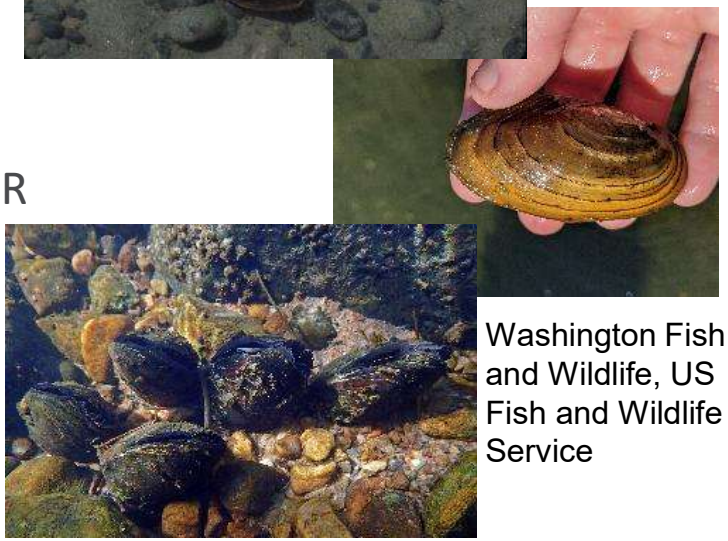
IDFG

Taxonomic Disputes*

Winged Floater and CA Floater – possibly similar enough to be one species (Xerces species profile, Chong et al 2008)

Some records refer to a Western Floater (*Anodonta kennerlyi*), however DEQ has not found any information indicating their presence in ID. Further, this species may be similar enough to OR Floater as to be the same species (USFWS species profile)

Historical record shows at least one Eastern Pearlshell (*Margaritifera margaritifera*) identification amongst BURP samples. DEQ is treating this as a misidentification.



Washington Fish and Wildlife, US Fish and Wildlife Service

*Recalculation and deletion procedure treats ITIS.gov taxonomy as authoritative. All taxonomic identifications have been updated to reflect the latest ITIS nomenclature.

Acute Toxicity Studies on Western Unionids

Indicate that Western Unionids are much less sensitive to Ammonia than Eastern species.

GMAVs for the most sensitive genuses in the 2013 database:

1. *Venustaconcha:* 23.12
2. *Lasmigona:* 23.41
3. *Epioblasma:* 31.14
4. *Villosa:* 34.23

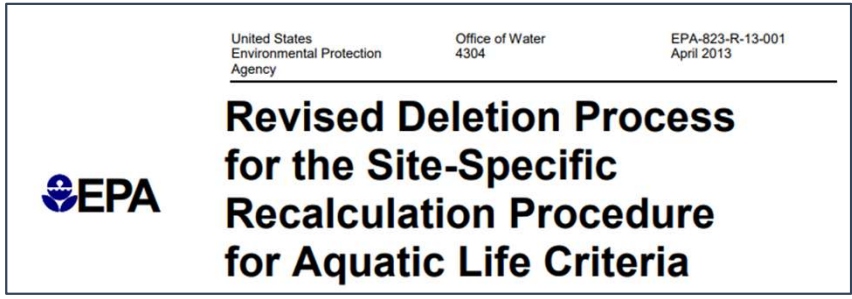
Table 2. Acute Data Added to National Database

Species	Chemical Name	Duration	Method	pH	Temp. (°C)	Total Ammonia (mg TAN/L)	Acute Value (mg TAN/L, pH7, 20°C)[a]	SMAV (mg TAN/L)	GMAV (mg TAN/L)	Reference
Oregon floater, (<5 d juvenile) *Anodonta oregonensis*	Ammonium chloride	4 d	R,M	8.10	20.2	14	73.93	63.67	81.65	PER 2018a
Oregon floater, (<5 d juvenile) *Anodonta oregonensis*	Ammonium chloride	4 d	R,M	8.07	20.2	11	54.84			PER 2018a
California floater, (<5 d juvenile) *Anodonta californiensis*	Ammonium chloride	4 d	R,M	8.06	19.8	22	104.1	104.7		PER 2018b
California floater, (<5 d juvenile) *Anodonta californiensis*	Ammonium chloride	4 d	R,M	8.04	20.4	22	105.3			PER 2018b
Western pearlshell, (6-10 d juvenile) *Margaritifera falcata*	Ammonium chloride	4 d	F,M	8.3	20	8.0	61.23	61.23	61.23	Wang et al. 2017
Western ridged mussel, (<5 d juvenile) *Gonidea angulata*	Ammonium chloride	4 d	R,M	8.02	20.3	14	63.99	59.81	59.81	PER 2018c
Western ridged mussel, (<5 d juvenile) *Gonidea angulata*	Ammonium chloride	4 d	R,M	8.03	20.3	12	55.90			PER 2018c

SMAV = species mean acute value.
GMAV = genus mean acute value.
R = static renewal exposure.
F = flow-through exposure.
M = measured concentrations.
a – Acute values are normalized to pH7 and 20°C as per the equations of USEPA 2013a.

