



FRIENDS of *Great Salt Lake*

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White Pelican Chicks, Chase Lake NWR, North Dakota by Rosalie Winard ©2003

PRESIDENT'S MESSAGE

Perseverance and the Process: Getting Out What You Put In

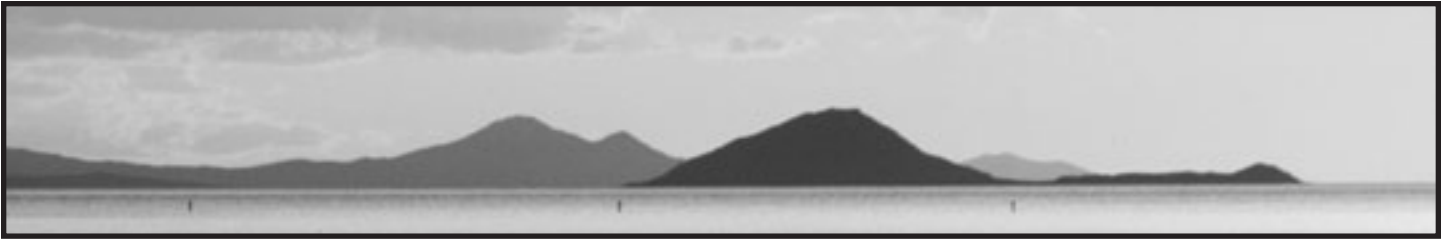


Photo from *The Lake Affect* - FoGSL

“Democracy invites us to take risks. It asks that we vacate the comfortable seat of certitude....We are nothing but whiners if we are not willing to put our concerns and convictions on the line with a willingness to honestly listen and learn something beyond our own assumptions.”

Terry Tempest Williams, *Orion* (March/April 2004)

Last Fall, the Jordan Valley Water Conservancy District (JVWCD) proposed discharging concentrates of sulfates and selenium into the Jordan River and its associated wetlands. This proposal was a part of the Natural Resource Damage (NRD) Settlement Proposal between the State of Utah, Kennecott Utah Copper (KUCC) and JVWCD to clean up contaminated groundwater aquifers and provide municipal quality drinking water to the Affected Areas in the Southwest Salt Lake Valley.

FRIENDS and other members of the Great Salt Lake community were opposed to JVWCD's proposal. We thought there needed to be better alternatives and a more robust discussion.

Happily, Dianne Nielson, the NRD Trustee, responded by initiating measures to involve a wider constituency in the decision making process and revise the terms of the original settlement proposal and implementation agreements.

If you have been tracking this issue, you recognize these efforts to improve opportunities for stakeholder participation and scientific review of the groundwater clean up project and other remediation work. The Trustee hopes that these measures will culminate in a better proposal and agreement.

In March a Stakeholder Forum was established. The Forum provided feedback to JVWCD on alternatives for managing wastes from the Zone B/Lost Use component. The Forum will continue

to review and discuss various aspects of KUCC's remediation programs under EPA and the Dept. of Environmental Quality oversight.

On July 7th, FRIENDS hosted a meeting for the conservation community to meet with the Trustee, KUCC and JVWCD. The purpose of this meeting was to review the proposed revisions and ask questions in preparation for the Public Hearing scheduled on July 14th at the South Jordan City Council Chambers. (Written comments on these revisions are due by August 2, 2004)

Although all of these efforts are commendable, what is important to remember is that the catalyst for this improved process was the collective public expression of the Great Salt Lake community. We were successful in making it clear that communication about the proposal was weak and decisions were being made without adequate public input.

Finally, in conjunction with these efforts, the Trustee has another tool she can use to help her decision making.

For many years, members of the conservation community and interested regulatory agencies have argued the need for developing numeric standards for Great Salt Lake. The Great Salt Lake Numeric Standards Working Group (GSL Working Group) has recently been formed. (See in this issue Numeric Standards for Great Salt Lake: The Time Has Come).

The GSL Working Group will recommend site-specific Numeric Water Quality Standards for the open waters of Great Salt Lake. These standards will prevent impairment of beneficial uses and sustain the natural resources of the Lake and associated wetlands. The first standard to be developed is for selenium. This standard will be critical in providing supporting data for one of three design options that JVWCD is proposing for discharging concentrates.

The Separate Design, the Integrated Design and the Minimum Integrated Design all meet the terms of the Consent Decree. Of the three designs, JVWCD prefers the Separate Design.

We find the Separate Design unacceptable for the following reasons.

1. The Separate Design discharges selenium directly into Great Salt Lake through a pipeline into Gilbert Bay (South Shore).

FRIENDS supports either the Integrated or Minimum Integrated designs because the concentrate is not discharged directly into Great Salt Lake.

2. The Separate Design includes a Reverse Osmosis (R/O) facility for both Zone B and the Lost Use component. This design exceeds the terms of the Consent Decree and is an attempt to create an infrastructure to meet the District's long term water development goals. The Integrated and Minimum designs do not include an R/O facility for the Lost Use component.

FRIENDS supports either the Integrated or Minimum Integrated designs because they satisfactorily meet the terms of the Consent Decree. Long term water development for the District is not a criterion for the Consent Decree. It requires a very different public process than the one related to this NRD proposal.

