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# Overview of New US EPA Ammonia Criteria – Part II

Options and considerations for  
achieving NPDES  
compliance and site-specific  
criteria development

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# Why does this require your attention?

- Criteria numerically lower, so meeting new ammonia permit limits could be difficult and costly for some WWTPs
  - Non-treatment compliance flexibilities exist, but some require better understanding or development
  - Both state regulators and the regulated community need to review and evaluate the new criteria, associated ramifications, and all the options available to comply with the criteria prior to adoption in state WQS
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# Ohio Ammonia Criteria vs New National Criteria – at pH 7

Temp (°C)	CMC-OA	WWH-OMZM		CMC-OP	CWH-OMZM		CCC	WWH-OMZA	CWH-OMZA
5	38	13		24	13		4.4	12.6	2.3
10	38	13		24	13		3.6	12.6 / 2.3	2.2
15	25	13		24	13		2.6	8.6 / 2.2	2.1
20	17	13		17	13		1.9	5.9 / 2.2	1.5
25	11	13		11	13		1.4	1.6	1.0
30	7.3	13		7.3	9.5		0.99	1.1	0.70

Dec-Feb / Mar-Nov

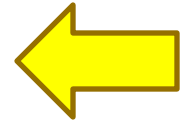
## Ohio Ammonia Criteria vs New National Criteria – at pH 8

Temp (°C)	CMC- OA	WWH- OMZM		CMC- OP	CWH- OMZM		CCC	WWH- OMZA	CWH- OMZA
5	8.8	9.9		5.6	6.2		1.8	3.3	1.4
10	8.8	9.5		5.6	5.9		1.5	2.3 / 1.4	1.3
15	5.9	9.2		5.6	5.7		1.1	1.6 / 1.4	1.3
20	3.9	9.1		3.9	5.6		0.78	5.9 / 1.4	0.90
25	2.6	9.1		2.6	4		0.56	1.0	0.60
30	1.7	6.6		1.7	2.9		0.41	0.70	0.50

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# Flexibilities authorized under the CWA for WQS implementation

- Site-specific criteria derivation,
- Variances,
- Revisions to designated uses,
- Dilution allowances, and
- Compliance schedules



See “Flexibilities” document available at:

<http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/ammonia/>

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# Reminders About National Criteria

- EPA Criteria are based on all acceptable data for a “target set” of species from North America
  - EPA Criteria are based upon tests in good quality (clean) laboratory water
  - There are methods to modify EPA Criteria to more closely match actual species present and actual water chemistry for any particular site
  - These methods usually require the development of additional data related to the site
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# Site-Specific Criteria (Things to Know)

- Can be higher or lower than the National criteria
  - Are usually discharge initiated due to indications (bioassessment or WET) that:
    - current discharge has no effect;
    - receiving water matrix will reduce toxicity;
    - inability to routinely meet permit limits; AND
    - receiving water may not contain sensitive species
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# Approaches to Modify Criteria

- Water-effect Ratio (WER)
    - Modifies criteria to site-specific water conditions
    - Ammonia WERs are typically 1, therefore no help
  - Recalculation Procedure (RP)
    - Modifies criteria to species *occurring at the site*
    - May help at certain sites
  - Resident Species Procedure
    - Modifies criteria to site water and site species
    - Very expensive
    - Typically does not result in lower criteria
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# US EPA's 2013 Revision to the RP

- **Fixes a previous incongruity in step-wise deletion process** – i.e., eliminates the possibility of unintended results at the order, class and phylum levels
  - **Important for Site-Specific Criteria (SSC) development for ammonia** – in cases where probable absence of unionid mussels can be demonstrated
  - **Available as a pdf at:**  
<http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/ammonia/upload/Revised-Deletion-Process-for-the-Site-Specific-Recalculation-Procedure-for-Aquatic-Life-Criteria.pdf>
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# Deletion Process of RP

- **Goal** - eliminate from the National dataset those taxa that are not resident (and not expected to be present) in the site waters,
    - while keeping in *toxicological surrogates for taxonomically-related resident species* for which no data are available
  - **Systematic stepwise deletion process** - which deletes species from the National dataset following a set of stringent guidelines
  - **End result** - dataset is more representative of the sensitivities of species found at the site – criterion is recalculated from the adjusted faunal dataset
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# Alternative Criteria for Ammonia- App. N SSC

- Appendix N provides SSC for four “general” scenarios:
    - Unionid Mussels Absent and Oncorhynchus spp. Present
    - Unionid Mussels Absent and Oncorhynchus spp. Absent
    - Unionid Mussels Absent, Fish Early Life Stage (ELS) Protection Necessary
    - Unionid Mussels Absent, Fish Early Life Stage (ELS) Protection Not Necessary
  - What’s the difference between Appendix N SSC and developing your own? – **Appendix N SSC are based on the same faunal list used to derive the National dataset**
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# Starting the Deletion Process

- Obtain a copy of the National dataset
  - Group all the species in the National (**and site-specific**) dataset taxonomically by Phylum, Class, Order, Family, Genus, and Species
  - Circle each species in National dataset that “occurs at the site”
  - Methodically apply step-wise deletion process with each species in the National dataset
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# EPA's definition of "occurs at the site"

- Usually present
- Present only seasonally
- Present only intermittently
- Were present in past, are not currently present due to degraded conditions, but are expected to return when conditions improve
- Are present in nearby waterbodies

(Note: Does not include species that were present and cannot exist now due to permanent alterations of the habitat or other conditions not likely to change)

# Step-wise Deletion Process

## **Step 1. Does a species in the Genus occur at the site?**

No. Go to step 2

Yes. Within the Genus, are there resident Species that are not in the National dataset?