From CVCWA final Recalculation Report (2020)

Recalculation Process



- Developed ID-Resident Species List
  - Resources used:

    Fishes of ID, IDFG Biologist References, Freshwater Mussels of the PNW, historical BURP macroinvertebrate database, ITIS.gov, IDFG species catalog.
- Progressed through EPA's Deletion Process (2013) for the acute dataset after incorporating the new toxicity values.
- Reviewed and selected a genus-level ACR conversion method to develop GMCVs. – EPA Region 9's recommendation to CVCWA

Resident Species List

- 103 fish species, 15 amphibian species, 61 mollusk species/groups
- Fish: all from Fishes of Idaho (Sigler and Zaroban, 2018)

- Some species are no longer present due to extinction (Snake River Sucker) or extirpation (Rainbow Smelt, Rock Bass, Orangespotted Sunfish, Sauger, Chum Salmon, Atlantic Salmon)

- Amphibians: from IDFG's SWAP coordinator list

- No amphibians are to be deleted from dataset

- Mollusks: BURP database

- No gastropods are to be deleted.

- There are only three orders (Sphaeriida, Unionida, Veneroida) in the class bivalva.

- Non-Mollusk Invertebrates: BURP database

- Did not update taxonomy, as there is over 1200 species, and no NMIs are to be deleted from the dataset



IDFG

Deletion Process

Acute (after adding GMAVs for WP, WRM, and Anodonta)

24 species deleted.

17 unionids – all residents are represented at genus or lower

4 moronidae fish – all resident perciformes families are represented

+

Atlantic Salmon (only salmo in ID is brown trout which is retained)

Lost River Sucker (all resident Catostomidae genuses are represented)

Guadalupe Bass (all resident species in Micropterus are in dataset)

Chronic (after adding GMCVs for WP, WRM, and Anodonta)

3 species deleted.

All unionids:

Wavy-Rayed Lamp Mussel

Fatmucket

Rainbow Mussel



iNaturalist

All resident unionid genuses in ID are represented by the three GMCVs recommended by EPA Region 9 in CVCWA's recalculation document.

ID-Specific Acute Dataset

60 GMAVs – will use ranks 2-5 to develop the FAV, as per EPA

Most sensitive species:

Rank	Genus	Species	Common Name	GMAV (mgTAN/L)
5	Notemigonus	crysoleucas	**Golden shiner**	63.02
4	Fluminicola	sp.	**Pebblesnail**	62.15
3	Margaritifera	Falcata	**Western Pearlshell**	61.23
2	Gonidea	Angulata	**Western-Ridged Mussel**	59.81
1	Prosopium	williamsoni	**Mountain Whitefish**	51.93

Since the most sensitive species include invertebrates, the acute equation will be temperature and pH dependent.

Deriving Criteria

- FAV – from 4 GMAVs closest to 95th percentile

O. Using the selected GMAVs and Ps, calculate

$$S^2 = \frac{\sum((\ln GMAV)^2) - ((\sum \ln GMAV))^2 / 4}{\sum (F) - ((\sum(\sqrt{P}))^2 / 4)}$$

$$L = (\sum (\ln GMAV) - S(\sum(\sqrt{P}))) / 4$$

$$A = S(\sqrt{0.05}) + L$$

$$FAV = e^A$$

FAV = 61.16 mg TAN/L

A. Example Calculation

N = total number of MAVs in data set = 8

Rank	MAV	ln(MAV)	ln(MAV)^2	P = R / (N+1)	$\sqrt{P}$
4	6.4	1.8563	3.4458	0.44444	0.66667
3	6.2	1.8245	3.3290	0.33333	0.57735
2	4.8	1.5686	2.4606	0.22222	0.47140
1	0.4	-0.9163	0.8396	0.11111	0.33333
Sum		4.3331	10.0750	1.11110	2.04875

$$S^2 = \frac{10.0750 - (4.3331)^2 / 4}{1.11110 - (2.04875)^2 / 4} = 87.134$$

S = 9.3346

L = [4.3331 – (9.3346)(2.04875)] / 4 = -3.6978

A = (9.3346) ($\sqrt{0.05}$) – 3.6978 = -1.6105

FAV = $e^{1.6105}$ = 0.1998

PB85-227049

Guidelines for Deriving Numerical National Water Quality Criteria for the Protection Of Aquatic Organisms and Their Uses

by Charles E. Stephen, Donald I. Mount, David J. Hansen, John R. Gentile, Gary A. Chapman, and William A. Brungs