We believe that the revisions to the original NRD proposal and implementation agreements were timely and necessary. However, our analysis is that the Separate Design is not in the best interest of the Jordan River, Great Salt Lake, or the communities, both natural and economic, that depend on them. 🇺🇸

In saline,

Lynn de Freitas

What You Can Do

Review documents at the Utah Dept. of Environmental Quality website - www.deq.utah.gov/issues/nrd.

An information flyer - NRD Trustee Southwest Jordan Valley Groundwater Cleanup Report to the Public-June 2004

The KUCC-JVWCD Proposal to the Utah State NRD Trustee and USEPA CERCLA Remedial Project Manager

Revised draft of August 7, 2003 - Agreement among the Trustee for Natural Resources for the State of Utah, JVWCD and KUCC

Revised draft of August 7, 2003 - Project Agreement Between KUCC and JVWCD

Submit comments by August 2, 2004

mail:

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FRIENDS ORGANIZATIONAL STATEMENT

The mission of FRIENDS of Great Salt is to preserve and protect the Great Salt Lake Ecosystem and to increase public awareness and appreciation of the lake through education, research, and advocacy.

FRIENDS has a very active Board of Directors and an Advisory Board consisting of professionals in the scientific, political, literary, education, and broadcast communities. Founded in 1994, we have organized and sponsored an array of programs, activities and materials in pursuit of our mission.

Since 1996, we have sponsored a biennial Great Salt Lake Issues Forum that provides a gathering for policy makers, researchers, planners, industry reps and citizens who are involved in and concerned about the Great Salt Lake.

The goal of each Forum is to encourage constructive dialogue about the future of the lake's ecosystem and its resources, and to illuminate the complexities involved in research, management and planning for the lake.

In 1997, we hired Bruce Thompson as our education director and initiated a major regional education project

designed to enhance both the knowledge about and care for the future of Great Salt Lake. Bruce wrote and produced a live-narrative slideshow program "The Lake Affect: Living Together Along the Shores of Something Great." Over 11,000 people in the 5 counties surrounding Great Salt Lake have seen the program.

We are presently working on video & DVD versions of The Lake Affect. With this and the Project SLICE, a Great Salt Lake curriculum correlated to the fourth grade science core curriculum, we hope to achieve a positive, long-lasting impact on the future of Great Salt Lake and those who dwell upon its shores.

In 2003, we awarded our first Doyle W. Stephens research scholarship. Until his death in May 2000, Stephens served as a research hydrologist for the U.S. Geological Survey. He is particularly remembered for his work toward increasing public awareness of the Great Salt Lake Ecosystem.

FRIENDS was awarded the Conservation Achievement Award by the Utah Chapter of the Wildlife Society in 1998. 🦋

On the Cover

White Pelican Chicks, Chase Lake NWR, North Dakota, July 2003 ©Rosalie Winard

I was first introduced to Great Salt Lake by Terry Tempest Williams. Its primitive and challenging beauty provided added inspiration for a photo book I have been working on since 1997 entitled **Avian Primitives: Large Birds of the Wetlands**. Terry will contribute an essay to the book and a touring exhibition is planned for the near future.

For me, one of the most glorious features of Great Salt Lake is Gunnison Island. Protected and restricted from human access, this remote island is home to thousands of breeding pairs of American white pelicans. Gunnison, along with Chase Lake National Wildlife Refuge in Medina, North Dakota and Pyramid Lake in Sutcliffe, Nevada are the three largest sites for breeding colonies of American white pelicans in North America.

I photographed this mass of 3-4 week old pelican chicks at Chase Lake in July 2003. Last year's count was 29,494 pelicans. The lake lies on the Missouri Couteau, an unspoiled roadless, hilly prairie dotted with thousands of wetlands or "prairie potholes". In early June a disturbing mystery occurred at Chase Lake. Over 27,000 pelicans disappeared; abandoning their nests, eggs and young. Pelicans are abandoning nests at Pyramid and Gunnison too. The cause has yet to be determined.

After teaching an Ornithology Class at New College in Sarasota, Florida and conducting a two year study on the threat and greeting displays of the Brown Pelican in Roberts Bay, Sarasota, I realized that through my art, I could rouse our sense of conservation and recognition of the beauty and fragility of our natural world. I strive in my images to emphasize birds as individuals, populations, and as part of a community and habitat.



FRIENDS OF GREAT SALT LAKE

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HAPPY BIRTHDAY FRIENDS!

10 years of working hard to preserve and protect
the Great Salt Lake Ecosystem.

Special birthday activities are being planned for September and October.
Details will be posted on our website and mailers will go out to members.

Thanks to all of you who have supported our Lake work.
It means a lot.

2003 DOYLE W. STEPHENS SCHOLARSHIP RECIPIENT

The Economics of the Brine Shrimp Resource in GSL - Hyochang Lee



Photo from *The Lake Affect* - FoGSL

The Brine shrimp resource in the Great Salt Lake is a valuable natural resource both ecologically and economically. Economics and environmentalism must work together to improve conservation for the long-term benefit of human beings. Brine shrimp eggs are harvested and processed and exported to Southeast Asia and South America. The brine shrimp industry in the Great Salt Lake has about 90 percent world market share, and contributes more than \$80 million to the Utah economy annually.

