



Utah Implementation Guidance for the 2013 USEPA Ammonia Criteria for the Protection of Aquatic Life

September 20, 2017

Version 1.0

¹ The review draft of this document was titled *Adoption of 2013 USEPA Ammonia Criteria for the Protection of Aquatic Life for Utah*

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Introduction and Scope

In 2013, the U.S. Environmental Protection Agency (USEPA, 2013a) published updated ammonia water quality criteria for the protection of aquatic life under Section 304(a) of the Clean Water Act. The Utah Division of Water Quality (DWQ) is evaluating the applicability of these criteria for implementation in Utah using the methods provided in USEPA (2013b). While the focus of these USEPA documents is the ambient water quality for the protection of aquatic life for ammonia, the methods are generally applicable to any aquatic life criteria. USEPA (2013d) lists all the regulatory options for implementing the USEPA (2013a) ammonia criteria. With the exception of the option to adopt the most protective ammonia criteria, additional data are needed to support any of the other regulatory options for less stringent criteria. In this document, DWQ describes a process that is consistent with USEPA (2013d) to determine appropriate criteria for Utah's surface waters. This process is intended to guide DWQ or others' data collection and analyses efforts. Although DWQ anticipates several years will be needed to fill the data gaps and formulate a proposal for statewide adoption, the ammonia criteria may be revised on a site-specific basis if other interested parties collect, compile and perform the analyses.

Until changed by the Utah Water Quality Board, the currently applicable water quality criteria for ammonia are the criteria in UAC R317-2-14. In addition to the data needs discussed herein, additional discussions with stakeholders are necessary to determine when any revised criteria should be implemented into UPDES permits and water quality assessments. Predicting when revised criteria will be proposed to the Water Quality Board is uncertain because the timing is dependent on the results of ongoing and yet-to-be started studies (discussed later). A tentative schedule is provided in Table 1.

USEPA (2013a) Ammonia Criteria for the Protection of Aquatic Life

The specific USEPA (2013a) ammonia criteria are dependent on the aquatic life community to be protected and other parameters. As will be further discussed below, the USEPA (2013a) ammonia criteria are sensitive to:

- the presence of unionid mussels,
- the presence of early life stages of fish,
- the presence of salmonids,
- the water temperature, and
- pH

USEPA (2013a) criteria that include protection for unionid mussels (Class Unionoida/Superfamily Unionoidea) are intended to be protective of aquatic life nationally. These criteria are currently presumed to be applicable as defaults for Utah waters where insufficient data are available to support that unionid mussels are not residents (USEPA, 2013c). Prior to proposing revised ammonia criteria to the Water Quality Board, this assumption will be verified based on the studies proposed. As with any water quality criteria, these can be revised in the future based on site-specific information (USEPA, 2013c). USEPA (2013b) discusses flexibilities for applying the USEPA (2013a) criteria that include refinements to the use and/or ammonia criteria to protect the use. Application of one or both of these approaches can be used for less-stringent ammonia criteria that will be protective of the aquatic life uses.

Accurately defining the aquatic life that represents the aquatic life use is critical to determining the appropriate ammonia criteria. The residence status of unionid mussels, salmonids and early life stages of fish are especially important because the ammonia criteria are significantly more stringent if these taxa are "residents" (Figures 1 through 8). The criteria are also sensitive to temperature and pH. Figures 1 and 2 illustrate different potential ammonia criterion maximum concentrations (CMC, aka, acute) at pH 7 and pH 8, respectively, from temperatures of 5 to 27°C. Figures 3 and 4 illustrate different potential CMCs at temperatures of 10 and 25°C, respectively, for a pH range of 6 to 9.

Some generalizations regarding the USEPA (2013a) criteria are immediately apparent. First, the criteria are generally more stringent at higher temperature and higher pH (Figures 1 through 4). Second, the presence of unionid mussels and salmonids require the most stringent CMCs but this relationship doesn't hold for all

combinations of temperature and pH. As shown on Figures 1 and 2, below 15°C, the CMC is most sensitive to the presence of salmonids. At a temperature of 15°C, the CMCs for unionid mussels and salmonids present, unionid mussels present and salmonids absent, and unionid mussels absent and salmonids present converge on the figure (the calculated CMC is 0.3 mg/L less stringent for the unionid mussels present and salmonids absent). At temperatures above 15°C, the CMC is most sensitive to the presence of unionid mussels. As shown on Figures 3 and 4, when temperature is held constant and pH varied, the CMCs are more stringent and move towards convergence at higher pH values. The difference between CMCs is greater at lower pH values.

Similar to the CMC, the continuous criterion concentration (CCC, aka, chronic) is also sensitive to temperature and pH but the critical taxa are different. Figures 5 through 8 illustrate the CCCs for the same temperature and pH combinations as Figures 1 through 4. At water temperatures less than 21°C, the most stringent CCCs are to protect unionid mussels and early life-stages of fish, followed by the presence of early-life stages and no unionid mussels, and the least stringent CCC is for no unionid mussels and no early life-stages. At temperatures above 21°C, the CCC is sensitive to the presence of unionid mussels but not early life-stages of fish. Similar to the CMCs, the CCCs are the most different at lower pH values and move toward convergence at higher pH values. These figures also illustrate the importance of accurate pH and temperature measurements when preparing waste load allocations. Permittees are encouraged to ensure that the data available to DWQ for these parameters for both effluents and receiving waters are robust and representative.

In addition to the importance of temperature and pH, Figures 1 through 8 illustrate the importance of the specific taxa, or residents, that comprise the aquatic life to be protected by the criteria. USEPA (2013d) defines “residents” as taxon 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.

While the resident species procedure described in USEPA (2013a; 2013b; 2013c) is not limited to unionid mussels, DWQ will only focus on the presence or absence of unionid mussels in this document. However, all available information will be considered in determining the appropriate ammonia criteria for a specific water body. These types of information include if water quality is currently supporting the uses and residence determinations for aquatic life other than mussels. For instance, unionid mussels may be determined to not be residents because the site does not support a necessary host such as fish. In this case, a Use Attainability Analysis may support site-specific ammonia criteria recalculated to not include both fish and unionid mussels.

For most situations, ammonia criteria that are not protective of unionid mussels will be supported by the Recalculation Procedure or by a Use Attainability Analysis. These two approaches have different regulatory paths although there can be considerable overlap in the data requirements and the resulting criteria.

Methods for Determining the Appropriate Ammonia Criteria for Utah Waters

Current absence and data that demonstrate that unionid mussels were not indigenous to a water body are sufficient to support that unionid mussels are not residents for determining the applicable ammonia criteria but current absence alone is insufficient to demonstrate that unionid mussels are not residents. Indigenous is not an explicit USEPA (2013d) criterion for the Recalculation Procedure but provides a useful decision point for determining if unionid mussels are usually present at a site, or were present in the past and not currently present because of degraded conditions and are expected to return if conditions improve. Unfortunately, for many Utah

waters, data may not exist to determine if unionid mussels were indigenous. When the existing records are insufficient to determine if mussels were residents and current surveys conclude the mussels are absent, the conditions of the water body will also need to be considered. If unionid mussels are not currently present and there is no evidence that degraded conditions are the cause(s) of the absence, then the unionid mussels may be determined not to be residents and the Recalculation Procedure will be used to derive the ammonia criteria. If the mussels are expected to return when the degraded conditions improve, then the ammonia criteria will be protective for mussels.

For waters where unionid mussels were historically present but are not currently present, the causes for the extirpation need to be evaluated. A Use Attainability Analysis or similar analyses are used to demonstrate that either a) the highest attainable use does not include unionid mussels because of one or more of the 40 CFR 131.10(g) factors or b) unionid mussels are not expected to return when conditions improve. The former are site-specific criteria based on a Use Attainability Analysis whereas the latter are site-specific criteria based on unionid mussels not being residents. A Use Attainability Analysis is always required to change the use to have less restrictive criteria unless the unionid mussels are not residents. Which path is applicable will likely be unknown during the initial stages of the evaluations. Although these two processes are different, the data needs for a Use Attainability Analysis will also support determining if unionid mussels are residents.

DWQ intends to compile and collect sufficient data to determine the residence status of unionid mussels for the receiving waters for publically-owned treatment works (POTWs). DWQ has also initiated work to determine when early life stages of fish are present because these too affect the ammonia criteria. DWQ will also provide technical and regulatory support when other interested parties are interested in further evaluating the residence status of unionid mussels or fish early life stages on a site-specific basis. The currently available information is insufficient to accurately define the scope and resources needed to meet these goals. Hence, these methods may be adapted and changed if necessary, to be consistent with new information and the resources available to DWQ.

For Utah, current presence is defined as the presence of unionid mussels on or after November 28, 1975 which is the same date as an existing use (UAC R317-1-1). Water quality criteria must be protective of existing uses. The methods in this document were developed assuming that physical mussel surveys will be conducted to determine presence or absence. Operationally, presence is based on observations of live mussels, mussel tracks and shells (USEPA, 2013c). Shells are considered indicative of current presence unless data are available to conclude that the shells are representative of historical conditions. Other types of survey methods, e.g., *eDNA*, may support more precise and economical surveys in the future and a different operational definition of presence.

Figure 9 illustrates the general steps to determine what ammonia criteria are appropriate for a given water. As shown in Figure 9, the first step is to review any available surveys for unionid mussels. In 2017, Utah State University is scheduled to complete a comprehensive literature search of historical records that document the presence and absence of unionid mussels in Utah. Records are considered current if they represent existing uses, i.e., on or after November 28, 1975. Records prior to this date and after *circa* 1900 represent historical conditions.

