OF THE EARTH

By Leland Myers

Water is water is water, right? That could be the case, unless the water is in the Great Salt Lake (GSL). In a hypersaline lake such as the GSL, the water ecosystem may be more complex because of the impact of high salt content and the unique ecology that exists in such places. But understanding is key to protecting, and this is a responsibility we give ourselves when we take on the mantle of "Clean Water Professional."

> he way I see it, the challenge for many of us as utility leaders and workers is not only to go out of our way to operate within our ecosystems sustainably, but to give each ecosystem the respect that it deserves-both in understanding and protecting it-to ensure that it will be around, and healthy, for future

generations to enjoy. And to this end, the Great Salt Lake (GSL) has given us quite the challenge!

The GSL ecosystem has a salinity range from brackish to 28% salt and a total salt content of about 4.7 billion tons. It is divided into four separate, distinct bays, each functioning very differently from the next and serving unique ecological functions.

Over the past three decades, the Lake's elevation has varied about 20 feet. The GSL has an average of 15.4 million acre-feet of water and an average depth of only 13 feet. As a part of a hemispheric flyway, the Lake and its wetlands support between three and six million birds annually and provides about 40% of the world's supply of brine shrimp cysts, a valuable food source for aquiculture. In addition to supporting this diverse ecology, the Lake also provides a significant source of mineral extraction and economic benefit. Case in point: the entire United States production of magnesium comes from the GSL. And further, the Lake is also the largest solar producer of sulfate of potash in the world. Overall, the economic benefit of the GSL to Utah is \$1.3 billion annually.

GIVING DUE DILIGENCE

These facts may give you the impression that the GSL ecosystem's functions are well-known, but you would be wrong. More than ten years ago, after recognizing the complexity of the Lake and noting the lack of significant water quality studies on it, Central Davis Sewer District (CDSD)-in cooperation with other water reclamation facilitiesformed a research

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organization called the Wasatch Front Water Quality Council. Its ongoing objective is to provide critical research that will inform decisions relating to nutrients as well as other potential pollutants to the GSL ecosystem.

Knowing that CDSD is a relatively small water reclamation facility with a population base of 60,000 citizens, the District's leaders surmised that it would be prohibitively difficult to generate the millions of dollars needed to understand the GSL's complexities. So they formed an interlocal agency with like-minded leaders from several other water treatment facilities to work on this research.

The Farmington Bay area of the GSL is an example of the complexity of the research needed. Farmington Bay is a hypereutrophic, extremely shallow area with plentiful wetlands serving as a food source for birds, but it also produces high concentrations of cyanobacteria and toxins. This system flows into the GSL's Gilbert Bay, which supports the plentiful brine shrimp population.

Gilbert Bay is considered nutrient poor and could produce more brine shrimp with more nutrients, which would be an economic benefit for the state and an additional food source for birds. Gilbert Bay needs the nutrients, including those fixed by cyanobacteria from the air, flowing from Farmington Bay. If nutrients from water reclamation facilities are reduced to help Farmington Bay be less productive and possibly reduce the production of cyanobacteria and its toxin, Gilbert Bay could be harmed and its ecosystem function seriously reduced.

PROTECTING THROUGH STANDARDS

The beneficial and proper use of Farmington Bay is defined by the Utah Administrative Code as "protected for infrequent primary and secondary contact recreation, waterfowl, shore birds and other water-oriented wildlife including their necessary food chain" (R317-2). Subsequently, the GSL does not support fish populations and is not used for irrigation or drinking water supply. The invertebrate population that it hosts is relatively tolerant to many elements or compounds that would otherwise be considered a concern in a freshwater lake. Hence, to date the Lake has only one numeric criterion that has been established-for selenium-to protect its terrestrial life uses.

Much of the research being conducted will aid in the formation of other standards that could be established. In collaboration with university researchers and commercial consultants, the Council has conducted dozens of research projects and maintains public access to the resulting project reports via the web (http:// wfwqc.org/research/). True to the Council's goal, considerable knowledge has been added to the Lake's database and has been used to inform water quality decisions. As administrators of publicly owned water reclamation systems discharging within or near the Lake, we at the CDSD are proud that this helps protect the ecosystem at appropriate levels based on the beneficial uses.

DISCOVERING REAL VALUE

The greatest challenge the GSL faces today is a stable water supply. This is of great concern because the Lake was more than 20 feet lower in 2018 than it was in 1986. In some areas of the 21,500-square-mile GSL watershed, the ecosystem is a desert with little or no runoff. Along the eastern side of the Lake, the Wasatch mountain range provides water to the populated Ogden-Salt Lake-Provo area, and much of the runoff is consumed and lost to beneficial use in the Lake.

Today, approximately 10 percent of the flows, or 276,000 acre-feet annually delivered to the Lake, comes from reclaimed water that was discharged by water reclamation facilities. This baseline flow water is critical to Lake health and associated beneficial uses. While there are locations in the United States where water reuse is being done to meet secondary and primary water needs,the most valuable use for discharges at or near the lake continues to be the GSL. Several bird species-including songbirds, ducks, Tundra Swans (shown here), and Bald Eaglesspend the winter at Great Salt Lake.

KNOWLEDGE THAT NURTURES

Based on what we know today, reclaimed water discharged from publicly owned treatment facilities serves as a valuable benefit to the GSL ecosystem. And with knowledge gained from research, we are able to educate Utah's legislature about the Lake, which will in turn lead to policies that protect the GSL, and the cycle continues.

We know more today than we did yesterday based on research conducted by the Wasatch Front Water Quality Council. And as we continue respecting and understanding our GSL ecosystem, we will know more tomorrow. Ultimately, we live in this ecosystem, and it is our duty to understand and protect it.

Leland Myers is the Executive Director of the Wasatch Front Water Quality Council, an organization performing water quality research in the Utah Lake, Jordan River and Great Salt Lake ecosystem. Leland is also the former General Manager of the Central Davis Sewer District.