Since the initiation of Great Salt Lake Management Plan in 1996, the Utah government effectively protects the brine shrimp resource to achieve the max sustainable yield in the Great Salt Lake Ecosystem. The government imposes a 21-cysts-per-liter escapement target for reseedling of the next season. When we consider over-winter mortality, predator (mainly bird) feeding and hatchability in the next spring, we can sustain the minimum required eggs, 3.5 cysts per liter, at the spring hatching time. According to the population growth model, the beginning of harvest season biomass level, 70 cysts per liter, will be in a full steady state.

The management of the brine shrimp resource has been dominated by biologists. The biologists maintained that the appropriate management criterion was to achieve maximum sustainable yield. This standard ignores the cost side in shrimping. The resource managers have begun to view this maximum sustainable yield rule less favorable and want to replace it with some concept of optimum sustainable yield. This criterion is relevant to cost-benefit considerations which lead to the economically optimal resource management system.

While this management system, including the maximum sustainable yield rule and the escapement target, conserve the resource successfully, it would induce an overcapacity problem in the brine shrimp eggs industry. Since harvest companies compete rigorously to catch enough eggs before the ending bell rings, they might equip more vessels, bigger boats and extended working hours. This will lead to economic inefficiency to the industry and the society. If we employ the redundant capital and labor into other sectors, the economy of the whole society would improve.

In a mathematical dynamic model between the government and the industry, the industry is ever increasing their efforts until their profit is dissipated. Additional vessels, bigger boats, faster boats, more airplanes and hard working shrimpers are employed in the industry. The brine shrimpers buy more expensive vessels. They work hard all the day and night during the harvest season. The unit cost per harvest increases year by year. The dynamic path to the zero profit level of the industry's capacity, and the corresponding season length, depends on the industry's adjustment speed and their irreversible capital investment. It is inevitable in my research that over the long run, more capacity is attracted and the harvest season shortens. Reduction in season length will mean that fixed capital will lie idle or underutilized for an increasingly long off-season.

An economically and ecologically oriented management program involves the use of individual transferable harvest quotas (ITQs). Each shrimper is awarded a certain quota of total allowable catch (TAC) and these quotas can be transferred, in whole or in part. Reduced competition for shrimp increases profitability. ITQs provide shrimpers with a great assurance of catching their respective shares of the harvest. This may reduce racing behavior between shrimpers to "catch the eggs before someone else does" and allow quota holders to harvest the resource in a more efficient manner. Transferability of quota enhances the returns so that more efficient shrimpers can acquire a greater share of the total harvest. The shrimper who harvests at less cost buys more ITQs.

When the ITQ system is adopted, the harvest season can be extended for 5 months from October to February. The government would enforce progressive rate of harvest quota on weekly basis. Harvesters can get more flexible harvest plans to save harvesting costs. Since they have a sure harvest quota, they don't have to compete with other harvesters into the harvesting capacity. It will promote cooperation and/or a sharing of harvest equipment which yields saving of harvest cost. If the extent harvesting instruments are redundant after ITQ system, the government can compensate the industry according to the buyback programme.

With the right to catch a specified quantity of cysts, the shrimper can avoid dangerous conditions and wait to fish when it is safe. Shrimpers will spread their fishing efforts over a longer period of time and the number of vessels on the grounds at any time will decline thus reducing problems of congestion and conflict on the grounds. They don't need to race to the streaks any more.

Initial allocation of ITQs should be fair and equitable by avoiding unintended wealth distribution. Each allocation is inescapably distributional. It is necessary to research on complete benefit-cost analysis. Financial information and knowledge of the brine shrimp industry would be analyzed for who gains and who loses from switching to ITQ management. Full array of beneficial and harmful effects is helpful to build the political consensus to advance ITQs. Historic harvest have to be protected in the sense of fairness. The factor of production can not be damaged from any transformation of the management system.

The management authority retains the direct control of the escapement target over the shrimp resource. The survival and growth of brine shrimp in the spring is more density dependent due to the large fluctuation in the volume of the lake through time. Adjustment to the total quota and to the individual quota can be made successively in response to natural density stock fluctuations. Individual quotas are defined as proportions of the total allowable annual catch. The government can allocate individual transferable quota on the basis of harvest history. Each shrimper can get their quota relative to their catch history during last 10 years.

In most fisheries, the number of vessels employed in the fisheries declined with the introduction of ITQs. While roughly the vessel cost of the whole industry is \$4 million every year under the present management system, the research suggests that the fixed cost is reduced by half under individual transferable quota system. The efficiency gains are estimated to be at least \$2 million annually. More efficient ways to harvest would yield savings of \$10 million in vessel costs for five years in the future.

ITQs systems are not a panacea for all the problems that arise in shrimping. They, however, do overcome the "tragedy of the commons" in shrimping and exchange the commons into a jointly owned resource. With this perception of an exclusive and durable property right, brine shrimping can be expected to produce a higher net return from the resource over the longer run. 🐞

by Hyochang Lee,
Doctoral candidate in economics
at the University of Utah.

"RESEARCH... MANAGEMENT... CONSERVATION..."

Protecting the Homes of Millions

I don't remember the year, but I do recall it was during one of the shorebird surveys. Yae Bryner and myself were driving down a dike at Ogden Bay when we startled a small group of eared grebes in an adjacent canal. As they flew alongside us, one of the grebes failed to achieve the altitude needed to clear the vegetation and landed with its tiny wings outstretched in the weeds. Eared grebes have a unique morphology in which their small wings and the juxtaposition of their legs in relation to their body doesn't allow for terrestrial mobility. Needless to say, this little guy was in trouble and unable to extricate himself from this predicament. I walked over and plucked him from the weeds and dropped him back in the water where he proceeded to dive, (probably realizing that flying wasn't his best option at that point).