Deriving Criteria

- Temperature and pH dependencies

$$AV_{t,7} = \frac{AV_t}{\left(\frac{0.0114}{1 + 10^{7.204-pH}} + \frac{1.6181}{1 + 10^{pH-7.204}}\right)}$$

pH relationship

$$\log(AV_{t,7,20}) = \log(AV_{t,7}) - [-0.036(18^{\circ}C - 20^{\circ}C)]$$

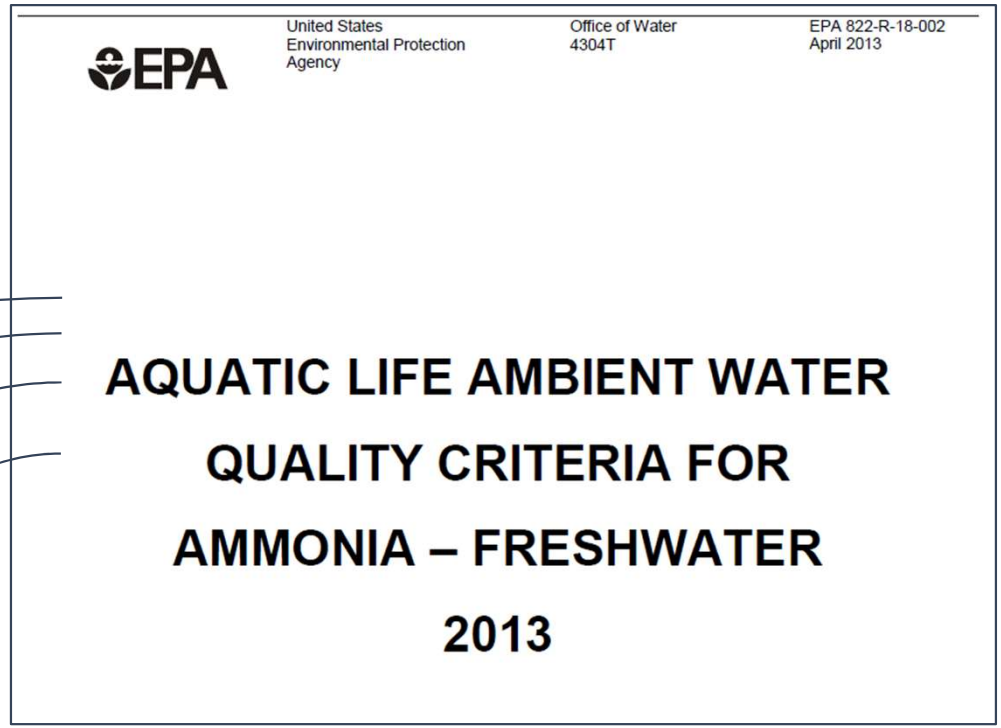
(invertebrate only) temp relationship

$$CMC = 0.7249 \times MIN\left(51.93, 23.12 \times 10^{0.036\times(20-T)}\right)$$

Mountain Whitefish (most sensitive species) criteria eqn

$$CMC = MIN\left(24.10, \left(45.05 \times 10^{0.036\times(20-T)}\right)\right)$$

Adult Rainbow trout (most sensitive species at low temps) criteria equation



Acute Criteria Equation

$$CMC = MIN\left(\left(\frac{0.275}{1+10^{7.204-}}+\frac{39.0}{1+10^{pH-7.204}}\right), \left(\frac{0.4015}{1+10^{7.204-}}+\frac{56.98}{1+10^{pH-7.204}}\right)\times\left(10^{0.036\times(20-T)}\right)\right)$$

*equation corrected as of 8/12/2026

Acute Criteria Equation

$$CMC = MIN\left(\left(\frac{0.275}{1+10^{7.204-pH}}+\frac{39.0}{1+10^{pH-7.204}}\right), \left(\frac{0.4015}{1+10^{7.204-pH}}+\frac{56.98}{1+10^{pH-7.204}}\right)\times\left(10^{0.036\times(20-T)}\right)\right)$$

*equation corrected as of 8/12/2026

!!!

