

FRIENDS of *Great Salt Lake*

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Stansbury Island Dust Storm by Charles Uibel ©2007

The mission of FRIENDS of Great Salt Lake 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.

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EXECUTIVE DIRECTOR'S MESSAGE

THE PUBLIC TRUST, GREAT SALT LAKE & THE RIGHT TO BE HEARD – ALL AT RISK

“The Great Salt Lake is a remarkable natural resource that should remain untainted by this sort of development, especially in the area surrounding Robert Smithson's masterpiece, Spiral Jetty. It is a cultural icon of international significance and should not be compromised by greed. The infrastructure necessary to accommodate this plan will irrevocably harm a wild and natural environment and a work of art that has special appeal and a support base far beyond Utah and people of the region.”

Jan Rothschild, -National Trust for Historic Preservation

Dated January 15, 2008, an Application for Permit to Drill by Pearl Montana Exploration & Production, LTD was moving through the RDCC process to begin drilling exploratory boreholes in Gunnison Bay, Great Salt Lake. The application was earmarked “quick turn around” for approval with a potential project start date as early as January 30th.

That is indeed a pretty quick turn around.

With the assistance of conservation allies, FRIENDS was informed about this application. We requested an extension of the deadline to comment through the Public Lands Policy Coordinating Office (PLPCO). Since the proximity of these leases was within the viewshed of one of the most significant earthworks of the 20th Century – Spiral Jetty - we also notified the national arts community.

In no time at all, responses from around the world-Germany, France, Brazil, UK, as well as New York-came pouring into the PLPCO office requesting an extension on the deadline and protesting drilling for oil and gas in Great Salt Lake. Clearly, Spiral Jetty is a touchstone for the global arts community. The passion and the spectrum of involvement from students, professors, filmmakers, museums, arts publications, galleries, blogs, the National Trust for Historic Preservation and so on, was a heartening experience for all of us touched by the power of public expression.

We were grateful to have the deadline extended until February 13th, but this trend of development comes

from two outdated management plans that continue to drive the Division of Forestry, Fire and State Lands' (Division) management decisions for Great Salt Lake. These plans are the 2000 GSL Comprehensive Management Plan (CMP) and the 1996 Mineral Lease Plan (MLP). Both plans need to be updated to reflect the science and the trends of today, not what we knew 8 or 12 years ago. There is far too much at stake to manage this way for a hemispherically important ecosystem.

It is likely that leases approved for this project were part of a public offering by the Division in 2005. During that year, 78 parcels of sovereign state lands under the bed of Great Salt Lake located northwest of Promontory Point near Rozel Point were open for public bid. The combined leases would affect nearly 175,000 acres of Gunnison Bay – home of Gunnison Island, a protected island for the third largest breeding population of American White Pelicans in North America. The area is also home to the late Robert Smithson's world renown earthwork – Spiral Jetty. Site-specific environmental analysis on any lease would not be required until development proposals were approved.

With what could be characterized as a liquidation sale of Great Salt Lake assets, in November 2005, when the final 52 parcels were open for bid, FRIENDS, the Utah Chapter of the Sierra Club, National Audubon, and Great Salt Lake Audubon filed a Request for Agency Action and Petition for Agency Declaratory Order with the Division. We advocated for the protection of the public trust values and the protection and sustainability of Great Salt Lake.

We expressed concern about the magnitude of leases available for public bid. We objected to the lack of site-specific analysis and determination of the long term costs and benefits of such leasing. We held that the 1996 Utah Mineral Lease Plan should be revised and updated to reflect the science and existing pressures on the lake. We argued for a better public notification system. And we concluded that these combined issues created serious deficits in effective management of the public trust resources by the Division charged to protect them.

An agreement was reached in May 2006. The state agreed to pull back the oil and gas leases in Gunnison Bay totaling more than 116,000 acres. However, energy leases that were issued earlier in 2005, would not be affected by the terms of the settlement. What we are seeing with the application of Pearl Montana Exploration & Development, Inc is part of the crop of oil and gas leases that are moving forward to develop.

At the same time, on January 18, 2008, the Division determined that the conservation groups that appealed the Record of Decision granting a mineral lease to Great Salt Lake Minerals Corporation to expand its operations by 23,088 acres in, Great Salt Lake, had no right to appeal – or even petition for review of – the management decision.