I have found myself in the enviable position involving one of the most challenging and rewarding projects in the state. I am currently the avian biologist for the Great Salt Lake Ecosystem Project (GSLEP). This project addresses concerns surrounding the lake through different avenues of research. The Great Salt Lake is a unique, complex and diverse ecosystem. The GSLEP looks at all the different components in and around the lake and how they relate to one another to make up that ecosystem. As we begin to understand its complexities we are able to apply sound management and conservation strategies to the lake. The avian aspect of the project is just one piece of that ever-changing puzzle.

In 1997, a monumental project began under the tutelage of the great but not late Don Paul. This project was known as the "5-Year Waterbird Survey". The goal of the project was to examine the temporal and spatial relationships of waterbirds in response to varying lake levels during peak migration periods. Its magnitude and extensive use of community volunteers was unprecedented. A large number of people came together and sacrificed their time and

energy to help collect data, which helped to clarify the role of the Great Salt Lake in the Great Basin for waterbird migration and production. Many questions were answered and many more were brought to the forefront. This project averaged over 9 million bird observations per year and utilized volunteer hours worth over \$650,000 dollars.



John Luft at Work by Rosalie Winard

The Great Salt Lake provides a unique opportunity for research. It is a terminal playa lake with a low-gradient bottom and a highly transitory shoreline which provides for a dynamic environment for shorebirds. One thing that the 5-year study substantiated was that the Great Salt Lake was of hemispheric importance.

The lake is an oasis habitat in an expansive arid environment. It is the only habitat of that nature occurring for hundreds of miles. Its rich, readily available food supply makes it a popular breeding, staging and molting habitat for large numbers of some species. Shorebirds have narrow habitat requirements which limits them to a few highly productive "stopover" sights. The Great Salt Lake plays a key role for many waterbird species in this unique capacity. Degradation to such an important staging area could be detrimental to an entire population.

Not only do the shorebirds have narrow habitat requirements, they use the same staging areas year after year. However due to the dynamic nature of the lake and its highly transitory shoreline these birds must adjust to the rise and fall in lake elevation. The surveys intent is to determine how this affects distribution and abundance among the different species. Armed with this kind of information we can conserve and manage those important habitats at the most critical times.

The lake will always change and so will the habitats in and around it. The lake level has dropped to an elevation it has not been at for almost 50 years. This current level has a probability of occurring less than eight percent of the time. It is important to capture this moment in time

to determine bird use and distribution when the lake recedes to this level. With the lake elevation dropping considerably with the recent drought, it has increased the amount of mudflat which surrounds it. It has become increasingly difficult to approach the lake without specialized equipment. Some areas that were covered by salt water are now expanding communities of emergent vegetation. Some islands have become peninsulas. With the dynamic nature of the lake, birds must be able to adjust and respond to its changes to maintain safety and utilize the lakes many resources.

The numbers of eared grebes that visit the Great Salt Lake every year can reach as many as 1.5 million. The grebe I mentioned earlier was not a rarity. Had I driven on by, its loss would not have made a difference to the overall population. I shared that story, not because one bird was spared that day, but because the GSLEP has made a difference for entire populations of waterbirds through the waterbird surveys. It has helped to define the role that the GSL plays in the welfare of many migratory bird species.

Shorebirds face many challenges in their long migrations. Habitat loss and degradation at wintering and migration areas may determine the future welfare of these birds. As our population grows the demand for water will obviously increase possibly endangering the lake and its inhabitants. We can't manage for the weather and consequently the

lake's elevation. However, we can understand, predict and protect those areas which are unique to the species that utilize them. Management is not constant or universal. It is a continuous process of adjustment in response to societies needs and anthropogenic impacts.

There are few places that exhibit as much diversity as the Great Salt Lake. Who doesn't feel rewarded by witnessing thousands of phalaropes undulating in harmony across the lake or a watching a single peregrine stoop, with purpose, on a flock of green-winged teal.

Our duty is to maintain the place and the experience for future generations. Most people are familiar with the phrase "To Protect and to Serve" which is printed on the side of most police vehicles. I was tempted to create a slogan which would embody the feeling a biologist would have on his vehicle. I discovered my idea was not original and had already been incorporated into the vehicle of choice when on the lake. On each one of the GSLEP boats reads the phrase "Research . . . Management . . . Conservation".

How appropriate! They took my idea before I had it. 🐦

by John Luft,
Avian biologist with GSL Ecosystem Project.



Pelicans On Farmington Bay by Rosalie Winard ©2002

2004 DOYLE W. STEPHENS SCHOLARSHIP RECIPIENT

Examining the Microbial Diversity of Great Salt Lake - Ashlee Allred



Photo from *The Lake Affect* - FoGSL

The Doyle W. Stephens Research Assistance Scholarship celebrates Doyle's scientific contributions towards understanding of the Great Salt Lake Ecosystem by helping young researchers who are following in his footsteps.