Chronic Derivation

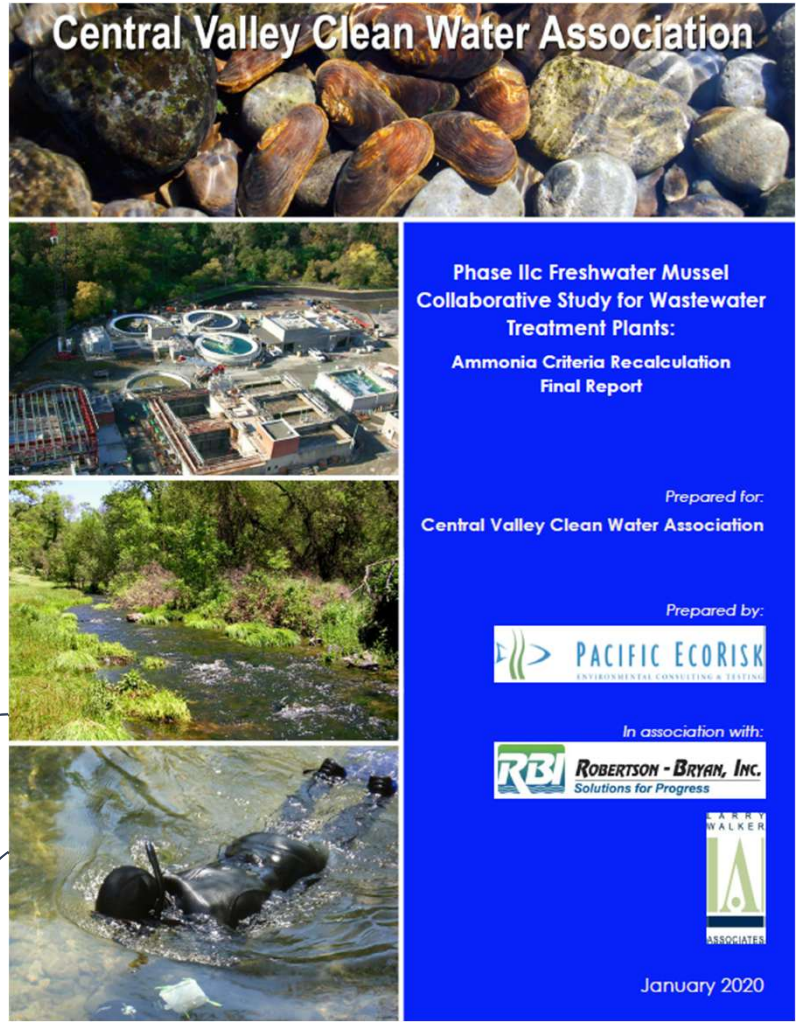
Uses EPA's recommendation for using the Unionid ACR to convert GMAVs to GMCVs, to then derive the FCV.

Since ID's site-specific chronic dataset is the same as CVCWA's, we opt for EPA's "salmonids present" recommendation from CVCWA's recalculation report.

$$CCC = 0.8634 \times \left(\frac{0.0278}{1+10^{7.688-pH}} + \frac{1.1994}{1+10^{pH-7.688}}\right) \times \text{MIN}\left(6.663, 3.854 \times 10^{0.028\times(20-T)}\right)$$

Appendix D,
"Alternative Chronic Criteria"

Genus	GMAV (mg TAN/L)	Unionid Family ACR	Surrogate Unionid GMCV (mg TAN/L)
Anodonta	81.65	15.52	5.261
Margaritifera	61.23	15.52	3.945
Gonidea	59.81	15.52	3.854



Derivation of Numerical Criteria from Equations

Recalculation results in less restrictive criteria than EPA's nationwide 2013 recommendations:

At pH 7 and 20C (in MG TAN/L)	ID Current	ID-SC	EPA 2013
Acute	24.1	24.1	17
Chronic	4.2	3.3	1.9

Resulting acute criteria are equivalent to the current criteria at all temperatures at or below 23^{o}C.

Resulting chronic criteria are not ELS dependent.