“In its scope and scale, this proposal ranks as one of the most potentially system-altering proposals for lake development in our generation.” - The Nature Conservancy – Scoping comments for the environmental impact study on the proposed expansion of Great Salt Lake Minerals, December 2007.

Although an Environmental Impact Study by the Army Corps of Engineers is currently underway, the basis for our appeals of the approval of the mineral lease remains grounded in our overall concern for the viability of the ecosystem and the protection of the public trust. We believe that the public has the right to be heard throughout all parts of the process and there should be provisions in management plans and in agency practices to facilitate this.

“All evidence demonstrates that, for shorebirds like these, critical sites such as the Great Salt Lake are irreplaceable. Indeed, it was on this very principle that WHSRN was formed more than 20 years ago and it is the premise that the Utah Department of Natural Resources recognized in seeking recognition for the Great Salt Lake” - Western Hemispheric Shorebird Reserve Network - Letter in response to the ROD on approving the mineral lease to GSL Minerals.

It would be naïve to think that the national trend to promote energy development while at the same time streamlining the approval process does not have some relevance in this context. Nevertheless, it is our considered analysis that continuing to manage the Great Salt Lake with an emphasis on hasty development does not bode well for this fragile ecosystem. 🐦

In saline,

Lynn de Freitas

What You Can Do

Stay engaged. Participate in the upcoming public commenting and public hearing opportunities on the Environmental Impact Study for the proposed expansion of Great Salt Lake Minerals.

Check the FRIENDS website www.fogsl.org for notification of these events.

Urge the Division of Forestry, Fire and State Lands to update the 1996 Mineral Lease Plan and the 2000 GSL Comprehensive Management Plan. Contact Dick Buehler, Director of the Division

dickbuehler@utah.gov

FRIENDS ORGANIZATIONAL STATEMENT

FRIENDS of Great Salt Lake was founded in 1994. The mission of FRIENDS 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. The long-term vision of FRIENDS is to achieve comprehensive watershed-based restoration and protection for the Great Salt Lake Ecosystem.

FRIENDS has a very active Board of Directors and an Advisory Board consisting of professionals in the scientific, political, literary, education, and broadcast communities. The organization sponsors an array of programs, activities, and materials in pursuit of its mission.

Every two years, FRIENDS hosts the Great Salt Lake Issues Forum to provide a focused discussion about the Lake for policy makers, researchers, planners, industry and other stakeholders. 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.

The Friend of the Lake Award, given at each forum, acknowledges a citizen, business or organization working to promote GSL awareness in the community.

In 1997, Bruce Thompson was hired as Education Director to initiate 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." The program is now available on DVD.

In 2000, Project SLICE, a 4th grade curriculum using Great Salt Lake as a system of study was initiated. It consists of 7 units of study, a Speakers Network, Teacher Training Workshop, and Lakeside Learning Field Trips. Currently work is being done to expand the curriculum into other grades.

In 2005, FRIENDS hired Katie Pearce as Assistant Director, who is working to refine the Project SLICE curriculum and expand education outreach into the Great Salt Lake community.

In 2002, the Doyle W. Stephens Scholarship Award was established. The scholarship provides support to undergraduate and graduate students engaged in new or ongoing research that focuses on Great Salt Lake.

In 2006, FRIENDS was the recipient of the Calvin K. Sudweeks Award by the Utah Water Quality Board for outstanding contributions in the water quality field.

In 2002, President Lynn de Freitas, was awarded the outstanding volunteer educator award by the Utah Society for Environmental Education.

In 1998, FRIENDS was awarded the Conservation Achievement Award by the Utah Chapter of the Wildlife Society. 🐾

On the Cover

Stansbury Island Dust Storm by Charles Uibel ©2007

This image of Stansbury Island was taken in mid-July. Clouds of dust were rolling over the top of the island. I was surprised at the result of the photo; I really hadn't noticed all the dust in the air at the time.

It has been my pleasure to hike and photograph much of the area around Great Salt Lake during the past two years. There is something new to discover on every trip to the lake.

A vast and mostly empty place, Great Salt Lake offers us a much-needed return to the natural world. Quiet, easy walks, water and sand, weather and sky. Long views of nature and its eternal processes.

The greatest benefit of carrying a camera around, in my opinion, is that it simply gives you a reason to be there. Being there is what is most important. More of my photographs can be seen at <http://greatSaltLakePhotos.com>.