DWQ will evaluate the representativeness of the records on a watershed basis by considering factors such as:

- The quality and reliability of the record(s) considering rigor of the survey, taxonomy, documentation and age of record,
- The proximity of the record location to the sites under consideration,
- The hydraulic connectivity of the record location with the site,
- The stream order of the record location compared to the site,
- The stream gradient of the record location compared to the site,
- The substrate of the record location compared to the site,
- The barriers to dispersal between the record location and the site,
- The other available data for comparing the record location to the site such as fish or macroinvertebrate assemblages.

Based on DWQ's initial reviews, historical records are expected to be more reliable for establishing presence but not absence because negative findings were not reported. Although situations when records documenting

absence are anticipated to be rare, this option was included for completeness. DWQ's expectation for most Utah waters is that the historical records will report presence or no records will be available. If no records are available and surveys demonstrate that mussels are absent, then water quality and habitat needs to be considered. As shown on Figure 9, if unionid mussels are not currently present and there is no evidence that the mussels were historically present, and conditions are not degraded or the water quality is degraded but mussels are not expected to be present if water quality conditions improve, the ammonia criteria will not include protection of unionid mussels. If the records support that unionids are currently present, then unionid mussels meet the USEPA (2013d) definition of residents for the purposes of determining the applicable ammonia water quality criteria and no additional surveys are needed.

Figure 10 illustrates the specific steps that DWQ will take to determine the appropriate ammonia criteria for POTW receiving waters. Figure 11 illustrates the steps for all other Utah waters besides the POTW receiving waters. The primary difference between the approaches is that DWQ intends to conduct and compile the research to answer if unionid mussels are residents for POTW receiving waters but doesn't anticipate having sufficient resources to conduct these studies statewide. As previously discussed, ammonia criteria that are protective of unionid mussels are anticipated to be appropriate default criteria for Utah. However, the historical records and data collected for the POTW receiving waters will be evaluated to determine if this statewide default assumption is appropriate. If unionid mussels are or were residents in most Utah waters, the default assumption of their presence would be appropriate. If unionid mussels are/were not residents in a substantial number of Utah waters, then this assumption will be reevaluated (Figure 11).

As shown on Figure 9, if representative records are unavailable or indicate that unionid mussels were historically present, the default ammonia criteria protective of unionid mussels will apply unless the absence of mussels is confirmed by the results of qualitative surveys as defined by USEPA (2013a) or alternate survey methods approved by the DWQ. As general guidance for physical surveys, DWQ recommends that, survey designs that have at least a 90% probability of detecting unionid mussels when they are present at a density of 0.1/m² are desired (see box). A reconnaissance survey as defined by USEPA (2013c) may be initially conducted to determine that unionid mussels are present or that qualitative surveys are needed to confirm absence. The sampling rationale, design and methods for the survey methods must be clearly documented (see checklist in USEPA, 2013c) and DWQ concurrence is recommended prior to initiating the surveys. Failure to obtain preapproval may result in unnecessary and potentially costly resampling efforts.

If the outcomes of the qualitative surveys are that unionids mussels are currently present, then the mussels meet the USEPA definition of residents for the purpose of determining the ammonia criteria. As shown by the dashed line on Figure 9, additional surveys are potentially an option to rebut the operational definition that shells or individuals represent an existing use that must be protected. If unionid mussels are not an existing use, then a Use Attainability Analysis can potentially be used to support that the unionid mussels do not require protection but a Use Attainability Analysis cannot be used to remove an existing use. However, situations with mussels are theoretically plausible when the existence of a shell or an individual would not represent an existing use. For instance, some species such as *Margaritifera margaritifera* can live for 75 years or more (e.g., Baur, 1987) and the presence of one or a few older individuals may represent historical populations. Likewise, the presence of shells may only represent historical presence because the shells often persist in the environment. Concurrence from DWQ and EPA is strongly encouraged prior to implementing any evaluations to rebut that individual mussels or shells do not represent an existing use.

The methods of Smith (2006) can be used to estimate the level of effort required to detect rare mussels. The table below shows the how much of a stream needs to be sampled to have a 90% probability of detecting the mussels. These estimates assume 100% capture efficiency and a stream length of 50 miles and 15 m wide.

Mussel Density /m ²	Fraction of Total Area Sampled %	Total Area Sampled m ²
0.0001	1.8	16,071
0.001	0.18	1,608
0.01	0.018	161
0.1	0.0018	16
1	0.00018	2

If the qualitative surveys support that unionid mussels are not currently present, but other records support that they were present historically or their historical presence is uncertain, then the potential impacts of degraded conditions are evaluated. These evaluations determine if unionid mussels could return if conditions improve, and if they can, the mussels are considered to be residents (Figure 9).

The level of effort to evaluate if unionid mussels can return if conditions improve is dependent on site-specific conditions. For instance, the level of effort will be low for a site where unionids mussels can be concluded to be absent because of a non-anthropogenic cause such as naturally-occurring high salinity or at relatively pristine sites where unionid mussels are not currently present. Conversely, a site where unionid mussels were previously present that has existing water quality impairments will likely require more effort to conclude that unionids mussels could not return. Any known water quality degradation must be addressed and may require the preparation of a Total Maximum Daily Load, a use attainability analysis, or other similar analyses to support that unionid mussels cannot return. The wildlife management goals of the Utah Division of Wildlife Resources or recovery goals of the U.S. Fish and Wildlife Service for unionids mussels will also be considered when evaluating if unionid mussels could return. Consistent with the adoption process for all criteria, the goals of other stakeholders will also be considered.

If unionid mussels could return when conditions improve, the ammonia criteria are based on protecting an aquatic life use that includes unionid mussels. As with any use or criteria, options are available to support less stringent criteria if one or more of the 40 CFR 131.10(g) factors are applicable. The 40 CFR 131.10(g) factors may also be used to support an aquatic life use designation that does not include unionid mussels if the highest attainable use does not include unionid mussels. The 40 CFR 131.10(g) factors can also be used to support a variance based on the highest attainable conditions during the variance.

The 40 CFR 131.10(g) factors are:

1. Naturally occurring pollutant concentrations prevent the attainment of the use; or
2. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or
3. Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
4. Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or
5. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
6. Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

These processes can be applied to any waterbody or discharge permit. DWQ will provide regulatory support to any facility that is preparing either a UAA or variance request. Specifically for POTWs that are required to achieve effluent limits protective of unionid mussels, DWQ anticipates that the no. 6, substantial and widespread economic and social impact, will be the most common factor potentially applicable. While any treatment process is a candidate, DWQ is already working with USEPA Region 8 and other states in the region on developing a template that provides options for optimizing treatment and methods to support a determination of widespread social and economic impacts for lagoons systems serving small or economically-constrained population bases. DWQ will provide active support to Districts and Municipalities that provide the information necessary to support a variance request because of widespread social and economic impacts.

Schedule

The following schedule represents DWQ's estimates of how long each task will take and the estimated date of completion for the adoption of appropriate ammonia water quality criteria for Utah. DWQ will not recommend revised ammonia criteria be adopted statewide until all the data to support these efforts are available. The exception is if site-specific ammonia criteria are requested by- and supported by others. Since some of the steps are sequential, a delay to complete one step has the potential to impact the overall schedule. While significant uncertainties remain regarding the scope and time to complete these tasks, the schedule is provided to assist with planning purposes for permittees and DWQ's permitting, assessment and nutrient reduction programs.

Table 1. Estimated durations and completion dates for major tasks for updating Utah's ammonia water quality criteria for the protection of aquatic life based on USEPA (2013a)

Tasks	Estimated Duration	Estimated Completion Date
DWQ to complete historical surveys	14 months	May, 2017
DWQ to review historical surveys	2 months	July, 2017
DWQ to define scope for POTW receiving waters	1 month	August, 2017
DWQ request proposals to survey POTW receiving waters	2 months	October, 2017
DWQ secures funding for surveying POTW receiving waters	1 month	November, 2017
DWQ issues contract to perform qualitative surveys for POTW receiving water	1 month	December, 2017
Conduct surveys	24 months	January, 2020
Evaluate results	3 months	March, 2020
DWQ to propose ammonia criteria based on available data	4 months	June, 2020
Time for other interested parties to conduct supplemental surveys	12 months	June, 2021
Perform UAA for treatment lagoons, where appropriate	6 months	November, 2020
DWQ to compile all data propose adoption of statewide ammonia criteria to Water Quality Board	3 months	August, 2021

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FIGURES

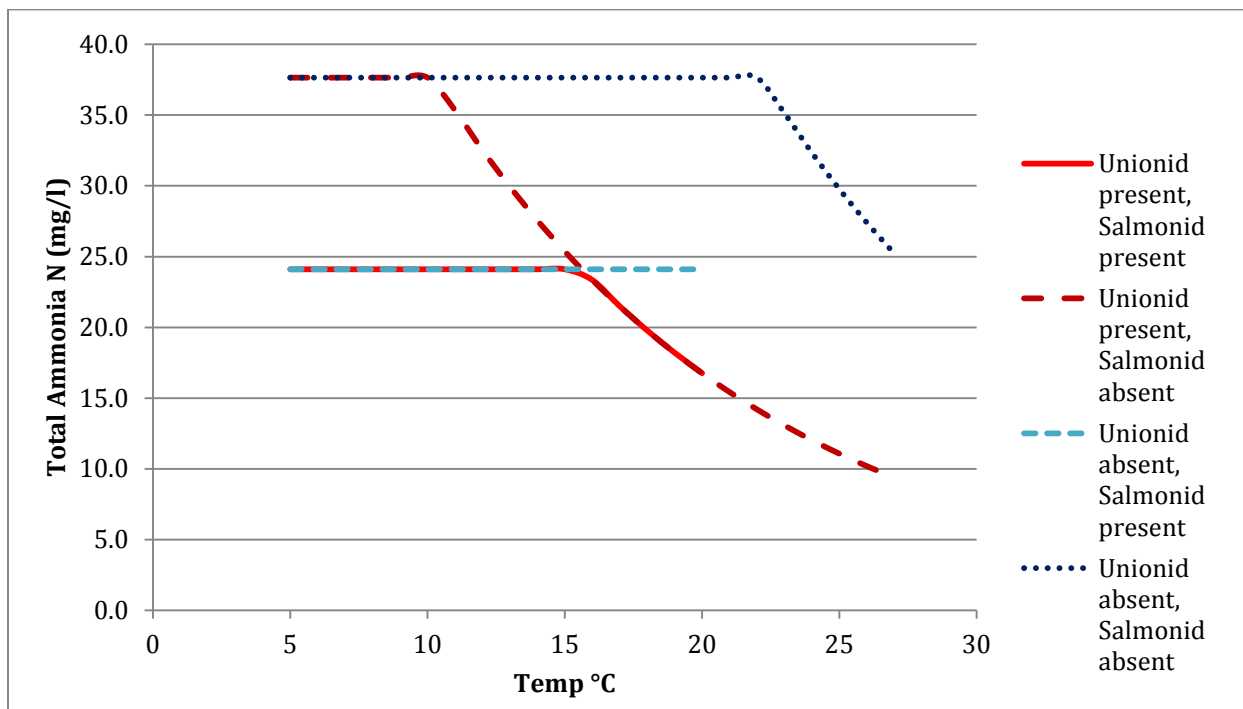


Figure 1. USEPA (2013a) Criterion Maximum Concentration for ammonia at pH 7. Salmonids presumed not present at temperatures greater than 20°C.

