U.S. Environmental Protection Agency, Region 8, Ecosystems Protection Program Comments on the Utah Division of Water Quality's Great Salt Lake Strategy, April 2012

Core Component 1: Proposed approach for Developing Numeric Criteria For Great Salt Lake

R8-EP applauds UDWQ for their logical approach to develop numeric criteria for the GSL that has been outlined in Core Component 1 of the GSL Strategy. It is clear that Utah understands the typical approaches used to develop numeric criteria, the EPA methods that can be used to help account for the unique characteristics of the GSL (e.g., UAAs, the recalculation procedure), and how development of numeric criteria will complement existing WQS for the GSL and facilitate other state programs that currently address GSL water quality. The proposed approach provides details on tasks that are necessary to initiate and execute the process, yet allows for flexibility on more difficult issues with greater uncertainty.

R8-EP concurs with UDWQ that numeric criteria are necessary for efficient and effective management of GSL resources and to ensure long-term protection of the lake's beneficial uses. The EPA encourages all states and tribes to use a combination of numeric and narrative criteria to protect surface waters. 40 CFR 131.11 requires states to adopt scientifically sound water quality criteria that protect designated uses. R8-EP recognizes that the blind application of state water quality criteria or national water quality criteria recommendations (304(a) criteria) is not appropriate for the GSL given the unique biology and chemistry of the lake. However, it is possible that there are portions of the lake currently without numeric criteria that are biologically similar enough to typical freshwater or marine aquatic communities for at least some portion of the year, that 304(a) criteria or a recalculated version of 304(a) criteria may be appropriate and protective. [1] R8-EP is also confident that scientifically sound methods can be developed to calculate criteria for the salinity classes where default criteria are not appropriate (e.g. hypersaline).

As discussed in Section IV, having a clear understanding of the expected aquatic organisms for each salinity class is the first step necessary to derive numeric aquatic life criteria. Although there is a general understanding of the expected species for each salinity class of the GSL, aquatic life criteria development (and the recalculation procedure) requires knowledge of the lowest taxonomic identification possible so that species-specific toxicity data can be evaluated. The resulting criteria must consider the sensitivity of all the species that are expected to occur at a site, or surrogate species that could represent a GSL species. For the GSL marine salinity class, it will be particularly important to define what zooplankton, mollusks and crustaceans are expected to occur, as well as the expected fish use. Criteria may focus on the sensitivity of a particularly important (ecologically, economically, or recreationally) species if the important species happens to be the most sensitive species expected to occur at the site.

The EPA's Guidance on the recalculation procedure defines the species that are expected to occur as species that are

- usually present at the site;
- present only seasonally due to migration;
- present intermittently because they periodically return to or extend their ranges into the site; and
- were present at the site in the past and are expected to return when conditions improve.

[1] The recalculation procedure is a method that may be used to derive a site-specific water quality criterion when the species, or the sensitivity of the species that are expect to occur at a site are substantially different from the sensitivity of the species that were used to derive the national criterion. EPA Guidance for the recalculation procedure is found in Appendix B of Appendix L of the Water Quality Standards Handbook: Second Edition. Available at: http://water.epa.gov/scitech/swguidance/standards/upload/2002_06_11_standards_handbook_handbookappxL.pdf

With respect to the hypersaline class, we understand that this class is dominated by algae, brine shrimp and brine flies. However, recent publications have indicated this class can be more diverse depending on the lake level and salinity. For example, corixids have been sampled from Gilbert Bay on a fairly frequent basis, as well as copepods when lake levels are high and salinity is reduced.[2] Additionally, stromatolitic structures, which are formed by blue-green algae, play an integral role in sustaining the brine flies that are an essential component of the GSL food web. The numeric criteria that are eventually derived will need to consider the sensitivity of all species (or surrogate species) expected to occur in Gilbert Bay, even if some species are less dominant in the ecosystem. For example, in freshwater ecosystems, water bodies are frequently managed for a particular fishery type such as rainbow trout or bass. Although these fish species constitute the greatest biomass in the ecosystem and are recreationally important, trout and bass are frequently not the most sensitive species. Rather, invertebrate species in their food chain (e.g., zooplankton, benthic crustaceans, mollusks) are often more sensitive and therefore drive many of the aquatic life criteria adopted by the states. Deriving criteria that consider the sensitivity of all species relevant to the salinity class will also provide protection for less sensitive species that are recreationally or economically important. We recognize that the GSL food web for the hypersaline class is unique and simple compared to other aquatic ecosystems and therefore may require a unique approach for deriving protective numeric criteria.