This year's scholarship winner is Ashlee Allred. Ashlee is a native Utahn and is currently studying as an undergraduate at Westminster College, where she has a 3.9 GPA. At Westminster, she is conducting independent research with Dr. Bonnie Baxter examining the microbial diversity of Great Salt Lake, including isolating unidentified bacteria species from the Lake. She is also studying the importance of pigments for providing phyto-protection, or inherent resistance to UV light, to these bacteria. Ashlee will use the scholarship award for genetic analyses that will allow taxonomic classification of the

unidentified bacteria and help them determine how these species are related to bacteria found in other environments.

The award presentation occurred at the 2004 Issues Forum, where Ashlee and Dr. Baxter also presented a poster with some results of Ashlee's research. We are proud and honored to have such a promising student as this year's scholarship winner. Congratulations Ashlee, and good luck! 🇺🇸



2004 FRIEND OF THE LAKE AWARD RECIPIENT

Joy Emory - Our Representative on the Kennecott TRC



Photo courtesy of Matt Crawley Design

Congratulations to Joy Emory as the 2004 recipient of the Friend of the Lake Award. Joy has been representing FRIENDS in a vital environmental stewardship role helping to protect Great Salt Lake.

Since 2001, Joy has been participating on the Kennecott Technical Review Committee (TRC). The TRC was convened to play a critical role in the review of technical studies carried out by Kennecott in conjunction with a huge remedial program to clean up contaminated groundwater in the Southwest Salt Lake Valley. The TRC also provided recommendations to the government agencies for the preferred clean up alternative.

In this capacity, Joy has enabled FRIENDS to better understand the astonishingly complicated technical issues that surround the Natural Resource Damage Settlement Proposal that we have been tracking since then.

She has committed volunteer time and energy well beyond the regularly scheduled TRC meetings. And has been able to skillfully translate and discuss the TRC technicalities at other meetings with the Department of Environmental Quality, the Great Salt Lake Alliance, and public hearings.

Joy came to Utah in 1989. She received her M.S. in Environmental Engineering. Her introduction to the Great Salt Lake came while working on a mountain bike patrol on Antelope Island. Together with her husband Patrick and son Miles, Joy enjoys full moon camping at Antelope Island, circumnavigating the Lake and visiting the Spiral Jetty.

Established in 2002 and awarded every two years during our Great Salt Lake Issues Forum, the Friend of the Lake Award is given to a person, organization, or business performing outstanding work in education, research, and/or advocacy to benefit Great Salt Lake.

The first award was presented to the late Dr. Donald R. Currey, geomorphologist in the Geography Department at the University of Utah. Dr. Currey worked hard to raise awareness of and preserve the unique geomorphological features that surround Great Salt Lake, and are in constant threat of destruction by urbanization. 🌲

TEACHER TRAINING WORKSHOP:

LIFE AND LEARNING AT GREAT SALT LAKE

Taught by Bruce Thompson,
FRIENDS Education Director

This workshop is designed to immerse educators – first figuratively, then literally – into the wealth of opportunities for integrated science education at and about the Great Salt Lake.

This summer's theme focuses upon the adaptations and interrelationships of the plants and animals of the rich and sometimes mysterious Great Salt Lake Ecosystem. Both classroom and field trip training are included. The workshop also includes free materials, classroom demonstrations, field specimens, information resources and lesson plans.

Date: Friday, July 30 and
Saturday, July 31

Time: 8:30 am – 4:30 pm

Location: Alfred Emery Building,
Room 340,
U of U Campus and field

Fee: \$50.00
(\$40.00 UMNH members)

Credit: 1.0 semester hours U of U
or In-service credit

Audience: 4th Grade teachers

Contact: Cathy Quinton
Museum of Natural History
801-581-4887

Lake Fact:

How many years does it
take for a California gull to
reach adulthood?

See page 19 for answer.