Acute Criteria Table

	Temp (ºC)												
pH	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	33	33	33	33	33	33	33	31	29	27	25	23	21
6.6	31	31	31	31	31	31	31	30	28	26	24	22	20
6.7	30	30	30	30	30	30	30	29	26	24	22	21	19
6.8	28	28	28	28	28	28	28	27	25	23	21	19	18
6.9	26	26	26	26	26	26	26	25	23	21	20	18	17
7	24	24	24	24	24	24	24	23	21	20	18	17	15
7.1	22	22	22	22	22	22	22	21	19	18	17	15	14
7.2	20	20	20	20	20	20	20	19	18	16	15	14	13
7.3	18	18	18	18	18	18	18	17	16	14	13	12	11
7.4	15	15	15	15	15	15	15	15	14	13	12	11	10
7.5	13	13	13	13	13	13	13	13	12	11	10	9.2	8.5
7.6	11	11	11	11	11	11	11	11	10	9.3	8.6	7.9	7.3
7.7	10	10	10	10	10	10	10	9.3	8.6	7.9	7.3	6.7	6.2
7.8	8.1	8.1	8.1	8.1	8.1	8.1	8.1	7.8	7.2	6.6	6.1	5.6	5.2
7.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.5	6.0	5.5	5.1	4.7	4.3
8	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.4	5.0	4.6	4.2	3.9	3.6
8.1	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.1	3.8	3.5	3.2	3.0
8.2	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.7	3.4	3.1	2.9	2.7	2.4
8.3	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.0	2.8	2.6	2.4	2.2	2.0
8.4	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.3	2.1	2.0	1.8	1.7
8.5	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	1.9	1.7	1.6	1.5	1.4
8.6	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.6	1.4	1.3	1.2	1.1
8.7	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.4	1.3	1.2	1.1	1.0	0.94
8.8	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.0	0.93	0.85	0.79
8.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.92	0.85	0.78	0.72	0.66
9	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.85	0.79	0.72	0.67	0.61	0.56

*corrected as of 8/12/2026

Chronic Criteria Table

Temperature and pH Dependent Values of Site-Specific CCC - Salmonids Present																					
	Temperature (°C)																				
pH	0-10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	6.5	6.5	6.3	5.9	5.5	5.2	4.9	4.6	4.3	4.0	3.8	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0
6.6	6.4	6.4	6.2	5.8	5.4	5.1	4.8	4.5	4.2	3.9	3.7	3.5	3.2	3.0	2.9	2.7	2.5	2.4	2.2	2.1	1.9
6.7	6.3	6.3	6.1	5.7	5.3	5.0	4.7	4.4	4.1	3.9	3.6	3.4	3.2	3.0	2.8	2.6	2.5	2.3	2.2	2.0	1.9
6.8	6.1	6.1	5.9	5.6	5.2	4.9	4.6	4.3	4.0	3.8	3.5	3.3	3.1	2.9	2.7	2.6	2.4	2.3	2.1	2.0	1.9
6.9	6.0	6.0	5.8	5.4	5.1	4.8	4.5	4.2	3.9	3.7	3.4	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8
7	5.8	5.8	5.6	5.2	4.9	4.6	4.3	4.0	3.8	3.5	3.3	3.1	2.9	2.7	2.6	2.4	2.3	2.1	2.0	1.9	1.7
7.1	5.5	5.5	5.3	5.0	4.7	4.4	4.1	3.9	3.6	3.4	3.2	3.0	2.8	2.6	2.5	2.3	2.2	2.0	1.9	1.8	1.7
7.2	5.2	5.2	5.1	4.8	4.5	4.2	3.9	3.7	3.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6
7.3	4.9	4.9	4.8	4.5	4.2	3.9	3.7	3.5	3.3	3.0	2.9	2.7	2.5	2.4	2.2	2.1	1.9	1.8	1.7	1.6	1.5
7.4	4.6	4.6	4.5	4.2	3.9	3.7	3.4	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4
7.5	4.2	4.2	4.1	3.9	3.6	3.4	3.2	3.0	2.8	2.6	2.5	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3
7.6	3.9	3.9	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2
7.7	3.5	3.5	3.4	3.2	3.0	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1
7.8	3.1	3.1	3.0	2.8	2.6	2.5	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.94
7.9	2.7	2.7	2.6	2.5	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.94	0.88	0.83
8	2.4	2.4	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.93	0.87	0.82	0.77	0.72
8.1	2.0	2.0	2.0	1.9	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.0	1.0	0.91	0.86	0.80	0.75	0.70	0.66	0.62
8.2	1.7	1.7	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.95	0.89	0.83	0.78	0.73	0.69	0.64	0.60	0.57	0.53
8.3	1.5	1.5	1.4	1.3	1.3	1.2	1.1	1.0	1.0	0.92	0.86	0.80	0.75	0.71	0.66	0.62	0.58	0.55	0.51	0.48	0.45
8.4	1.3	1.3	1.2	1.1	1.1	1.0	0.94	0.88	0.83	0.77	0.73	0.68	0.64	0.60	0.56	0.53	0.49	0.46	0.43	0.41	0.38
8.5	1.1	1.1	1.0	1.0	0.90	0.85	0.79	0.74	0.70	0.65	0.61	0.57	0.54	0.51	0.47	0.44	0.42	0.39	0.37	0.34	0.32
8.6	0.90	0.90	0.87	0.81	0.76	0.71	0.67	0.63	0.59	0.55	0.52	0.49	0.46	0.43	0.40	0.38	0.35	0.33	0.31	0.29	0.27
8.7	0.76	0.76	0.73	0.69	0.65	0.60	0.57	0.53	0.50	0.47	0.44	0.41	0.39	0.36	0.34	0.32	0.30	0.28	0.26	0.25	0.23
8.8	0.64	0.64	0.62	0.58	0.55	0.51	0.48	0.45	0.42	0.40	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.24	0.22	0.21	0.20
8.9	0.55	0.55	0.53	0.50	0.47	0.44	0.41	0.39	0.36	0.34	0.32	0.30	0.28	0.26	0.25	0.23	0.22	0.20	0.19	0.18	0.17
9	0.47	0.47	0.46	0.43	0.40	0.38	0.35	0.33	0.31	0.29	0.27	0.26	0.24	0.23	0.21	0.20	0.19	0.17	0.16	0.15	0.14