No. Delete the uncircled species (Code N-3).

Yes. Retain the uncircled species (Code Y-3).

## **Step 2. Does a species in the Family occur at the site?**

No. Go to step 3

Yes. Within the Family, are there resident Genera that are not in the National dataset?

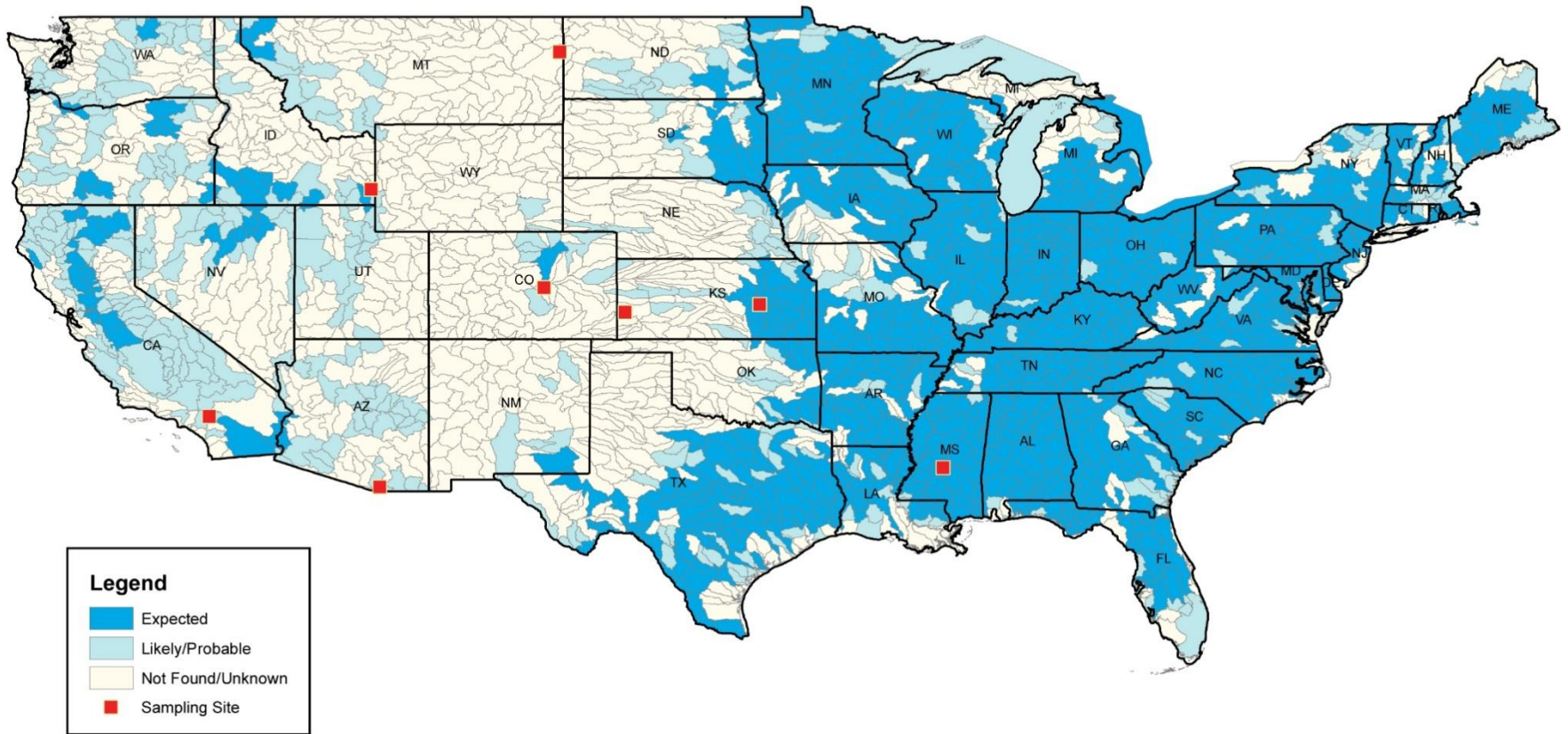
No. Delete the uncircled species (Code N-4).

Yes. Retain the uncircled species (Code Y-4).

\* Continue by starting at step 1 for each uncircled species until all uncircled species in the National dataset have been considered.

