Comments of

Great Salt Lake Brine Shrimp Cooperative, Inc.

On

" Water Quality Assessment: Utah's Current Integrated Report"

July 14, 2014

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To Utah Division of Water Quality, 195 North 1950 West, Salt Lake City, Utah 84114-4870

Attention James Harris

Summary Statement:

The report makes significant advances in the understanding of ecological and limnological dynamics on Great Salt Lake (GSL). It portrays water quality issues pertaining to GSL in a thoughtful and reasonable manner. It shows the substantial advances made by DWQ in its understanding of the unusual yet highly important characteristics of GSL. Great Salt Lake Brine Shrimp Cooperative, Inc. (GSLBSC) supports many of the comments in the document and otherwise offers recommendations to improve the outcome of research investigations and management decisions pertaining to GSL as outlined in the Integrated Report.

Chapter 2, page4; chapter 2 page 5, table 1; chapter 3, page 3; Chapter 7, page 2:

Great Salt Lake is a Unique Ecosystem and requires its own unique set of regulatory criteria.

We fully agree that the Great Salt Lake is a highly unique ecosystem in which regulatory decisions need to be tailored to the particular biological, ecological and limnological characteristics of the lake and its various bays. It is necessary for resource regulators to take into account the unique aspects of GSL in terms of examining and evaluating water quality

issues. Clearly GSL differs from both fresh water and marine systems in nutrient cycling, response to toxins, threshold levels for impairment, and in individual and population scale responses to environmental change or perturbation.

DWQ has done an admirable job of acknowledging the unique aspects of GSL and outlining the process through which the features of GSL will be documented and evaluated. We support DWQ in its comment that: “Numeric criteria that are broadly applied to other water bodies are generally not applicable to the lake because of its unique saline ecology, biogeochemistry, and hydrology.” Clearly GSL and its various bays require site-specific assessments for establishing water quality criteria.

Chapter 7, page 3 and 17:

“bay-by-bay assessment of GSL” and the need to recognize the interconnectivity of the bays.

We support the bay-by-bay approach identified by DWQ on page 3. On page 17 the linkages between the bays are briefly discussed. We agree with DWQ that the nutrient loads and limitations differ substantially among the bays. We also fully agree that the linkages between the bays need to be further studied and should always be taken into account in the management of each bay and in the overall assessment of the health of GSL. We believe more detailed research needs to be done on the linkages between the bays and the significance that this may have in the overall integrity of the GSL ecosystem. The characteristics of each bay need to be assessed, yet management decisions should take into account the influence of each bay on the entire GSL ecosystem viewed as an entire body of water.

This is particularly true of nutrients—transient elevations in nutrient levels may be desirable in one bay (for example Farmington Bay) in order to ensure that other, larger bays, such as Gilbert Bay and Gunnison Bay are not severely depleted of nutrients. We are concerned that Gilbert Bay is nitrogen limited and that Farmington Bay serves as an important source of nitrogen and other nutrients. A strong research effort needs to be done to fully assess these linkages and to determine the optimal way to improve nutrient conditions in Gilbert Bay while simultaneously addressing the impacts of transient elevated nutrient levels that are observed in Farmington Bay.

Chapter 7, page 7:

Methyl mercury concentrations in excess of total mercury.

GSLBSC strongly supports monitoring programs in Gilbert Bay, Farmington Bay, Ogden Bay, Bear River Bay, and to a lesser extent, in Gunnison Bay.

The mercury data discussed on page 7 is somewhat disconcerting as it is reported that methyl mercury levels exceeded total mercury. GSLBSC supports the rejection of such samples as

indicated in the report. Some discussion of how this happens and how such spurious results can be avoided would be helpful. GSLBSC would appreciate a comment or list of the most trusted analytical laboratories for high saline samples.

Chapter 2, page 5, table 1; Chapter 7, page 5, section "Background and Purpose":

Brine shrimp needs to be recognized as a "Species of Protcted Aquatic Wildlife".