Comparison % difference between current and recalculated criteria

At pH 7 and 20C (in mg TAN/L)	ID Current	ID-SC	EPA 2013
Acute	24.1	24.1	17
Chronic	4.2	3.3	1.9

Relative difference between recalculated CCC and current CCC

	Temperature (°C)																				
pH	0-10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
6.6	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
6.7	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
6.8	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
6.9	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.1	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.2	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.3	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.4	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.5	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.6	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.7	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.8	-2.66	-2.66	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.9	-2.66	-2.66	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8	-2.66	-2.66	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.1	-2.66	-2.66	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.2	-2.66	-2.66	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.3	-2.66	-2.66	-5.70	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.4	-2.66	-2.66	-5.70	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.5	-2.66	-2.66	-5.70	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.6	-2.67	-2.67	-5.70	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.7	-2.67	-2.67	-5.71	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.8	-2.67	-2.67	-5.71	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.9	-2.68	-2.68	-5.71	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
9	-2.68	-2.68	-5.72	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8

CHRONIC

Relative difference between recalculated CMC and current CMC

	Temperature (°C)								
pH	0-22	23	24	25	26	27	28	29	30
6.5	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
6.6	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
6.7	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
6.8	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
6.9	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
7	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
7.1	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
7.2	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
7.3	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
7.4	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
7.5	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
7.6	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
7.7	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
7.8	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
7.9	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
8	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
8.1	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
8.2	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
8.3	0.00	0.00	0.00	-3.46	-11.14	-18.21	-24.71	-30.70	-36.21
8.4	0.00	0.00	0.00	-3.46	-11.14	-18.21	-24.71	-30.70	-36.21
8.5	0.00	0.00	0.00	-3.46	-11.14	-18.21	-24.71	-30.70	-36.22
8.6	0.00	0.00	0.00	-3.46	-11.14	-18.21	-24.72	-30.71	-36.22
8.7	0.00	0.00	0.00	-3.46	-11.14	-18.21	-24.72	-30.71	-36.22
8.8	0.00	0.00	0.00	-3.47	-11.15	-18.21	-24.72	-30.71	-36.22
8.9	0.00	0.00	0.00	-3.47	-11.15	-18.22	-24.72	-30.71	-36.22
9	0.00	0.00	0.00	-3.47	-11.15	-18.22	-24.73	-30.71	-36.23

ACUTE

Comparison % difference between current and recalculated criteria

At pH 7 and 20C (in MG TAN/L)	ID Current	ID-SC	EPA 2013
Acute	24.1	24.1	17
Chronic	4.2	3.3	1.9

Relative difference between recalculated CCC and current CCC

Temperature (°C)

pH	0-10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
6.6	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
6.7	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
6.8	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
6.9	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.1	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.2	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.3	-2.65	-2.65	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.4	-2.65	-2.6											9.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.5	-2.65	-2.6											9.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.6	-2.65	-2.6											9.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.7	-2.65	-2.6											9.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.8	-2.66	-2.6											9.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
7.9	-2.66	-2.6											9.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8	-2.66	-2.6											9.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.1	-2.66	-2.66	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.2	-2.66	-2.66	-5.69	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.3	-2.66	-2.66	-5.70	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.4	-2.66	-2.66	-5.70	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.5	-2.66	-2.66	-5.70	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.6	-2.67	-2.67	-5.70	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.7	-2.67	-2.67	-5.71	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.8	-2.67	-2.67	-5.71	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
8.9	-2.68	-2.68	-5.71	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
9	-2.68	-2.68	-5.72	-11.6	-17.1	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8