Broken Mirror by Charles Uibel

10TH INTERNATIONAL CONFERENCE ON SALT LAKE RESEARCH & FRIENDS GREAT SALT LAKE ISSUES FORUM UNIVERSITY OF UTAH - SALT LAKE CITY, UTAH, USA, MAY 11-16, 2008

The joint conference of the International Society of Salt Lake Research and FRIENDS of Great Salt Lake will take place at the University of Utah (USA), May 11-16, 2008. The conference will cover all topics relevant to the science and management of inland saline ecosystems. The meeting will provide a stimulating mix of scientists, environmental groups and managers with a common interest in the conservation and scientific management of saline ecosystems.

Register Now/Submit Abstract - www.isslr.org/gsl2008/in

Thanks to the many sponsors who have helped to make this event possible

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A WATERSHED VISION FOR GREAT SALT LAKE

UTAH DIVISION OF WATER QUALITY



Black Rock by Michael Slade

I am sure that most who receive the FRIENDS newsletter know what experts are saying about Great Salt Lake (GSL): that it is the most important inland shorebird site in North America; that it supports 75% of the state's wetlands; that it is one of the most significant wildlife habitats in our hemisphere; and that it is the re-fueling stop for millions of migratory birds. Certainly, GSL is one of Utah's crown jewels – though perhaps the least understood and most neglected one.

The Utah Division of Water Quality (DWQ) is striving to understand this mysterious water body better, at least from a water quality perspective.

In cooperation with a magnificent group of scientists and stakeholders, DWQ has nearly completed a four-year study that is aimed at developing a numeric selenium standard for GSL. It is the first such numeric pollutant standard devised for GSL, although I believe more will follow.

During the same period, DWQ has led a nationally-recognized study investigating whether GSL wetlands are being impaired by excessive nutrients coming from

natural sources and human activities. Soon, we will begin a study investigating the methyl-mercury issue in GSL. That study will allow us to define the magnitude of the mercury problem and help lead to the sources of the mercury pollution. Over \$3 million has been committed for these three studies, all aimed at increasing our understanding of conditions that affect the GSL's water quality and helping us preserve the beneficial uses of the lake.

Each of these water quality investigations involve separate individuals and groups, but that approach is about to change. Soon, DWQ will add a full-time employee charged with coordinating activities for a newly-designated GSL Watershed. This new approach will coordinate public and private efforts toward solving pressing water quality problems in the drainage basin of GSL -- a 21,000-square-mile area that includes five major rivers and parts of three states. It is a huge area, equivalent to 25% of Utah's total land mass.

The GSL Watershed Committee will provide a continuing water quality forum based on strong science.



Lucin Cutoff Trestle Wood by Michael Slade

Its core principles will be stakeholder involvement and collaboration; data collection; resource assessment; clear problem prioritization; goal-setting; and effective implementation and evaluation. The new committee will carry on work begun by the Great Salt Lake Steering Committee, but in broader terms. It will not supplant the work of other formal and informal groups interested in GSL. Instead, the GSL Watershed Committee will coalesce financial and institutional resources to address GSL's challenges, with a focus on environmental and conservation issues.

I envision the GSL Watershed Committee eventually becoming a GSL Commission established by statute, as precedent suggests that it should. Of the major sovereign water bodies in the state, which are Great Salt Lake, Utah Lake, Bear Lake, Jordan River, and portions of Green River, Colorado River and Bear River -- only GSL, Jordan River and Green River do not benefit from statutory commissions. Despite the lack of an overseeing commission, Jordan River is under the stewardship of Salt Lake County which recently updated the area-wide water quality management plan which serves to

protect the river. This leaves GSL as one of only two "orphaned" sovereign water bodies.

I believe the creation of a GSL commission will be invaluable in bringing increased local, state, regional, and national resources to bear on managing Great Salt Lake -- thus preserving this crown jewel as a natural treasure for future generations to enjoy. This step would be in complete harmony with Utah's Public Trust Doctrine. I ask for your support in making this vision a reality. 🍷

Walter L. Baker
Director, Utah Division of Water Quality

MEMOIR

SNAPSHOTS OF THE LAKE



Antelope Island by Mark Knudsen (acrylic on panel 84" X 24")

Looking back, the lake intersects the line of my life, my time, like the receding sound of footsteps in wet sand.

I am nine. The Arcade at old Saltair has reopened. My parents, whose love for Saltair goes back to their own youths, the train rides, the dances, have brought the family to experience the legendary rollercoaster. From the top of the ride, the lake recedes, a crescent moon reflected. Then the fusion of pure terror and joy.