In table 1 on page 5 of chapter 2, Great Salt Lake, Gilbert Bay's designated use is described as follows: "Protected for infrequent primary and secondary contact recreation, waterfowl, shore birds and other water oriented wild life including their necessary food chain". In the section "background and Purpose" of chapter 7 (page 5) it states that "Brine shrimp tissue samples are collected to evaluate dietary exposure to birds"

Both chapters fail to account for the very important fact that brine shrimp from Great Salt Lake are considered protected aquatic wildlife and, as such, are tightly monitored and controlled by the Utah Division of Wildlife Resources. Administrative Rule R657-52-11 specifically identifies brine shrimp as a "Species of Protected Aquatic Wildlife". Brine shrimp need to be recognized as fundamentally essential to the ecosystem of the Great Salt Lake and that their protection be based on the fact that they are already designated as protected aquatic wildlife, in addition to, and independent of, their critical ecological functions within the food chain.

Chapter 7, Page 8:

Speculation on the exposure risk of brine shrimp to DBL contaminants as a result of mixing.

In Paragraph 2, there is a brief discussion of the deep brine layer (DBL) and speculation about mixing between the DBL and the epilimnion and consequent exposure of brine shrimp to contaminants in the DBL. This type of comment is unnecessary and misleading because the monitoring programs are measuring contaminants and nutrients in the epilimnion—therefore there is no need to speculate on contributions from the DBL to the epilimnion because it has been directly measured. Additionally, the reference to Belovsky et al., 2011 as a definitive comment on mixing between the DBL and the epilimnion is exaggerated; their study did not conduct detailed assessments of the hydrochemical linkages between these two layers. While they did conduct some preliminary work on the topic, there remains a great deal of highly sophisticated work that needs to be done to state anything conclusive about the chemical exchanges between these layers.

Chapter 7, page 11:

Challenges pertaining to the use of existing water quality criteria for fresh or marine systems when studying GSL.

The discussion on Page 11 reveals the challenges of using existing water quality criteria for fresh or marine systems. We applaud the comments of DWQ in which it is recognized that these existing criteria are really only useful in the framework of a benchmark. While this is useful it remains absolutely necessary to establish site specific criteria for GSL.

Chapter 7, page 11-12:

Comments regarding mercury contamination in GSL.

We agree with the comments on page 12 with regard to mercury contamination in the biota and water of the GSL—current results do not support the earlier dramatic reports of widespread and highly elevated levels of mercury in the GSL ecosystem. Total mercury levels are far below present EPA regulations of 940 ng/L for both the epilimnion and the DBL, whereas mercury levels in much of the biota of the lake levels are below actionable thresholds.

Chapter 7, page 14:

References to concentrations.

In the table and discussion on page 14 please check all references to concentrations. It looks as though 0.05 was incorrectly reported as 0.5. Also, some discussion about detection limits would be helpful.

Chapter 7, page 18:

Important clarification made regarding Carlson's Trophic Index.

On page 18 a very important clarification with regard to Carlson's Trophic Index was made: DWQ correctly stated that the chlorophyll levels associated with the index are an assessment of productivity and not water quality per se. This is a very important point and must be kept at the forefront of discussions about chlorophyll levels, primary productivity and the associated water quality assessments linked to such data. GSL is highly unique and the biota is characterized by boom and bust cycles that at certain times can be quite elevated but such cycles are all part of a "typical" biological response to environmental conditions and should not be viewed as an adverse water quality impact without taking into account the long-term temporal and spatial patterns.

Chapter 7, page 20: "ASSESSMENTS AND DATA GAPS"

Suggestions regarding data gaps.

With regard to data gaps the GSLBSC suggests that lake volume, bay inter-connectivity and its influence on water quality outcomes should be taken into consideration with all water quality criteria evaluations. The volume, circulation, and linkage across bays will have a huge influence on many of these measurements and in defining harm.