~15% change within pH and temp conditions that meet WQS

~20% change above 15º C

CHRONIC

Relative difference between recalculated CMC and current CMC

Temperature (°C)

pH	0-22	23	24	25	26	27	28	29	30
6.5	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
6.6	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
6.7	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
6.8	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
6.9	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
7	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
7.1	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
7.2	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
7.3	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
7.4	0.00							30.70	-36.21
7.5	0.00							30.70	-36.21
7.6	0.00							30.70	-36.21
7.7	0.00							30.70	-36.21
7.8	0.00							30.70	-36.21
7.9	0.00							30.70	-36.21
8	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
8.1	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
8.2	0.00	0.00	0.00	-3.45	-11.13	-18.20	-24.71	-30.70	-36.21
8.3	0.00	0.00	0.00	-3.46	-11.14	-18.21	-24.71	-30.70	-36.21
8.4	0.00	0.00	0.00	-3.46	-11.14	-18.21	-24.71	-30.70	-36.21
8.5	0.00	0.00	0.00	-3.46	-11.14	-18.21	-24.71	-30.70	-36.22
8.6	0.00	0.00	0.00	-3.46	-11.14	-18.21	-24.72	-30.71	-36.22
8.7	0.00	0.00	0.00	-3.46	-11.14	-18.21	-24.72	-30.71	-36.22
8.8	0.00	0.00	0.00	-3.47	-11.15	-18.21	-24.72	-30.71	-36.22
8.9	0.00	0.00	0.00	-3.47	-11.15	-18.22	-24.72	-30.71	-36.22
9	0.00	0.00	0.00	-3.47	-11.15	-18.22	-24.73	-30.71	-36.23

0% change within pH and temp conditions that meet WQS

ACUTE

Protectiveness

At pH 7 and 20C (in MG TAN/L)	ID-SC	Rank 1 (GMAV/GMCV)
Acute	24.1	48.2
Chronic	3.3	3.9

- Protects for ID's most sensitive species,
  - Western-ridged mussel, Mountain Whitefish, and adult Rainbow Trout at low temps
- Meets EPA's criteria dataset requirements
  - 2 salmon families, another chordata, 2 crustaceans (planktonic and benthic), an insect, a mollusk, another insect
- Under no conditions is it less stringent than DEQ's current criteria

Impacts to Stakeholders

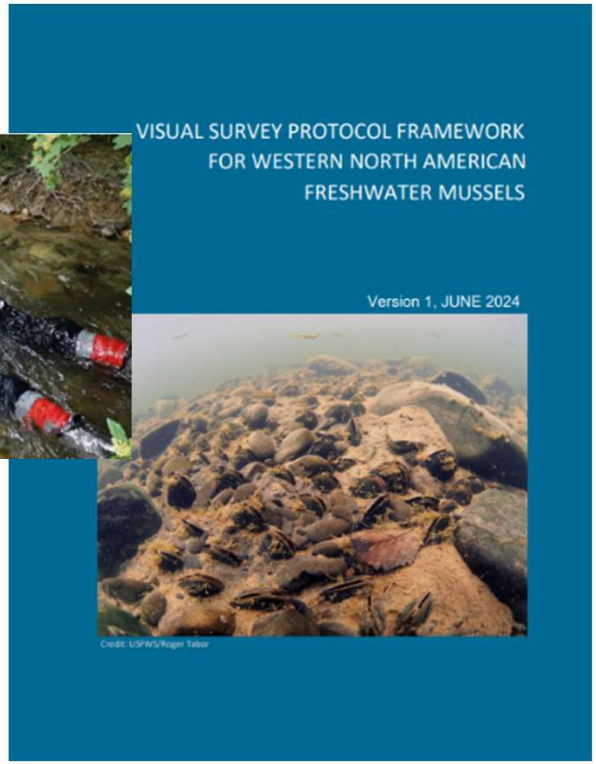
- In a preliminary analysis of downstream water data, DEQ estimated that no wastewater plants that currently meet their ammonia limits would be in danger of violating the new standard.
- WQS variances, compliance schedules, and site-specific criteria are tools which may be used to assist dischargers struggling to meet ammonia limits.
- DEQ and EPA funds are available for plant/system upgrades.

Support for Stakeholders Developing Site-Specific Criteria

- DEQ has been piloting eDNA sampling and visual survey techniques with IDFG, USFS, and Xerces Conservation Society
- 8 DEQ staff attended a visual survey training with Xerces in July
- EPA provides technical support for conducting surveys and reviewing data



Xerces Conservation Society



EPA and CVCWA both developed “unionids absent” criteria, that require evidence of mussel absence. DEQ has performed some preliminary work in developing Idaho-specific versions of these for site-specific applicants to reference.