I am in high school. My girlfriend and I are alone in the ruins of the old Saltair Pavilion at sunset. The glass from the windows of the high dome have shattered onto the dance floor, and the last of the days sun is reflected from them in a tango of dancing light. A few years later, the pavilion burned to the ground, a lost monument to the innocence of my parents youth.

I am a young father. My two-year old son Oliver's first visit to Antelope Island over the causeway is in late fall on a gray afternoon. He is running on the beach when a gale-force gust whips the sand through us. I scoop him up and make a dash for the car. Oliver's screech can be heard in Grantsville.

I am in the old Bronco II heading up to Lakeside. A herd of thirty antelope are grazing nonchalantly to the east. I notice a sign that announces Grassy Mountains and a dirt road to the west. I turn on the road and climb slowly into the hills. The road deteriorates as I go and without knowing quite how, I find myself in the curious position of being on the worst dirt road I have ever tried to negotiate. I am afraid to turn back. It's that bad. So I creep

forward over gap and crevasse. Eventually, I make it to the valley floor and head for I-80. There is a jeep in the rear view mirror with two MPs waving me over. I'm on the bombing range and they think I'm a Russian spy. I have my binoculars, my bird book and my shorts are too big -- the finest in tree-hugging nerd attire and a clever disguise. They want to know how I got there. They say the road is impassable. I agree. Finally, I get them to call my office at the Salt Lake Tribune to confirm my identity. If I have a secret to sell the KGB, it's, "Don't take that dirt road".

I am assisting Tom Wharton, then Outdoors Editor for the Salt Lake Tribune, with graphic design and illustration on a year-long project to produce a special tabloid section on the Great Salt Lake. We are part of a convoy with Don Paul of the DWR and members of the Audubon Society that will eventually drive all the way around the lake. But the first leg is to Wendover, north through the Silver Island Mountains to the old railroad watering hole, Lucin, then across the access road of the original laid UP track to the Hogup Mountains on the northwest point of the lake. The detour is necessary because access from Lakeside to the Hogups is controlled (and denied) by the Union Pacific Railroad. We set up camp near the water at Crocodile Mountain in the Hogups. Pelican Island is nearby. Only the dark side of the moon is more wild, remote more austere. The intersection of mountain, lake, island and evening light produce a beauty that could stop your heart.

Again, the roads are terrible. The next morning I am

driving behind Tom as we explore the area around the Hogups. His left rear tire explodes. As he walks back to investigate, I hear another pop and watch as the right rear tire lets the cart sink to the ground. Having only one spare, life becomes complicated, but Tom's efforts eventually win the project a nomination for the Pulitzer Prize.

The Lee Creek area at this time is famous as a rendezvous for drug dealers and their clientele. But it's also a great place to let the dogs run. A friend on my arm, we set up the telescope to watch Hale-Bopp's inexorable fall towards the sun.

I am tip-toeing around a thousand California Gull nests, most with eggs and built on the ground near the shore. I am with the DWR again and on a tour of the smaller islands. I lose a perfectly good Teva in the foot-deep muck near the water. My guess is, it is still there.

It is mid-summer and hot and dry as bones. My wife, Leslie and I are taking friends from Philadelphia to see Robert Smithson's Spiral Jetty near Promontory Point. The land is ridged and tan, a discarded snake skin. We come across a herd of wild horses, each mare with a foal, and try to get close. The stallion gives us the eyeball. I can not say I blame him.

The Jetty is magic. It has power. You begin to believe that the Jetty came first; that the magnificently harsh landscape grew up around it. Where is Fellini when you need him?

Leslie and I are up at 5:00 a.m. We are going to Antelope Island and we want the light to be just right. We are both landscape painters. As it turns out, the light is just right. An entire battalion of Wilson's Phalarope and one Prairie Falcon turn out to greet us.

My son Oliver is grown now and on a short visit from his home in Tucson. We have a few hours to kill before his plane departs. I ask him what he would like to do? "Why don't we drive up to Antelope Island." 🐾

Mark Knudsen

I am Mark Knudsen, a Utah native, lover of the lake, denizen of the desert. I regard the Great Basin as lush and trees make me nervous. I am not sure they can be trusted. I studied art at the University of Utah and found my calling doing illustration, design and some writing for the Salt Lake Tribune. An early retirement propelled me into a full time painting career.