Photo courtesy of FoGSL, *The Lake Affect*



ENERGY FLOW & ECOSYSTEM STRUCTURE

USGS - LIFE IN GREAT SALT LAKE

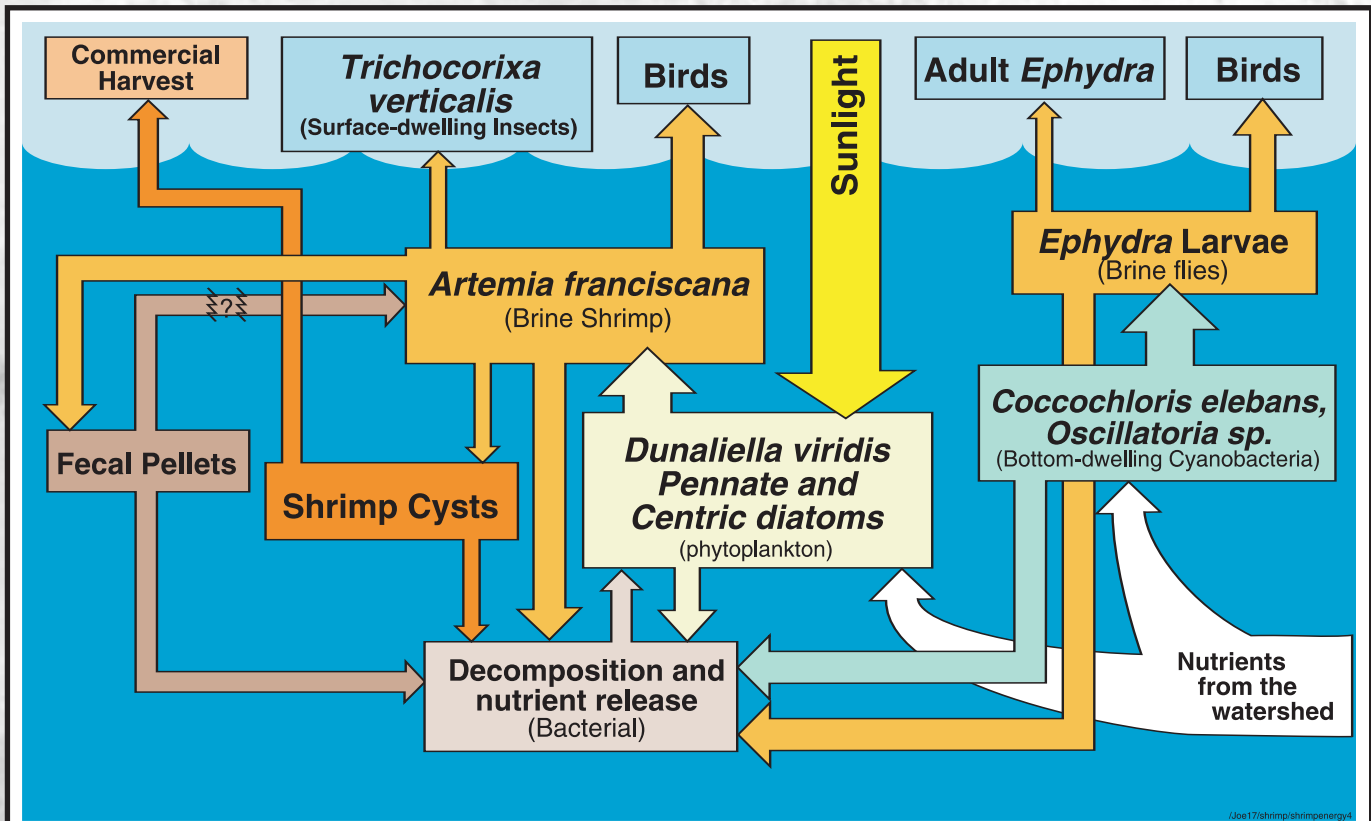


Figure 4. Generalized ecosystem structure and energy flow within Gilbert Bay of Great Salt Lake at salinities between about 9 and 15 percent.

Hypersaline lakes typically support fewer species of aquatic organisms than freshwater lakes because only a few specialized species can withstand the stress of saline water. The total number of species in Great Salt Lake depends on the salinity and is not accurately known because microscopic species have not been well studied.

When the salinity is high (28 percent in Gunnison Bay), there may be as few as six species. At lower salinities (6 to 9 percent in Gilbert Bay), the number of species has been estimated at 32.

These organisms interact to form a complex and highly productive ecosystem. Algae (25 species reported in 1979) provide the base for the food chain through photosynthesis. They serve as food for brine shrimp and brine flies, which in turn are consumed by birds or by the shrimp harvested for the aquaculture industry. Bacteria, protozoa, and brine flies recycle the organic material to release nutrients and keep energy flowing through the system. (USGS Water-Resources Investigations Report 99-4189, 2001.)

This information is provided by the U.S. Geological Survey, which has been researching Great Salt Lake since the G.C. Gilbert exploration of the 1870s. For additional information visit the website at: <http://ut.water.usgs.gov/>

NUMERIC WATER QUALITY STANDARDS FOR GSL

The Time Has Come

by Maunsel Pearce, Chair, Great Salt Lake Alliance

FRIENDS of Great Salt Lake and other conservation groups have expressed the need for numeric water quality standards in Great Salt Lake. Fresh water standards do not apply to this terminal hypersaline lake and arguments against standards development have included great expense, uncertainty of chemical measurements, and gaps in knowledge about components of the pelagic ecosystem and their relationship to the biota.

The Great Salt Lake Alliance has used the recent concerns over discharging contaminants (including selenium) into the Jordan River and GSL as a stimulus to begin conversations with the Division of Water Quality about standards development. The Alliance has had help from the leadership of FRIENDS and The Nature Conservancy of Utah, and DWQ in creating a conceptual flow chart for numeric standard development.

The process would involve creation of a water quality stakeholder/ steering committee and a separate scientific panel, which would identify gaps in knowledge, set priorities, agree on methods, gather information from other saline lake experience and oversee the science. A final science/ stakeholder conference could develop recommendations to the Water Quality Board. Simultaneously we have been involved with the Stakeholder Forums discussing Jordan Valley Water Conservancy District's ground water cleanup and discharge alternatives. Concerns about selenium in proposed discharges and uncertainty of accurate measurements in GSL have triggered several recent developments:

- JWWCD Board of Directors on April 28th voted to send discharge of reverse osmosis groundwater treatment to Kennecott's tailings impoundment rather than GSL or Jordan River. *Subsequent to this decision, additional alternatives which included direct discharge into GSL were proposed.
- The Board also voted to devote time and funding to study the selenium issue in GSL.
- Dianne Nielson, Director of Utah Dept. of Environmental Quality, has been influential in creating a GSL Numeric Standards Working Group.
- JWWCD and Kennecott have been very supportive of Standards development and encourage the process.