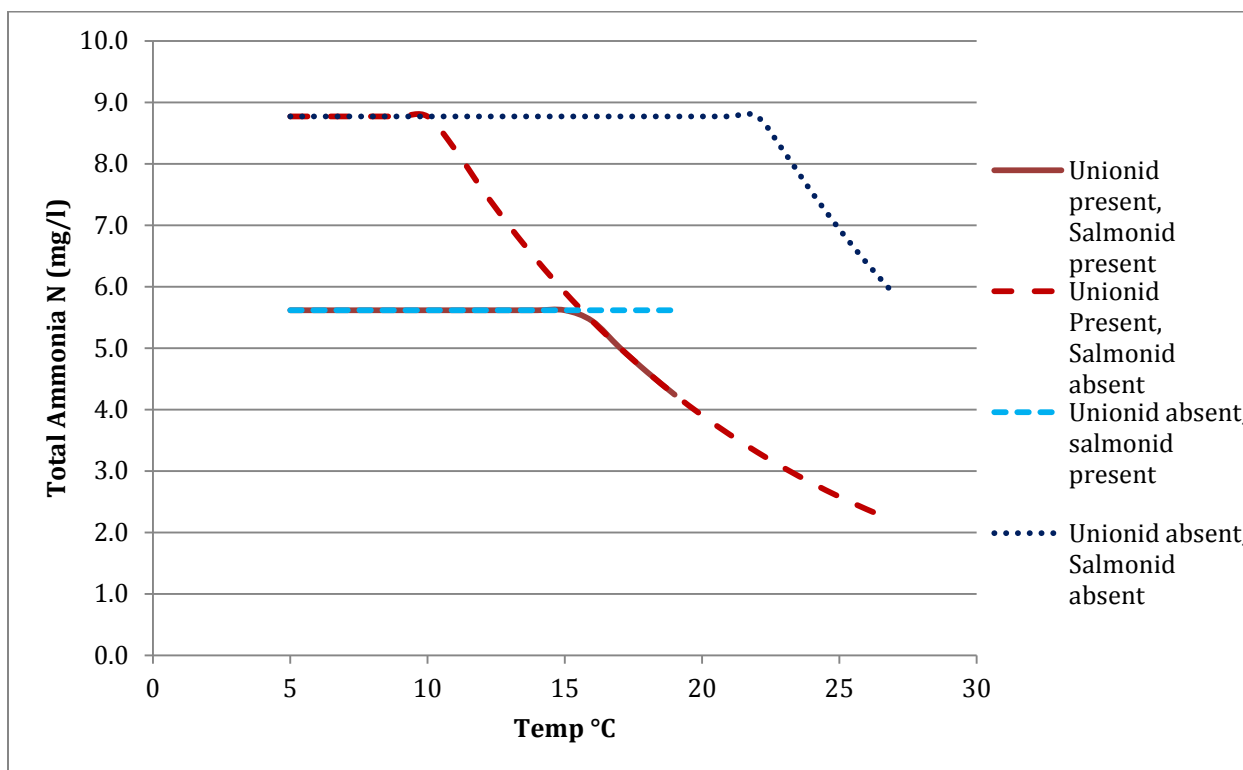


Figure 2. USEPA (2013a) Criterion Maximum Concentration at pH 8. Salmonids presumed not present at temperatures greater than 20°C.

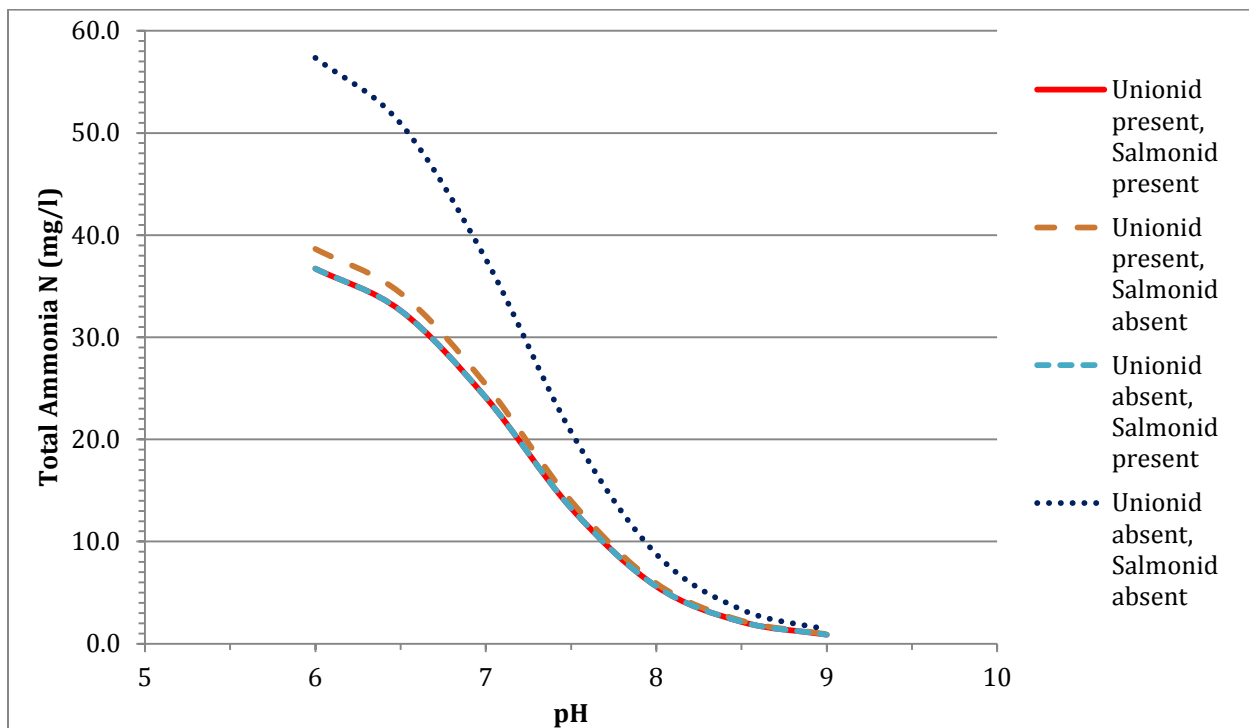


Figure 3. USEPA (2013a) Criterion Maximum Concentration at 10°C

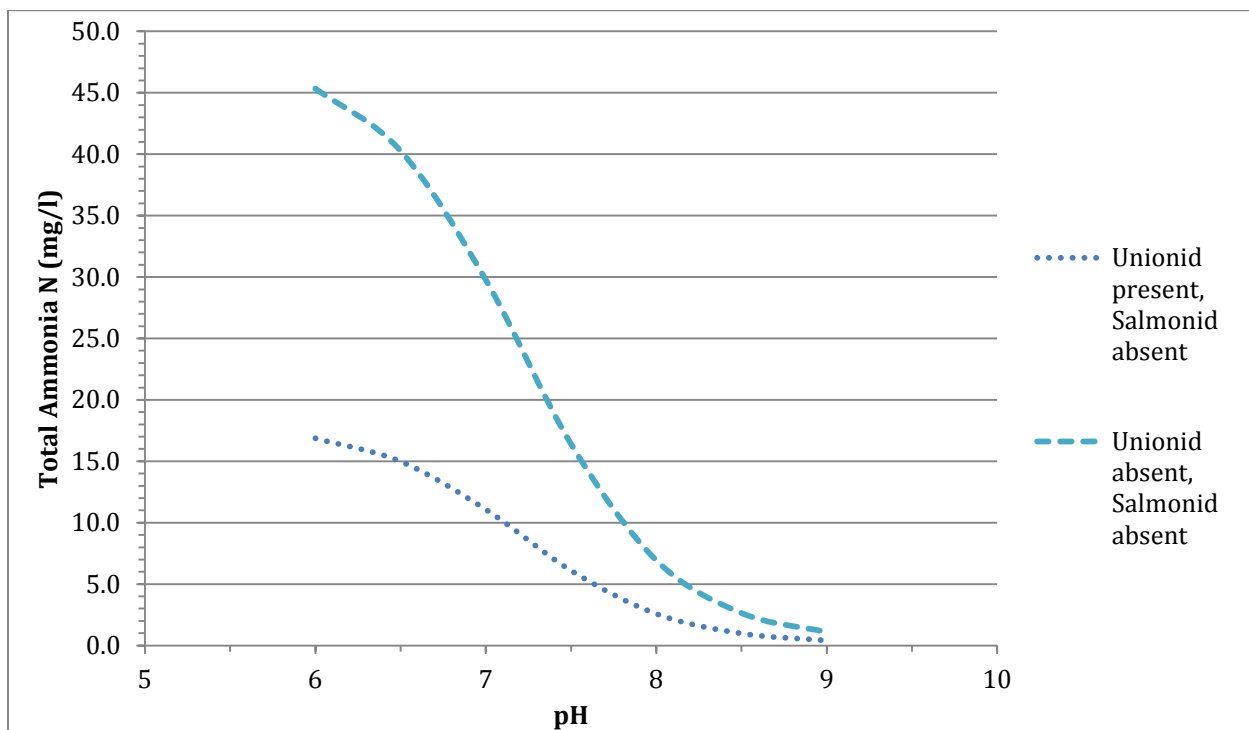


Figure 4. USEPA (2013a) Criterion Maximum Concentration at 25°C. Salmonids presumed to be absent.