Questions?

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

Proposed Rule Language

Acute

d. For Ammonia., The the following criteria are not to be exceeded dependent upon the temperature, T (degrees C), and pH of the water body: (3-31-22)

i. For Acute Criterion (Criterion Maximum Concentration (CMC)), The the one (1) hour average concentration of total ammonia nitrogen (in mg N/L) is not to exceed, more than once every three (3) years, the value calculated using the following equation:

$$CMC = \frac{0.275}{1 + 10^{7.204 - pH}} + \frac{39.0}{1 + 10^{pH - 7.204}}$$

$$CMC = MIN\left(\left(\frac{0.275}{1 + 10^{7.204-pH}} + \frac{39.0}{1 + 10^{pH-7.204}}\right), \left(\frac{0.4011}{1 + 10^{7.204-pH}} + \frac{40.9144}{1 + 10^{pH-7.204}}\right) \times 10^{0.036\times(20-T)}\right)$$

(3-31-22)

Chronic

ii. Chronic Criterion (Criterion Continuous Concentration (CCC)). (3-31-22)

(1) The thirty (30) day average concentration of total ammonia nitrogen (in mg N/L) is not to exceed, more than once every three (3) years, the value calculated using the following equations: (3-31-22)

$$CCC = \left(\frac{0.0240}{1+10^{7.688-pH}} + \frac{1.0356}{1+10^{pH-7.688}}\right) \times MIN\left(6.663, 3.854 \times 10^{0.028\times(20-T)}\right)$$

~~(a) When fish early life stages are likely present:~~

~~$$CCC = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) \bullet MIN(2.85, 1.45 \cdot 10^{0.028(25-T)})$$~~

~~(3-31-22)~~

~~(b) When fish early life stages are likely absent:~~

~~$$CCC = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) \bullet 1.45 \cdot 10^{0.028(25-T)})$$~~

~~(3-31-22)~~

(2) The highest four-day (4) average within the thirty-day (30) period should not exceed two point five (2.5) times the CCC. (3-31-22)

~~(3) Because the Department presumes that many waters in the state may have both spring spawning and fall spawning species of fish present, early life stages of fish may be present throughout much of the year. Accordingly, the Department will apply the CCC for when fish early life stages are present at all times of the year unless: (3-31-22)~~

~~(a) Time frames during the year are identified when early life stages are unlikely to be present, and (3-31-22)~~

~~(b) The Department is provided all readily available information supporting this finding such as the fish species distributions, spawning periods, nursery periods, and the duration of early life stages found in the water body; and (3-31-22)~~

~~(c) The Department determines early life stages are likely absent. (3-31-22)~~

Spokane River

275. SITE-SPECIFIC SURFACE WATER QUALITY CRITERIA.

~~283. SPOKANE RIVER, SUBSECTION 110.12, HUC 17010305, UNITS P-3 AND P-4, SITE-SPECIFIC CRITERIA FOR AMMONIA.~~

~~The following criteria are to be met dependent upon the temperature, T (degrees C), and pH of the water body:~~

~~(3-31-22)~~

~~01. Acute Criterion (Criterion Maximum Concentration (CMC)). The one (1) hour average concentration of total ammonia nitrogen (in mg N/L) is not to exceed, more than once every three (3) years, the value calculated using the following equation:~~

$$CMC = \frac{0.275}{1 + 10^{7.204 - pH}} + \frac{39.0}{1 + 10^{pH - 7.204}}$$

~~(3-31-22)~~

~~02. Chronic Criterion (Criterion Continuous Concentration (CCC)).~~ ~~(3-31-22)~~

~~a. The thirty (30) day average concentration of total ammonia nitrogen (in mg N/L) is not to exceed, more than once every three (3) years, the value calculated using the following equation:~~

$$CCC = \left(\frac{0.0577}{1 + 10^{7.688 - pH}} + \frac{2.487}{1 + 10^{pH - 7.688}} \right) \cdot MIN(2.85, 1.45 \cdot 10^{0.028(25 - T)})$$

~~(3-31-22)~~

~~b. The highest four (4) day average within the thirty (30) day period should not exceed two and five tenths (2.5) times the CCC.~~ ~~(3-31-22)~~



Discussion:

Western Pearlshell mussels in Lolo Creek near Weippe, ID

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

Gunnar Hilborn
Gunnar.Hilborn@deq.Idaho.gov
Water Quality Standards Analyst