# Test Application Case Study Sites

Native Freshwater Mussel Distribution by USGS Watershed



# Example – Yellowstone R., MT Faunal List (Showing Mollusks Only)

Order	Family	Genus	Species
UNIONOIDA	UNIONIDAE	LAMPSILIS	LAMPSILIS SILIQUOIDEA
UNIONOIDA	UNIONIDAE	QUADRULA	QUADRULA QUADRULA
BASOMMATOPHORA	ANCYLIDAE	FERRISSIA	
BASOMMATOPHORA	PLANORBIDAE	GYRAULUS	

## Highlights:

- Limited number of resident mollusk species
- *L. siliquoidea* is a “circled” species (tested sp. in National dataset)
- *Q. quadrula* is a “non-endemic” species



# Example – Yellowstone R., MT

## National Chronic Dataset Species Deletion List

Order	Family	Genus	Species	Decision	Reason
Diplostraca	Daphniidae	Daphnia	Daphnia magna	<b>Delete</b>	N-11
Plecoptera	Pteronarcyidae	Pteronarcella	Pteronarcella badia	Retain	Y-8
Amphipoda	Hyalellidae	Hyalella	Hyalella azteca	Retain	Y-2
Cypriniformes	Catostomidae	Catostomus	Catostomus commersonii	Retain	Y-2
Cypriniformes	Cyprinidae	Cyprinus	Cyprinus carpio	Retain	Y-2
Cypriniformes	Cyprinidae	Pimephales	Pimephales promelas	Retain	Y-2
Esociformes	Esocidae	Esox	Esox lucius	Retain	Y-2
Perciformes	Centrarchidae	Lepomis	Lepomis cyanellus	Retain	Y-2
Perciformes	Centrarchidae	Lepomis	Lepomis macrochirus	<b>Delete</b>	N-3
Perciformes	Centrarchidae	Micropterus	Micropterus dolomieu	Retain	Y-2
Salmoniformes	Salmonidae	Oncorhynchus	Oncorhynchus clarkii	Retain	Y-6
Siluriformes	Ictaluridae	Ictalurus	Ictalurus punctatus	Retain	Y-2
Unionoida	Unionidae	Lampsilis	Lampsilis fasciola	<b>Delete</b>	N-3
Unionoida	Unionidae	Lampsilis	Lampsilis siliquoidea	Retain	Y-2
Unionoida	Unionidae	Villosa	Villosa iris	Retain	Y-6
Veneroida	Pisidiidae	Musculium	Musculium transversum	<b>Delete</b>	N-9
Neotaenioglossa	Hydrobiidae	Fluminicola	Fluminicola sp.	Retain	Y-10

# Summary of Chronic SSC Recalculation - Results from Case Study Sites

<b>Site</b>	<b>SSC</b>	<b>SSC Direction</b>	<b>Change in Magnitude</b>
<b>2013 CCC = 1.9 mg TAN/L at pH 7 and 20°C</b>			
Indian Creek, MS	1.7	Down	Small
Cedar Creek, KS	1.7	Down	Small
Yellowstone River, MT (1)	2.2	Up	Small
Yellowstone River, MT (2)	2.9	Up	Moderate
<b>App. N "Mussels Absent" Chronic SSC = 6.5 mg TAN/L</b>			
Arkansas River, KS	6.5	Same	None
Santa Ana River, CA	6.5	Same	None
Santa Cruz River, AZ	8.2	Up	Moderate
Fountain Creek, CO	6.2	Down	Small
Crow Creek, ID	6.5	Same	None

# Bottom Line

- Appendix N provides alternative SSC for general scenarios – but developing your own SSC could still be worthwhile

<b>Hypothetical Scenario</b>	<b>Likelihood</b>	<b>Magnitude ↑ CCC</b>
No bivalve mollusks	Very Rare	Large
No unionid mussels	Low	Moderate
Certain unionid mussels present	High	None to Moderate

- Key operational term in the RP Deletion Process is “Surrogacy” – species absence does not automatically result in deletion

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# Key Considerations

- Determining presence or probable absence of unionid mussels
    - US EPA Technical Support Document for Conducting Mussel Occurrence Surveys – mostly informational (see EPA 800-R-13-003)
  - General lack of robust site-specific faunal Lists:
    - Need specific biological survey/sampling methods/procedures (**especially for unionid/bivalve mollusks**)
  - Taxonomic ID must be made at the Species level
  - Occurrence of non-endemic species (not native to site-specific waterbody of interest)
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# Parting Advice

- Know the biological community (fauna) at your site and utilize local expertise
  - Consider sponsoring additional toxicity tests with resident species, particularly ubiquitous FW unionid mussels and other mollusks (e.g., FW clams and gill-bearing snails)
  - Define the probability of the return of a species to a site with permanent physical or other alteration to habitat (e.g., dams, water diversion for irrigation)
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    - Marie Lewis of Golder Associates, Inc.
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# Questions?