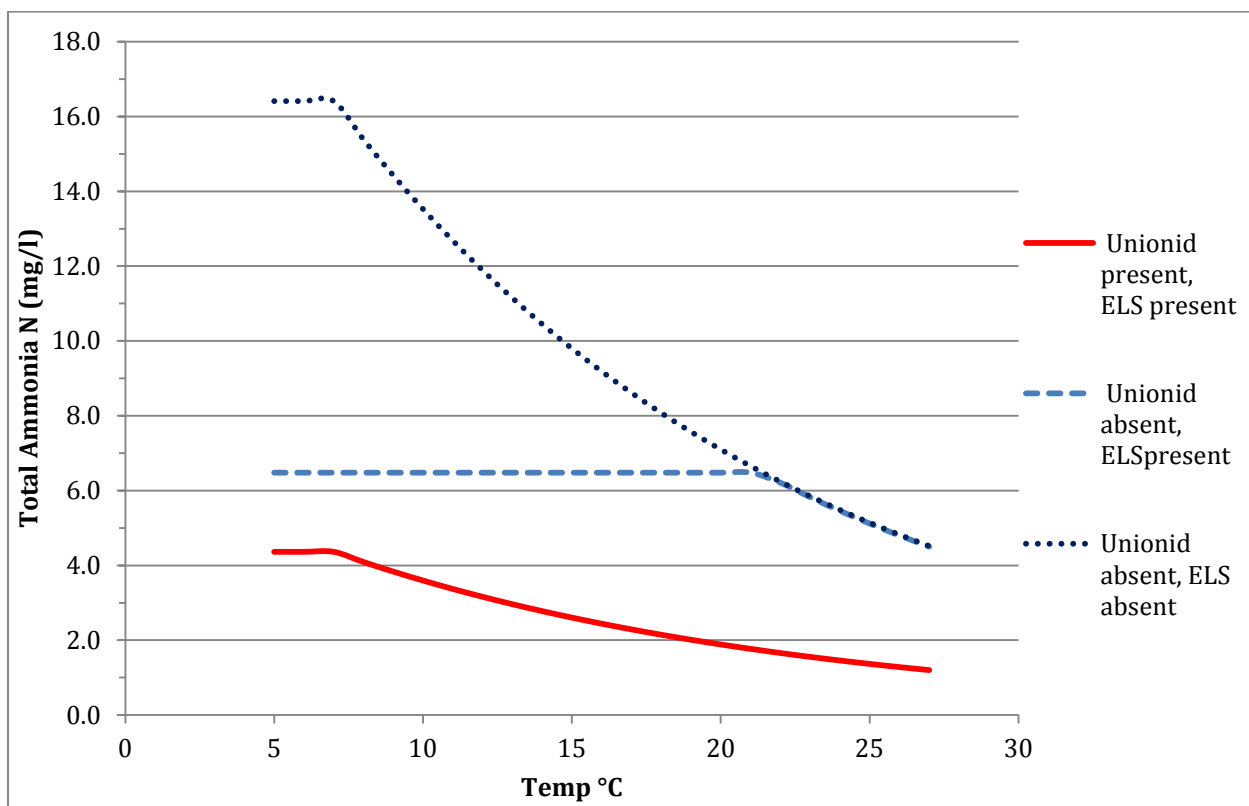


Figure 5. USEPA (2013a) Continuous Criterion Concentration at pH 7.0.

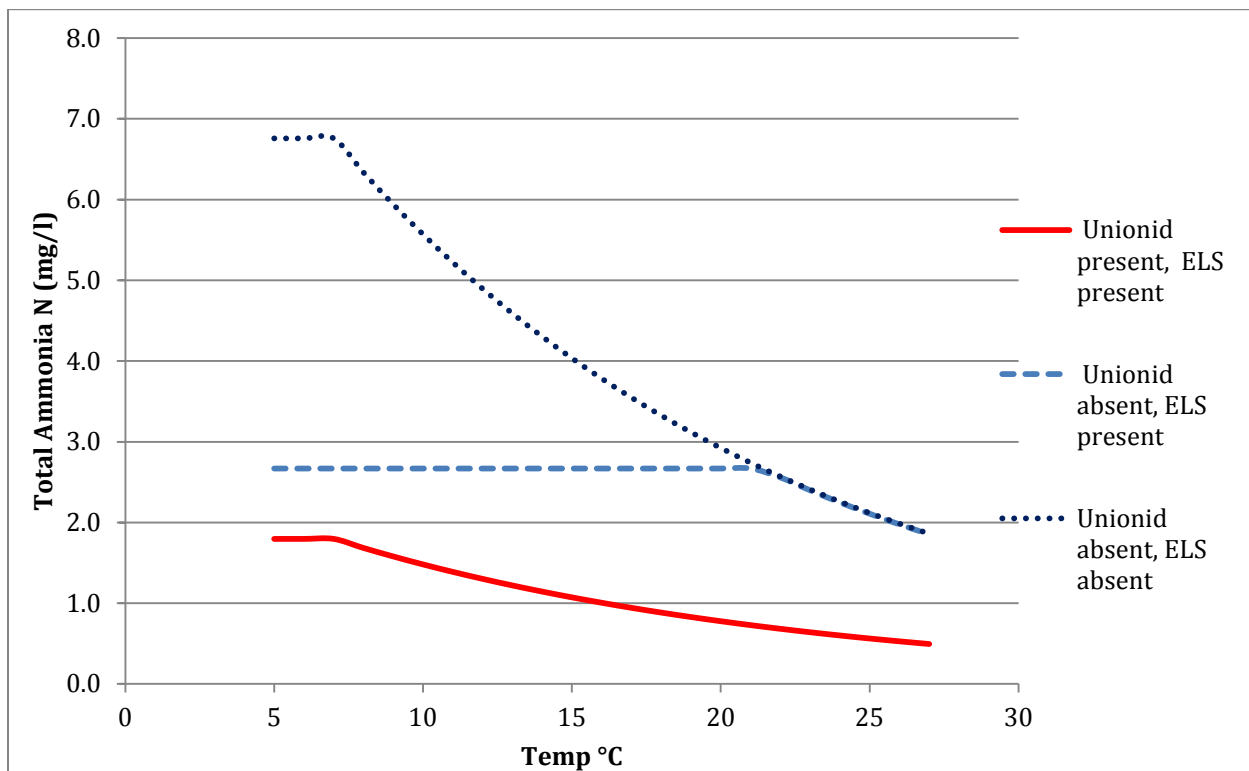


Figure 6. USEPA (2013a) Continuous Criterion Concentration at pH 8.0.

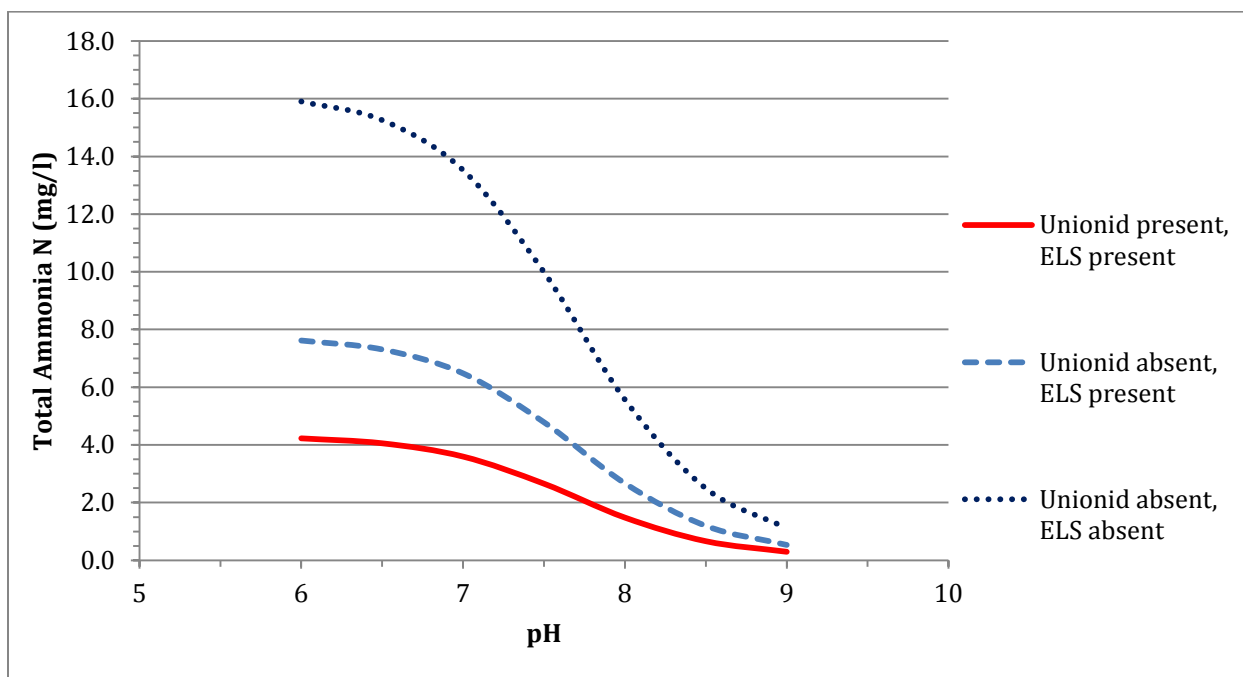


Figure 7. USEPA (2013a) Continuous Criterion Concentration at 10°C.