We see these developments as a means of creating a unique partnership among stakeholders, including conservation groups, industry, State and Federal regulatory agencies (including EPA) and recreational users to gain broad acceptance of the numeric standards process and achieve multiple funding sources.

The potential exists here and now to develop numeric standards to prevent future impairment of a unique natural resource. This process will require understanding the GSL ecosystem beyond controlling discharges. 🐼

References

1. Position Paper on Water Quality Standards for GSL; FRIENDS of GSL Science Committee 2004
2. The Great Salt Lake Ecological System Site Conservation Plan; The Nature Conservancy of Utah, Oct. 2004



Photo courtesy USGS



DR. EPHYDRA - WE WELCOME YOUR QUESTIONS VIA EMAIL OR PHONE

E•phy'•dra, a noun; a genus of two species of brine flies that live on the bottom of the Great Salt Lake as larvae and pupae, and along the shores of the Lake as adults.

Brought to you by the Science Committee to help explain the science surrounding Great Salt Lake.
We welcome your questions via email or phone. Contact Amy Marcarelli at amym@cc.usu.edu

People and River Restoration

River restoration concepts and practices have gained popularity and public attention in the last decade or two. River restoration is about attempting to re-create naturally functioning systems and provide habitat for a myriad of creatures. There are many restorative opportunities from large to small scale, all of which help to improve degraded landscapes and increase public awareness of what truly makes a river healthy. A variety of factors need to be balanced when trying to re-create a system that once fit well into the context of the landscape.

Changes in land use and hydrology of river basins necessitates careful planning in order to successfully restore essential landscape processes, versus simply restoring form. As stated in Mathias Kondolf's text, **Tools in Fluvial Geomorphology**, 2003, there are five main types of geomorphological questions that must be asked, and certain tools are associated with each question.

The historical framework and the methods and associated techniques to date and assess historical geomorphological

trends; the special framework and the concepts, methods and associated techniques that reveal spatial structure and nested character of fluvial forms; the chemical, physical and biological methods for dating and the study of spatial structure and fluvial processes; the analysis of processes and forms, the traditional heart of the discipline based on field surveys and measurement of sediment and water flow; and the future framework for which methods and techniques exist for discriminating, simulating and modeling trends.

With these tools and techniques, river scientists can balance process and form, while attempting to regain lost values in riverine ecosystems. The values restored include clean water, quality fish and wildlife habitat, and recreation, just to name a few. 🐸

*Kondolf, M., and Piegay, H. 2003. *Tools in Fluvial Geomorphology*, John Wiley and Sons. 696 pp.



Jordan River Narrows courtesy GSL Audubon



A TRIBUTE TO DONALD R. CURREY



January 24, 1934 - June 6, 2004

Don Currey, friend of Great Salt Lake, and friend of FRIENDS of Great Salt Lake died June 6, 2004. Don died with students, family, and colleagues at his side in Bountiful's Lakeview Hospital, a fitting name for the place this beloved scholar of Lake Bonneville would spend his final days.

Donald Rusk Currey was born and raised in California, vacationing in the Sierra Nevada and along the paleo-channel of the Owens River. Landscapes, the processes that shape them, and the history of climate change they tell, intrigued him early on and challenged him to the end. Just this past March on a Spring-break field trip to the Great Basin, he was back in this childhood territory sharing his knowledge of climate change and history of the Owens River with undergraduate and graduate students. Don attended Stanford as an undergraduate, worked summers surveying topography and in the Alaskan Branch of the United States Geological Survey, transferred to the University of Wyoming for reasons of health, and earned his BS (1957) and MA (1959) degrees both in geology. His Ph.D. (1969) from the University of Kansas in Physical Geography reported his research on post-Ice Age climate change in the mountains of southwestern United States. As part of that research, Don determined that an ancient

bristle cone pine in the Snake Range of eastern Nevada was over 4900 years old, and thus the oldest living tree known. The death of this tree and Don's championing the protection of the remaining grove were instrumental in establishing Great Basin National Park.

Don came to the University of Utah in 1970 and joined the faculty of the Department of Geography. He rose from Associate Professor, to Chair of the Department and full professor. He established the University of Utah Limnogeotectonics Laboratory and was instrumental in founding the DIGIT Lab (Digitally Integrated Geographic Information Technologies Laboratory). He chaired committees of over 30 masters students, 15 doctoral students, and advised 3 post-doctoral students. He mentored and served as a member of many graduate student committees within and outside the Department of Geography.

Don saw lakes as historians of climate change. His research ranged from saline lakes of the central Andes, to glacial lakes of the Canadian shield. He even co-authored work on extraterrestrial evidence of geomorphic processes. But, primarily he focused his research on Lake Bonneville sediments and landforms as the key to unraveling the

detailed history of climate change of western, continental, North America. He taught popular introductory courses in physical geography, undergraduate geoexcursions, and graduate courses in geomorphology of lakes, paleolakes, lake basins and coasts. Awards included the G.K. Gilbert Award (1992) of the Association of American Geographers, Geographer of the Year Award (1993) of the Utah Geographical Society, and Superior Research Award (1994) of the University of Utah College of Social and Behavioral Sciences. His professional activities included consulting for engineering firms, industry, and governmental agencies. He gave generous time and expertise to individuals and organizations including Friends of Great Salt Lake and the Utah Geological Survey. In 2002, Friends of Great Salt Lake awarded Don the first ever, annual Friend of Great Salt Lake Award.