R8-EP looks forward to working with Utah on the development of numeric criteria for the GSL and will collaborate with technical experts in the Agency as needed (see Attachment 1 for additional comments on Core Component 1 from Joe Beaman, Senior Scientist with the EPA Heath and Ecological Criteria Division in the Office of Science and Technology). We understand that the development of numeric criteria for GSL will require significant time and resources. The 10 year implementation schedule, depending on resource availability, is generally appropriate considering the current understanding of the lake's biology and chemistry, the necessary detailed literature reviews, and likely additional studies that will need to be conducted to fill data gaps; however, we suggest that numeric criteria are proposed as revisions to the state water quality standards as they are developed. The proposed schedule suggests that criteria will not be proposed for 10 years. It is possible that criteria for some salinity classes and parameters will be relatively easy to derive once the species lists are created (i.e., parameters where sufficient toxicity data are currently available in the literature or where default criteria are applicable). We encourage UDWQ to propose criteria with the state's required triennial review as they are developed, rather than waiting for a complete package with criteria for all parameters and salinity classes.

Finally, we believe that Section VI – near term actions, would benefit from a discussion on how the state is currently implementing the existing narrative standards for the GSL and any additional interim actions that UT is considering while criteria are being developed. For example, it would be useful to document how WET has been implemented in existing permits and UDWQ's plan to develop additional WET guidance for direct discharges to GSL.

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[2]Belovsky, GS, D Stephens, C Perschon, P Birdsey, D Paul, D Naftz, R Baskin, C Larson, C Mellison, J Luft, R Mosley, H Mahon, J Van Leeuwen, and DV Allen. The Great Salt Lake Ecosystem (Utah, USA): Long Term Data and a Structural Equation Approach. *Ecosphere*. V2(2): 1–40.

Core Component 2: Strategic Monitoring and Research Plan

R8-EP applauds UDWQ for their efforts in developing a multifaceted monitoring plan for the GSL that has been outlined in Core Component 2 of the GSL Strategy. We are encouraged that UDWQ will be collecting baseline data to track contaminant trends in the Great Salt Lake and will also target their monitoring efforts to support development of number water quality criteria. We have reviewed Core Component 2 and have a few comments for your consideration.

UDWQ proposes implementing baseline monitoring at GSL to track trends in water quality. Contaminants including selenium, mercury, heavy metals, nutrients, and chlorophyll a will be monitored in water. In addition, selenium, mercury, and heavy metals will be measured in brine shrimp and selenium and mercury monitored in bird eggs. Regarding baseline monitoring, we suggest that UDWQ:

- consider monitoring for bioaccumulative organic chemicals in the media described above;
- prepare a list of the important aquatic species present in GSL to support development of numeric criteria. The species list may be prepared from currently published information or may require targeted or routine collection and identification to track trends and could be a part of the baseline monitoring efforts;
- consider monitoring indicators that would support assessment of the recreational use of GSL. This may include analysis of pathogen indicators, algal toxins, or others. The Strategy mentions several forms of recreation at GSL. We would add that within the last several years, a swimming marathon was held off Antelope Island; hence, full-body immersion is occurring at GSL and should be included as a form of recreation. It is our understanding that little data are available to determine if GSL is meeting its recreation use; and
- monitor both methyl and total mercury in biological tissues for a period of time until the ratio of these mercury forms can be estimated with reliability for tissues of interest. Often, mercury benchmarks for avian tissues and dietary exposures are reported for methyl mercury; hence, a know relationship between total and methyl mercury will streamline the use of these benchmarks when only total mercury data are available.

UDWQ proposes studies to improve or validate the laboratory and field methods used to analyze and collect samples at GSL. R8-EP is very supportive of these studies so that data collected for GSL are of known quality.

UDWQ proposes targeted monitoring to support development of numeric water quality standards for GSL and R8-EP is very supportive of this approach. We suggest that UDWQ:

- again, monitor both methyl and total mercury in biological tissues for a period of time until the ratio of these mercury forms can be estimated with reliability for tissues of interest;
- monitor mercury in invertebrates beside just brine shrimp that may be important components of the avian food chain. In this way a more complete dietary exposure model can be prepared for avian populations feeding at the lake; and
- conduct a literature review of potential recreational indicators that may be useful for GSL and their associated benchmarks and either perform targeted monitoring for the indicators or include them in the baseline monitoring plan.