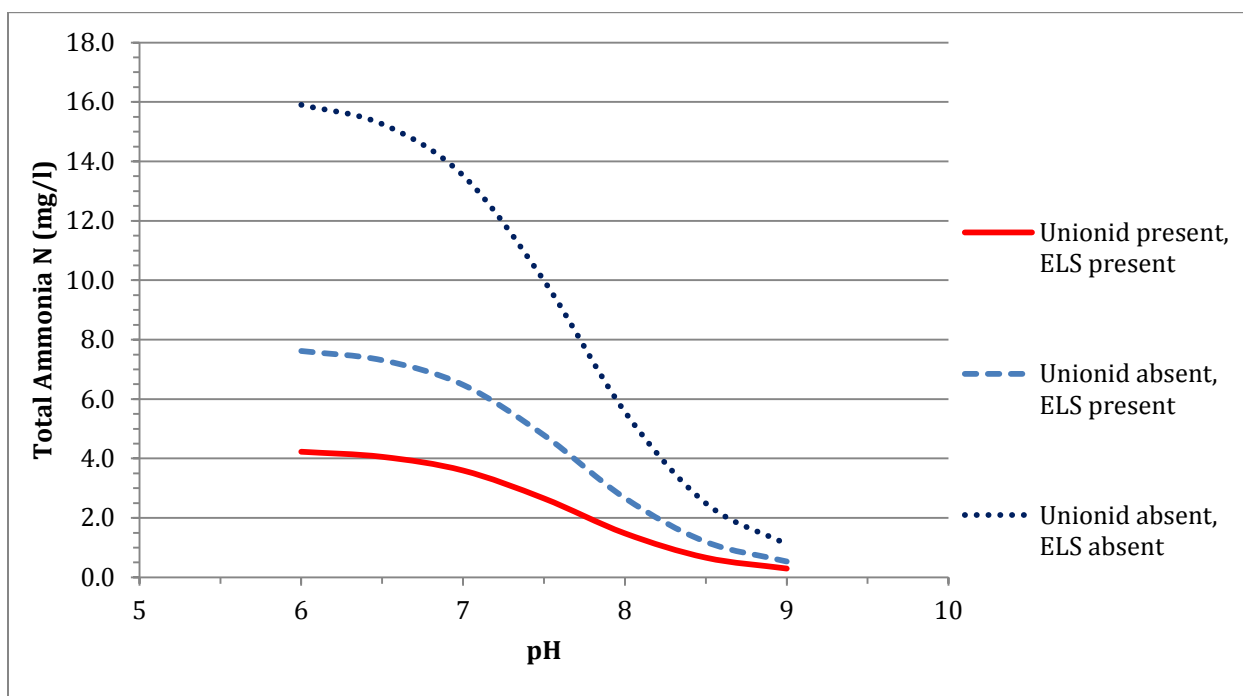


Figure 8. USEPA (2013a) Continuous Criterion Concentration at 25°C.

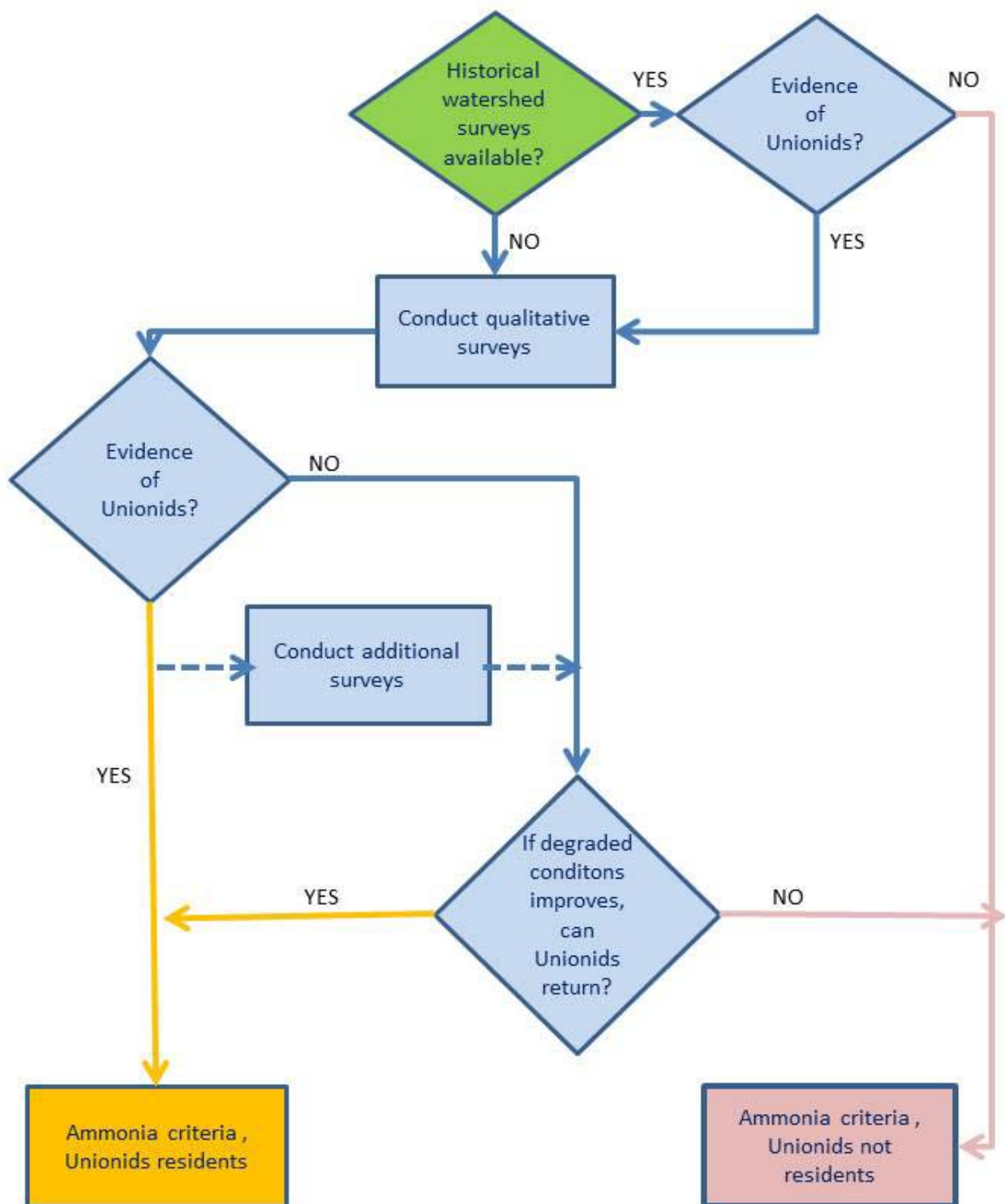


Figure 9. General process for determining if Unionid Mussels are residents for implementation of USEPA (2013a) ammonia water quality criteria for Utah. See text for specific details.

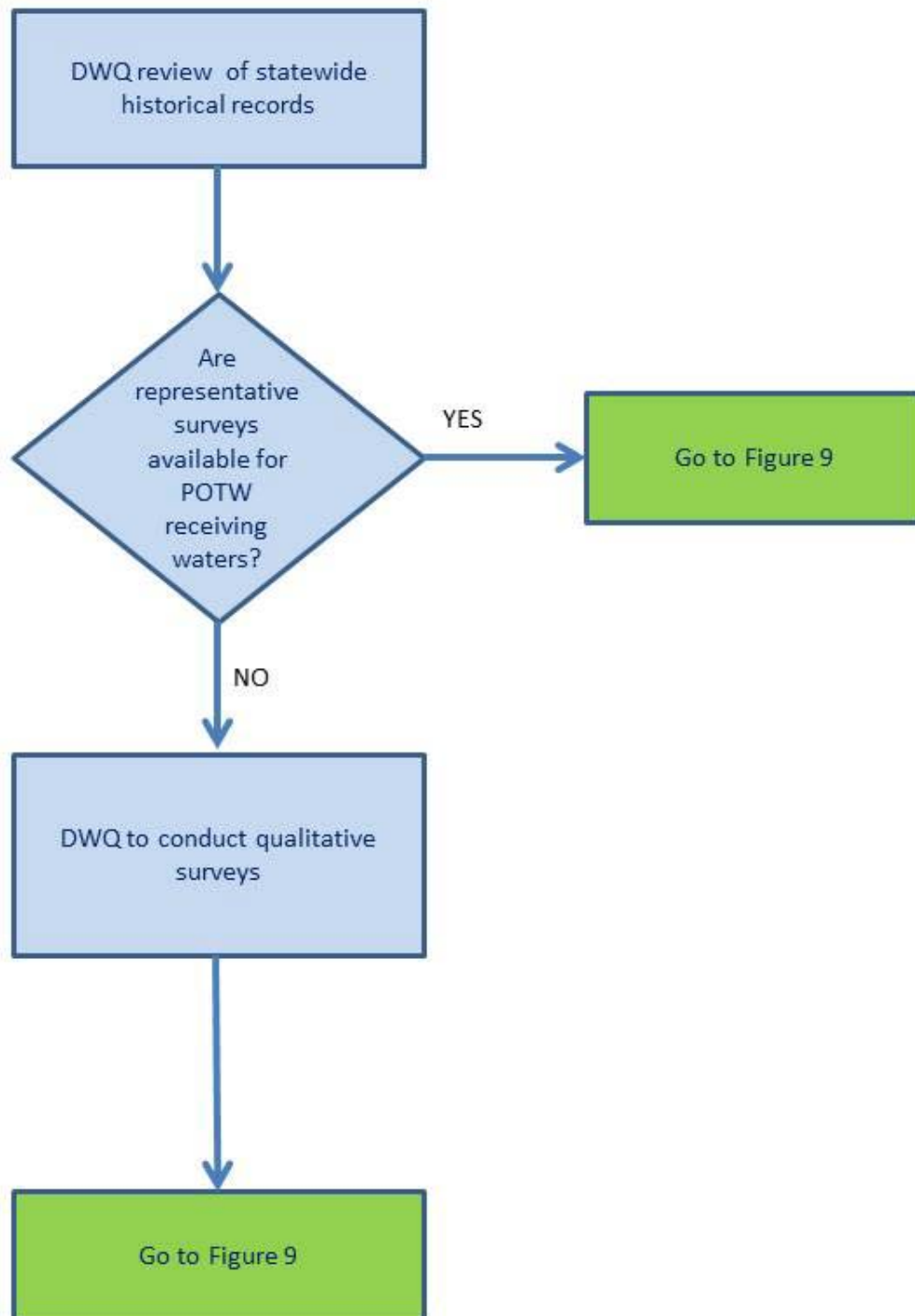


Figure 10. Process for Determining if Unionid Mussels are residents for Utah publicly-owned treatment works (POTWs) receiving waters for implementation of USEPA (2013a) Ammonia Criteria. See text for specific details.