About Spiral Jetty

It felt like a nerf ball fired from a bazooka had nailed me in the center of the forehead.

I was 10 years old at San Francisco's Palace of the Legion of Honour standing in front of my first Rembrandt. That sense of inevitable rightness, of life and largeness of spirit had me hooked early on. Goya, Velazquez, Vermeer burn holes into my head. Picasso does it with intimidating regularity. At a recent show at SFMOMA, Richard Tuttle rearranged my sense of space and time with his adroit constructions. Those guys always make it look easy.

Robert Smithson was such an artist, and Spiral Jetty is such a work.

There is an organic inevitability, an aesthetic of completeness and wildness in the fusion of the form with its environment. It belongs there. Smithson nailed it.

And now it is in danger.

My first visit to Spiral Jetty was like my first visit to Manhattan. I was shocked at how little photographs were able to convey about the spirit of either place.

So, I have a request and a modest proposal: If you haven't already - go see it for yourself. Then you will understand how important it is to convince Utah officials to disallow Pearl Montana Exploration and Production's plans to drill for oil just south of the Jetty.

SELENIUM

HOW PROTECTIVE SHOULD THE SELENIUM STANDARD BE?

The historic first Great Salt Lake Numeric Water Quality Standard Process is nearing its endpoint after three years of productive research. Although conservation groups had been pushing for water quality standards in the past, the opportunity arose from the Southwest Jordan Valley Water Cleanup Project. The plans for a 40-year discharge containing selenium into GSL resulted in a decision to develop a water quality standard for selenium before approving the discharge.

Early in 2004, the EPA disclosed that no fresh water standard would apply to GSL and that we must develop our own site-specific standard to then be accepted by the EPA. Overseen by a Steering Committee, an independent Science Panel has been directing this process along with the Division of Water Quality, CH2MHill (the engineering contractor) and mostly local GSL scientists. The research data has not been completed and no conclusions have been reached. However, it is not premature to begin the philosophical discussion of how protective we should be of our resource.

Selenium toxicity occurs in water birds through contamination of their diet. The toxic effects are exhibited in bird reproduction by embryo mortality reducing egg hatchability. Mallard ducks may be the most sensitive to selenium and using selenium threshold values derived for mallard effects is assumed to be protective of other species.

Before most data had been reported for the GSL selenium process the EPA representative on the Science Panel announced that EPA would accept a site specific standard no higher than an EC10 (an effect concentration of 10% on egg hatchability; or in other words - a 10% mortality for nesting avocets, stilts and waterfowl).

This 10% local mortality is considered to be reasonably protective (ie 90%) by some experts and presumably by the EPA, but is it protective enough for the ecosystem?

Selenium is one of many discharges permitted for the open waters of Great Salt Lake at any given time. Fold this into the constant background dynamics of a myriad of influences at play on the lake – including outbreaks of avian botulism, receding lake levels attributed to drought, potential development of mineral extraction

operations on the lake, and diversions of inflows to the Lake, and it's difficult not to ponder tipping points for this unique saline system.

We should begin to consider this now even though final conclusions have not yet been reached on the exact water column number. The Science Panel will likely provide a range of choices around an EC10 (from the most to least conservative) to the Steering Committee, early in 2008. A final recommendation will be passed on to the Water Quality Board for decision.