Don was amazing in the field. He was a skilled observer with outstanding ability to spot and identify natural features. He thought in four dimensions always, everywhere (latitude, longitude, elevation, and time). He enjoyed working with students and his students loved him and loved working with him. The classes he taught that involved major field trips to Great Salt Lake and to several regions of the Great Basin were legendary. He valued field work and field experience and made the Great Basin and western United States his students' outdoor laboratory.

A cause that absorbed much of his recent attention was to protect critical landforms, primarily Lake Bonneville features, that preserve important Earth systems information but are threatened by destruction from mining or urban sprawl. He joined Marjorie Chan of the University of Utah Dept of Geology and Geophysics in a National Science Foundation funded project to identify these features and develop strategies to protect them. Don, who was never reluctant to introduce new terms into the scientific literature, titled these features "geoantiquities."

Although Don studied many lakes, Great Salt Lake and its predecessor, Lake Bonneville, received his most tenacious attention. G.K. Gilbert's work in the 19th century defined major characteristics of Great Salt Lake and Lake Bonneville and related them to climate change. Later researchers had added to the story. Don and graduate students working with him made tremendous contributions to the public's and decision maker's understanding of Great Salt Lake. While many of his publications are technical and appear in professional journals, he also published articles and maps intended for the general public and for policy makers. In recent months, Don had obtained new dates on numerous Lake Bonneville features which he planned to use to develop a revised history of Lake Bonneville.



Don with Snooks by Genevieve Atwood

Don Currey will be remembered primarily (1) for his contributions to the understanding of the history of Pleistocene lakes and the use of these histories in the study of how Earth's climate has varied under natural conditions, and (2) for the students he inspired and trained, who have made, and will continue to make, important contributions in numerous areas. He will be greatly missed by his past and present students, his colleagues, family, and friends... and his small, white, floppy dog, Betsy. 🐕

by Genevieve Atwood, FRIENDS Advisory Board

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HELP WANTED - FRIENDS Treasurer

The Office of Treasurer is currently vacant. We are looking for someone to take on the following responsibilities for a term of at least one year. It is a volunteer position requiring 2-3 hours per week.

Track all existing accounts on Quickbooks Software.

Prepare a monthly account report for the Board of Directors.

Prepare for a semi-annual compiled financial statement.

Assist in developing an operational budget.

Oversee necessary tax reporting requirements

Maintain currency in all organizational/operational accounts

(corporate status, website renewals, mailbox rental, insurance, etc.)

Issue payments for all necessary expenditures

Reconcile bank records

If you would like to know more about this position, please contact either Tim Brown at twbslcut@yahoo.com or Lynn de Freitas at ldfreitas@earthlink.net.

SPECIAL THANKS

Printlarge Studio Service Bureau for the decorative panorama of Great Salt Lakescapes, Julia Corbett's UofU Students of Communications Class 5580 for developing a PR campaign for FRIENDS entitled "Your FRIENDS Need You", Laird Norton Family Fund and Great Salt Lake Yacht Club

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WE want to thank **Matt Crawley Design,**
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SUBMITTING MATERIAL FOR PUBLICATION

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E-mail to: ldfreitas@earthlink.net. Please call 801-583-5593 to confirm receipt of e-mail or with any questions, suggestions, comments, or ideas.

Deadlines: Sept. 16 (Fall), Dec. 16 (Winter), Mar. 16 (Spring), and June 16 (Summer).



Your FRIENDS Need You

The strength of FRIENDS comes from its members. All of you, with your individual contributions to Great Salt Lake awareness, help provide this organization with the momentum it needs to carry on its work for the lake. We all know about the tremendous challenges and opportunities for Great Salt Lake. Knowing those challenges and opportunities, FRIENDS' board of directors works hard to identify the best ways to respond to them. Some of our critical activities:

- The Transit First campaign against the Legacy highway
- Commenting on the Great Salt Lake Comprehensive Management Plan
- Educating the public at large about the importance of our big, salty neighbor
- Participating in public hearings and on committees that address development around the lake,

But without the support and participation of the membership, the work of the board is limited. General meetings, field trips, and volunteering are all ways that you can help build public recognition of FRIENDS and its mission. Through these means, you also become more knowledgeable about the lake, its science, its history, and our relationship to it.

One of the goals that the board continues to identify at its annual retreat is building membership. How can we develop a robust and active membership ? We need to develop a critical mass of lake advocates, true friends of Great Salt Lake.

So, we're asking you, our members, to keep active through participation and by keeping your membership current. Check your mailing label for your membership renewal due date. Renew promptly if you have expired. If you have questions about your membership, please call Lynn at 801-583-5593.

And do what you can to help recruit new members to strengthen our voice for Great Salt Lake protection and preservation. Pass on your newsletter to a friend or neighbor. Spread the news about who we are and how we are working for Great Salt Lake.

Big Thanks!

PS. Does this sound like your mother?

Lake Fact Answer:

4 years

Thank You to Our New and Renewed Members for Your Support

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Lorinza Brooks
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*Remember, all membership fees and donations are tax deductible
to the extent allowed by law.*



Pelicans Floating On Bear River by Rosalie Winard ©2002