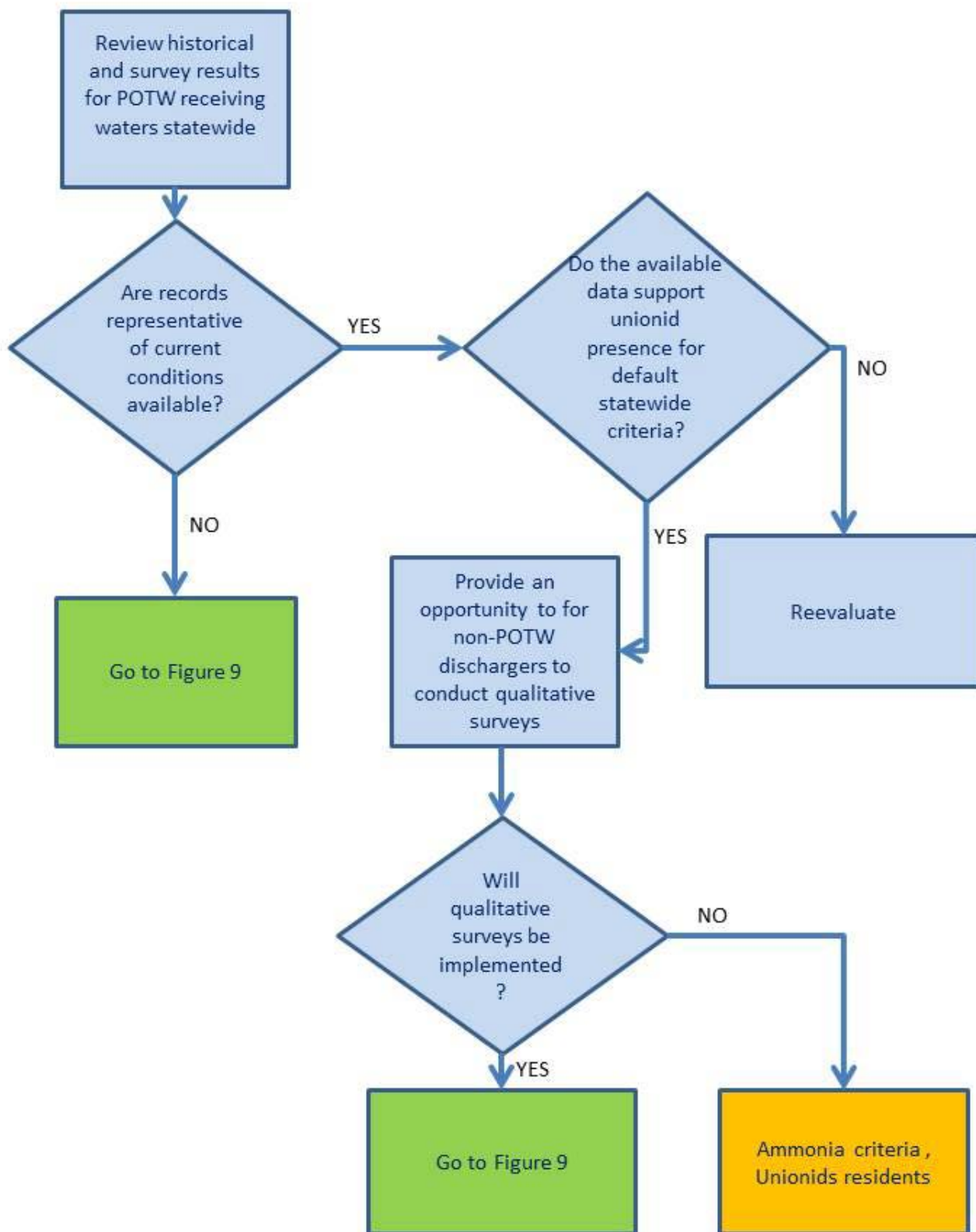


Figure 11. Process for Determining if Unionid Mussels are residents for implementation of USEPA (2013a) ammonia criteria for Utah waters other than publically-owned treatment works (POTWs) receiving waters. See text for specific details.

Attachment 1. Comments Received and Responsiveness Summary

*Adoption of 2013 USEPA Ammonia Criteria for Protection of Aquatic Life Criteria for Utah, March 12, 2017
Review Draft, v. 0.1*

1. Comment: Page 3, paragraph 3, last sentence - We suggest revising this sentence to read:

However, if unionid mussels are not currently present and there is no ~~evidence~~ expectation that they will return if degraded conditions improve ~~are the cause(s) of the absence~~, then the unionid mussels may be determined ~~are~~ not to be residents and . . .

DWQ Response: This section was revised for clarity. As explained by the revised text, if no data are available on the historical occurrence of mussels, and current surveys support they are not present, then the site conditions are evaluated. If a site is not degraded and mussels are not present, the mussels will be concluded to not be residents. If the site is degraded but the mussels are not expected to return if site conditions improve, the mussels will be concluded to not be residents.

"Based on DWQ's initial reviews, historical records are expected to be more reliable for establishing presence but not absence because negative findings, were not reported. Although situations when records documenting absence are anticipated to be rare, this option was included for completeness. DWQ's expectation for most Utah waters is that the historical records will report presence or no records will be available. If no records are available and surveys demonstrate that mussels are absent, then water quality and habitat need to be considered. As shown on Figure 9, if unionid mussels are not currently present and there is no evidence that the mussels were historically present, and conditions are not degraded or the water quality is degraded but mussels are not expected to be present if water quality conditions improve, the ammonia criteria will not include protection of unionid mussels. If the records support that unionids are currently present, then unionid mussels meet the USEPA (2013d) definition of residents for the purposes of determining the applicable ammonia water quality criteria and no additional surveys are needed."

2. Comment: Page 4, paragraph 2, first sentence - We recommend revising this sentence to read:

As shown in Figure 9, if the records support that unionid mussels are not currently present and there is no evidence that the mussels were historically present, and unionid mussels are not expected to occur if degraded water quality conditions improve, the ammonia criteria will not . . .

DWQ Response: The sentence was revised for clarity:

"As shown on Figure 9, if unionid mussels are not currently present and there is no evidence that the mussels were historically present, and conditions are not degraded or the water quality is degraded but mussels are not expected to be present if water quality conditions improve, the ammonia criteria will not include protection of unionid mussels."

"As previously discussed, ammonia criteria that are protective of unionid mussels are anticipated to be appropriate default criteria for Utah. However, the historical records and data collected for the POTW receiving waters will be evaluated to determine if this statewide default assumption is appropriate. If unionid mussels are or were residents in most Utah waters, the default assumption of their presence would be appropriate. If unionid mussels are/were not residents in a substantial number of Utah waters, then this assumption will be reevaluated (Figure 11)."

3. Comment: Page 4, paragraph 3, last two sentences - We recommend revising these sentences to read:

If unionid mussels are or were ~~common~~ residents in Utah waters, the default assumption of their presence would be appropriate. If unionid mussels are/were ~~rare~~ not residents then this assumption will be reevaluated (Figure 11).

DWQ Response: The purpose of the text in this section is to acknowledge that DWQ will evaluate the data that are collected to validate the assumption that the default ammonia criteria protective of mussels is appropriate for unsurveyed Utah waters. The quantity and quality of the data are currently unknown and no specific thresholds for these determinations were developed because they will be based on quantity and quality of the data. This section was revised for clarification:

“As previously discussed, ammonia criteria that are protective of unionid mussels are anticipated to be appropriate default criteria for Utah. However, the historical records and data collected for the POTW receiving waters will be evaluated to determine if this statewide default assumption is appropriate. If unionid mussels are or were residents in most Utah waters, the default assumption of their presence would be appropriate. If unionid mussels are/were not residents in a substantial number of Utah waters, then this assumption will be reevaluated (Figure 11).”

4. Comment: Page 4, paragraph 4, second sentence - We suggest revising this sentence to read:

As a general rule of thumb, DWQ recommends ~~W~~when feasible, survey designs that have ...

DWQ Response: The sentence was revised as suggested:

“As general guidance for physical surveys, DWQ recommends that, survey designs that have at least a 90% probability of detecting unionid mussels when they are present at a density of 0.1/m² are desired (see box).”

5. Comment: Page 5, paragraph 1, last sentence - We suggest revising this sentence to read:

~~Because of the lack of specific USEPA guidance or rules for evaluating an existing use for this type of situation,~~
Concurrence from DWQ and EPA is strongly encouraged ...

DWQ Response: The sentence was revised as suggested.

6. Comment: Page 6, paragraph 1, first sentence - We suggest revising this sentence to read:

... options for optimizing treatment and methods to support a determination of widespread social and economic impacts for lagoons systems serving small or economically-constrained population bases.

DWQ Response: The sentence was revised as suggested.

7. Comment: Page 13, Figure 9 - We suggest DWQ address that some historical surveys may not provide evidence of the presence of unionid mussels, but may still not provide conclusive evidence that they were not a resident species at the time of the survey. Some historical surveys may leave uncertainties whether unionid mussels were present and not found or identified (e.g., whether the sampling protocols used were sufficient to establish absence). For such instances, should there be an additional pathway through the "If degraded conditions improve, can Unionids return?" flowchart diamond, before leading to a determination that unionid mussels are not resident? Alternatively, this could be addressed in the Methods section of the Document.

DWQ Response: For clarity, the text was revised consistent with the comment:

“Based on DWQ’s initial reviews, historical records are expected to be most reliable for establishing presence because negative findings, that is, mussel surveys were conducted but mussels were not found, were not reported. Although situations when records documenting absence are anticipated to occur infrequently, this option was included for completeness. DWQ’s expectation is that the historical records may show presence or no records will be available. If no records are available, then water quality and habitat need to be considered. As shown on Figure 9, if the records support that unionid mussels are not currently present and there is no evidence that the mussels were historically present, and conditions are not degraded or the water quality is degraded but mussels are not expected to return if water quality conditions improve, the ammonia criteria will not include protection of unionid mussels. If the records support that unionids are currently present, then unionid mussels meet the USEPA (2013d) definition of residents for the purposes of determining the applicable ammonia water quality criteria and no additional surveys are needed.”

8. Comment: We understand DWQ is evaluating the applicability of the United States Environmental Protection Agency (USEPA) 2013 water quality criteria for protection of aquatic life utilizing methods prescribed by USEPA. We also recognize that in Utah we have a unique and valuable resource in the Great Salt Lake (GSL); which, as a hypersaline lake, has a different ecosystem than freshwater lakes and waterbodies of which the evaluation methods were established. We support the DWQ's study of receiving waters for individual POTWs and believe this case-by-case analysis is essential for all water bodies and specifically for GSL given the unique properties of the lake and its associated ecosystem. We encourage DWQ to continue to use sound and reasonable science when making decisions on evaluation and establishment of criteria for the GSL. SLCDPU will continue to participate with and support the State as an active stakeholder to further our collective understanding of the GSL watershed.

DWQ Response: We appreciate Salt Lake City Corporation's continued support in establishing appropriate ammonia criteria to protect Utah's waters. We recognize the uniqueness of Great Salt Lake and expect that the salinity will preclude mussels inhabiting most or all of the Lake. DWQ will also evaluate the Northwest Oil Drain (the immediate receiving waters for Salt Lake City's Wastewater Reclamation Facility) for the presence of unionid mussels. We will coordinate with the staff from Salt Lake City when this evaluation is conducted in the future. Although unionid mussels have been found proximal to Great Salt Lake in the Public Shooting Grounds, our expectation (to be confirmed in the future) is that unionid mussels are unlikely to be residents in the Northwest Oil Drain because of the severely habitat-limited conditions.

9. Comment: We are aware that research and discussions have been, and will be taking place on the GSL. Specific to ammonia-criteria, further research of Farmington Bay and the GSL to determine if these are nitrogen-limited waters. The SLC Water Reclamation Facility (SLCWRF) is essentially a direct discharge to GSL and limitations on our ammonia would limit the amount of nitrogen going to GSL. Much research will be taking place on GSL in the future and regulations on ammonia and nitrogen may be better to wait until that time in order to have a better understanding of what is best for the health of the GSL.

DWQ Response: We acknowledge the many current data gaps in our understanding of nutrient dynamics in Great Salt Lake and are actively working with stakeholders in designing studies to better understand nutrient dynamics in the Lake. Ammonia is toxic to aquatic organisms when concentrations are high but can be a readily-available nitrogen nutrient for aquatic plants at lower concentrations. We anticipate that protection from the toxic effects of ammonia can be balanced with continued support of a vibrant Lake ecosystem. We are committed to collecting the data necessary to inform these decisions and we look forward to Salt Lake City's and other Lake stakeholder's continued support. No revisions were necessary to respond to this comment.

10. Comment: Additionally, SLCWRF effluent flows through roughly nine miles of manmade canal prior to discharge into the Farmington Bay on the GSL. This canal also transports a portion of Salt Lake City's storm water and a permitted effluent stream from Chevron Oil, however, the majority of the flow is SLCWRF effluent. As such, the canal does not meet any USEPA [2013d] criteria definition for "resident" of taxon, which is important when considering the applicability of the USEPA 2013 water quality criteria/evaluation methods for the SLCWRF discharge into this canal.

DWQ Response: We are unclear of the intent of this comment. Salt Lake City discharges to Waters of the State. All Waters of the State, including the Northwest Oil Drain, have designated beneficial uses and criteria to protect those uses. The criteria to protect the uses are based on the "residents." If Salt Lake City believes that the current beneficial uses or the existing criteria to protect those uses are not appropriate for the Northwest Oil Drain, we suggest that you contact the DWQ Standards Coordinator, Mr. Chris Bittner at cbittner@utah.gov to investigate petitioning the Water Quality Board for a change. No revisions were necessary to respond to this comment.

11. Comment: Finally, the USEPA evaluation criteria lists the importance of taxa that comprise the aquatic life to be protected. Specifically, this includes the presence of unionid mussels, early life stages of fish and the presence of salmonids. The criteria further states that taxa evaluation will include residents that, "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." In the event this evaluation shows that unionid mussels [or the other listed taxa] were historically present in the SLCWRF receiving waters, we encourage DWQ to determine the most probable cause of the absence of the mussels, and when the absence occurred. We realize this may not be feasible but

encourage use of sound science to try and answer these questions prior to establishing the most stringent ammonia criteria at the GSL.

DWQ Response: As explained in the document on page 5, we agree that identifying the cause(s) for absence is a critical step for selecting the appropriate ammonia criteria:

“The level of effort to evaluate if unionid mussels can return if conditions improve is dependent on site-specific conditions. For instance, the level of effort will be low for a site where unionids mussels can be concluded to be absent because of a non-anthropogenic cause such as naturally-occurring high salinity or at relatively pristine sites where unionid mussels are not currently present. Conversely, a site where unionid mussels were previously present that has existing water quality impairments will likely require more effort to conclude that unionids mussels could not return. Any known water quality degradation must be addressed and may require the preparation of a Total Maximum Daily Load, a use attainability analysis, or other similar analyses to support that unionid mussels cannot return. The wildlife management goals of the Utah Division of Wildlife Resources or recovery goals of the U.S. Fish and Wildlife Service for unionids mussels will also be considered when evaluating if unionid mussels could return. Consistent with the adoption process for all criteria, the goals of other stakeholders will also be considered.

If unionid mussels could return when conditions improve, the ammonia criteria are based on protecting an aquatic life use that includes unionid mussels. As with any use or criteria, options are available to support less stringent criteria if one or more of the 40 CFR 131.10(g) factors are applicable. The 40 CFR 131.10(g) factors may also be used to support an aquatic life use designation that does not include unionid mussels if the highest attainable use does not include unionid mussels. The 40 CFR 131.10(g) factors can also be used to support a variance based on the highest attainable conditions during the variance.”



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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Ref: 8OWP-WQU

Mr. Christopher Bittner
Division of Water Quality
Utah Department of Environmental Quality
Salt Lake City, Utah 84114-4870

Subject: Comments on Adoption of USEPA 2013 Ammonia Criteria for the Protection of
Aquatic Life for Utah

Dear Mr. Bittner:

Thank you for notifying the U.S. Environmental Protection Agency (EPA) Region 8 Water Quality Unit (WQU) of the comment opportunity for the *Adoption of USEPA 2013 Ammonia Criteria for the Protection of Aquatic Life for Utah, March 12, 2017, Review Draft v. 0.1* (Document). The Document outlines the process, decision matrices, data needs and draft timeline that the Utah (State) Division of Water Quality (DWQ) will follow in adopting and implementing the EPA's Clean Water Act (CWA) Section 304(a) criteria recommendations for the protection of aquatic life from ammonia.¹ The WQU has reviewed the Document and the purpose of this letter is to provide our comments and suggestions.

Recent toxicity testing data demonstrates the effects of ammonia on sensitive freshwater species including mollusks (e.g., freshwater mussels in the Order Unionoida and non-pulmonate snails) and certain fish species (e.g., salmonids) as well as sensitive life stages of aquatic species generally.² Ammonia is considered one of the most important pollutants found in aquatic environments due to its highly toxic nature and ubiquity in surface water ecosystems. Salmonids and freshwater mussels are broadly distributed across the U.S., as are freshwater non-pulmonate (gill-bearing) snails, another sensitive invertebrate taxon, and each of these groups is now included in the ammonia dataset used to derive the 2013 CWA Section 304(a) ammonia criteria recommendations for the protection of aquatic life. Thus, the 2013 freshwater acute and chronic aquatic life criteria recommendations for ammonia will more fully protect the aquatic community than previous criteria, and are represented by a single (non-bifurcated) value each for acute and chronic criteria.

As acknowledged in the Document, the criteria magnitude is affected by pH and temperature. When expressed as total ammonia nitrogen (TAN), the effect concentrations for fish are normalized only for pH, reflecting the minimal influence of temperature on TAN toxicity to fish. For invertebrates, TAN effect concentrations are normalized for both pH and temperature. At water temperatures greater than 15.7°C, the 2013 acute criterion magnitude is determined primarily by effects on freshwater unionid mussels. At lower temperatures the acute criterion magnitude is based primarily on effects on salmonids and other fish. Throughout the temperature range, the 2013 chronic criterion magnitude is determined primarily by the

¹ The EPA's website provides the 2013 ammonia criteria document, discussion of the effects of ammonia toxicity on aquatic life, and supporting technical documents at: <https://www.epa.gov/wqc/aquatic-life-criteria-ammonia>.

² See Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater 2013. EPA-822-R-13-001. U.S. Environmental Protection Agency, April 2013. 225pp. Available at: <https://www.epa.gov/sites/production/files/2015-08/documents/aquatic-life-ambient-water-quality-criteria-for-ammonia-freshwater-2013.pdf>.

effects on freshwater mollusks, particularly unionid mussels. As acknowledged in the Document, the accurate identification of the present and expected community of resident aquatic species (and range of expected pH and temperature conditions) are critical to the appropriate application of ammonia criteria protective of aquatic life uses designated for these surface water ecosystems.

The WQU expects the Document will facilitate important decision-making supporting the State's adoption and implementation of the 2013 ammonia criteria for the protection of aquatic life in surface waters statewide. The WQU acknowledges the benefits that will be provided by the Document, and offers the following comments for consideration.

Specific Comments:

Methods to Determine the Appropriate Ammonia Criteria for Utah Waters

1. Page 3, paragraph 3, last sentence - We suggest revising this sentence to read:

However, if unionid mussels are not currently present and there is no ~~evidence~~ expectation that ~~they will return if degraded conditions improve~~ are the cause(s) of the absence, then the unionid mussels may be determined ~~are not to be~~ residents and ...

There are multiple lines of evidence that may be considered when the State makes determinations whether unionid mussels are a resident species, and if determined not to be residents, whether they could return if degraded conditions improve.³ While the availability of evidence on the effects of degraded conditions is important, it may not be the sole determining factor in deciding whether there is an expectation of unionid mussels returning. Also at a minimum, the Water Quality Standards Regulation (see 40 C.F.R. 131.20(a)) requires that states and tribes hold hearings to review their WQS at least once every 3 years (a triennial review). The aquatic community including resident species present in any waterbody may change over time and demonstrate mussels recolonizing waters as degraded conditions improve. Any data and information documenting such changes must be considered during a triennial review. We suggest a slightly modified statement about causal evidence of degraded conditions on species absence, and the finality of resident status determinations.

2. Page 4, paragraph 2, first sentence – We recommend revising this sentence to read:

As shown in Figure 9, if the records support that unionid mussels are not currently present and there is no evidence that the mussels were historically present, and unionid mussels are not expected to occur if degraded water quality conditions improve, the ammonia criteria will not ...

It appears that the State may conclude that unionid mussels are residents if they would be expected to return if/when degraded conditions improve. Should this consideration be added to the scenario outlined?

³ The Document cites the considerations for determining species expected to occur at a site (see specifically: p. 2, paragraph 5, a. through e.). For further discussion see: Water Quality Standards Handbook, Chapter 3.7.4 The Recalculation Procedure, and Appendix L. Available at: <https://www.epa.gov/wqs-tech/water-quality-standards-handbook>.

3. Page 4, paragraph 3, last two sentences – We recommend revising these sentences to read:

If unionid mussels are or were ~~common~~ residents in Utah waters, the default assumption of their presence would be appropriate. If unionid mussels are/were ~~rare~~ not residents then this assumption will be reevaluated (Figure 11).

The terms “common” and “rare” do not appear to be defined in the Document, and may add uncertainty to unionid mussel presence and absence determinations. It appears the key decision is whether unionid mussels are, were, or are expected to be, residents in these ecosystems. We recommend this change for consistency and clarity in the Document.

4. Page 4, paragraph 4, second sentence – We suggest revising this sentence to read:

As a general rule of thumb DWQ recommends ~~When~~ feasible, survey designs that have ...

These survey designs and protocols are an evolving field of study, and may change as more states and tribes gain experience with further field studies. Also, site-specific conditions may vary the necessary degree of sampling, as noted further below in this paragraph. We suggest the sampling guidelines provided here be presented as general, order-of-magnitude suggestions, and not as specific sampling protocols to be followed.

5. Page 5, paragraph 1, last sentence – We suggest revising this sentence to read:

~~Because of the lack of specific USEPA guidance or rules for evaluating an existing use for this type of situation,~~ Concurrence from DWQ and EPA is strongly encouraged ...

We note that the Document itself cites four separate EPA publications including guidance on existing use evaluations for aquatic communities. Another option could be to cite the importance of site-specific conditions in making existing use evaluations, similarly reinforcing the benefits of early concurrence with DWQ and EPA.

6. Page 6, paragraph 1, first sentence – We suggest revising this sentence to read:

... options for optimizing treatment and methods to support a determination of widespread social and economic impacts for lagoons systems serving small or economically-constrained population bases.

The suggested added language identifies a stronger link to the 131.10(g) factor 6 mentioned previously in this paragraph.

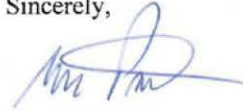
Figures

7. Page 13, Figure 9 – We suggest DWQ address that some historical surveys may not provide evidence of the presence of unionid mussels, but may still not provide conclusive evidence that they were not a resident species at the time of the survey. Some historical surveys may leave uncertainties whether unionid mussels were present and not found or identified (e.g., whether the sampling protocols used were sufficient to establish absence). For such instances, should there be an additional pathway through the “If degraded conditions improve, can Unionids return?” flow-

chart diamond, before leading to a determination that unionid mussels are not resident?
Alternatively, this could be addressed in the Methods section of the Document.

Thank you for the opportunity to provide comments on the *Adoption of USEPA 2013 Ammonia Criteria for the Protection of Aquatic Life for Utah. March 12, 2017, Review Draft v. 0.1*. The WQU supports the DWQ's efforts to provide this guidance on considerations, options, data needs and timeframes as a component supporting adoption and implementation of the 2013 ammonia criteria recommendations for the protection of aquatic life. If you have questions or wish to discuss this further, please contact me at (303) 312-7027, or by email at parrish.george@epa.gov.

Sincerely,



George Parrish
Water Quality Unit

JACQUELINE M. BISKUPSKI
Mayor



DWQ-2017-005625

JS



DEPARTMENT OF
PUBLIC UTILITIES

June 21, 2017

Utah Department of Environmental Quality
Division of Water Quality
195 North 1950 West
Salt Lake City, UT 84114-4870
Attn: Mr. Chris Bittner



Subject: Salt Lake City Department of Public Utilities (SLCDPU) Comments on the Utah Division of Water Quality Adoption of USEPA 2013 Ammonia Criteria for the Protection of Aquatic Life for Utah, dated May 22nd 2017.

Dear Mr. Bittner:

Thank you for the opportunity to provide comments on the Utah Division of Water (DWQ) Quality Review Draft Adoption of USEPA 2013 Ammonia Criteria for the Protection of Aquatic Life for Utah. Salt Lake City Department of Public Utilities (SLCDPU) appreciates the efforts of DWQ to protect and restore water quality in Utah.

We understand DWQ is evaluating the applicability of the United States Environmental Protection Agency (USEPA) 2013 water quality criteria for protection of aquatic life utilizing methods prescribed by USEPA. We also recognize that in Utah we have a unique and valuable resource in the Great Salt Lake (GSL); which, as a hypersaline lake, has a different ecosystem than freshwater lakes and waterbodies of which the evaluation methods were established. We support the DWQ's study of receiving waters for individual POTWs and believe this case-by-case analysis is essential for all water bodies and specifically for GSL given the unique properties of the lake and its associated ecosystem. We encourage DWQ to continue to use sound and reasonable science when making decisions on evaluation and establishment of criteria for the GSL. SLCDPU will continue to participate with and support the State as an active stakeholder to further our collective understanding of the GSL watershed.

We are aware that research and discussions have been, and will be taking place on the GSL. Specific to ammonia-criteria, further research of Farmington Bay and the GSL to determine if these are nitrogen-limited waters. The SLC Water Reclamation Facility (SLCWRF) is essentially a direct discharge to GSL and limitations on our ammonia would limit the amount of nitrogen going to GSL. Much research will be taking place on GSL in the future and regulations on ammonia and nitrogen may be better to wait until that time in order to have a better understanding of what is best for the health of the GSL.

Additionally, SLCWRF effluent flows through roughly nine miles of manmade canal prior to discharge into the Farmington Bay on the GSL. This canal also transports a portion of Salt Lake City's storm water and a permitted effluent stream from Chevron Oil, however, the majority of the

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flow is SLCWRF effluent. As such, the canal does not meet any USEPA (2013d) criteria definition for "resident" of taxon, which is important when considering the applicability of the USEPA 2013 water quality criteria/evaluation methods for the SLCWRF discharge into this canal.

Finally, the USEPA evaluation criteria lists the importance of taxa that comprise the aquatic life to be protected. Specifically, this includes the presence of unionid mussels, early life stages of fish and the presence of salmonids. The criteria further states that taxa evaluation will include residents that, "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." In the event this evaluation shows that unionid mussels (or the other listed taxa) were historically present in the SLCWRF receiving waters, we encourage DWQ to determine the most probable cause of the absence of the mussels, and when the absence occurred. We realize this may not be feasible but encourage use of sound science to try and answer these questions prior to establishing the most stringent ammonia criteria at the GSL.

Thank you for the opportunity to provide comments on the evaluation of the applicability of the USEPA 2013 Ammonia Criteria for the Protection of Aquatic Life for Utah.

Sincerely,



Laura Briefer
Director

cc: Jesse Stewart, Salt Lake City Department of Public Utilities, Deputy Director
Dale Christensen, Salt Lake City Department of Public Utilities, Water Reclamation Facility Manager
Marian Rice, Salt Lake City Department of Public Utilities, Water Quality and Treatment Administrator