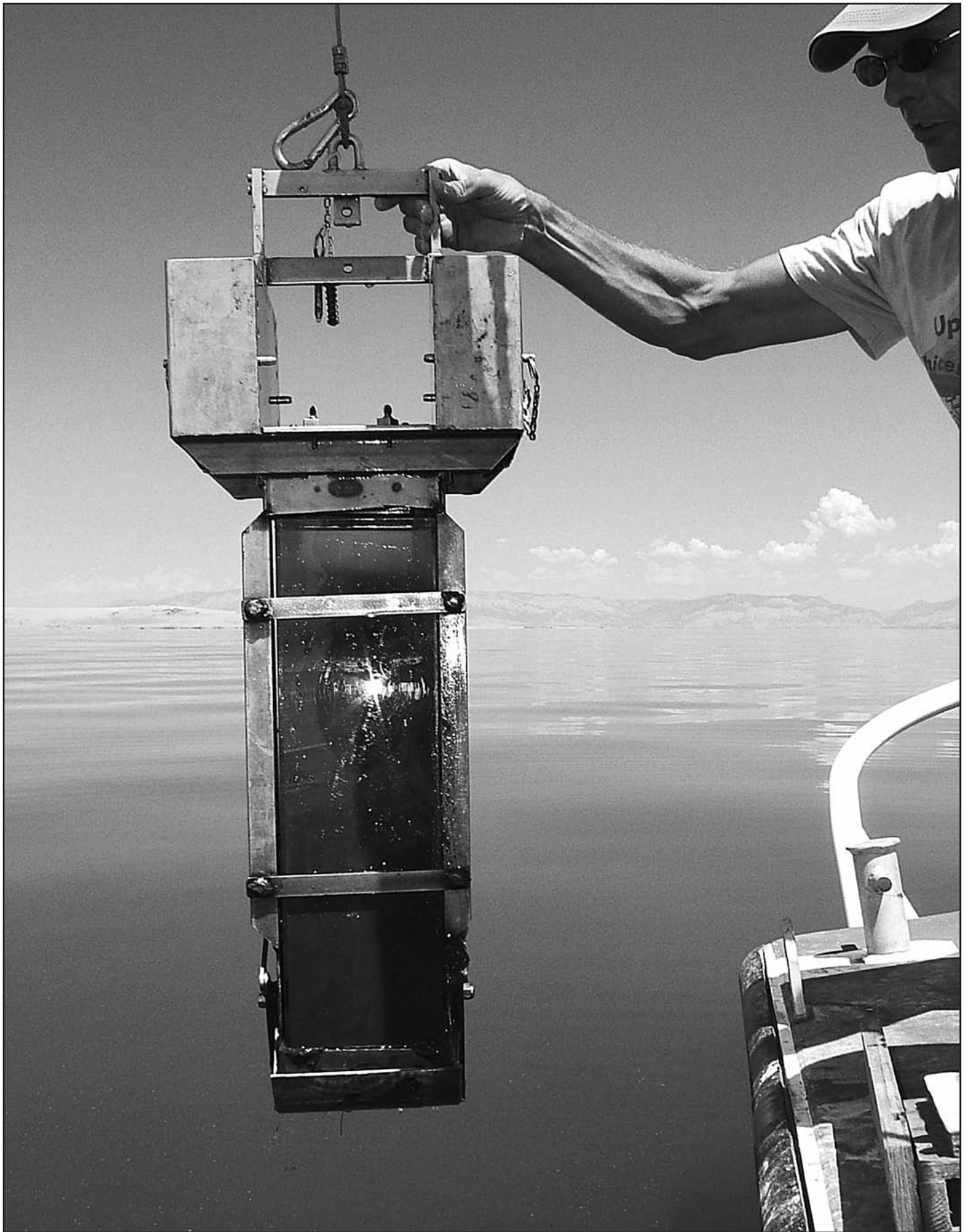
Two years of data collection and \$2,000,000 of research projects have provided unique answers to questions of selenium movement from surface inflow into water, sediment, food chain biota and ultimately the water birds that are dependent on GSL food sources. Information has also been gained about basic GSL ecosystem functions which will be of great value to future researchers. Relating the selenium concentration in bird eggs back through the food web to a water column number will not be an easy process.

There are many reasons to be conservative in choosing a water quality standard for GSL. Some that come to mind include the international importance of GSL to nesting and migratory birds, and the economic importance of GSL to the state of Utah.

The state must be accountable for supporting a standard that will have no harmful effect.

The involvement of the public through conservation groups as well as individuals could certainly impact the debate on this issue. All meetings of the Steering Committee and Science Panel are open to the public. Check the DEQ website: www.deq.utah.gov for the schedule and be prepared to participate and speak for the Lake.

Developing the first water quality standard for selenium in the open waters of Great Salt Lake is a significant step. But whether or not that standard is protective enough of the long term sustainability of the Great Salt Lake Ecosystem is a decision that we should all be ready, willing and able to make.



Coring the Great Salt Lake Sediments by W. Wurtsbaugh

GREAT SALT LAKE EDUCATION

STUDENTS TEACHING STUDENTS ABOUT GREAT SALT LAKE



GSL Tête-a-Tête by L. de Freitas

Last spring, the Ogden City School Board voted to create its first Environmental Magnet School at Grandview Elementary. A magnet school is one which utilizes a thematic approach to educating students by offering specialized courses or curricula to enhance student learning and interest.

I realized that this designation was a great opportunity to bring both Weber State University (WSU) students together with Grandview Elementary so that both could learn about and develop an appreciation for their local environment.

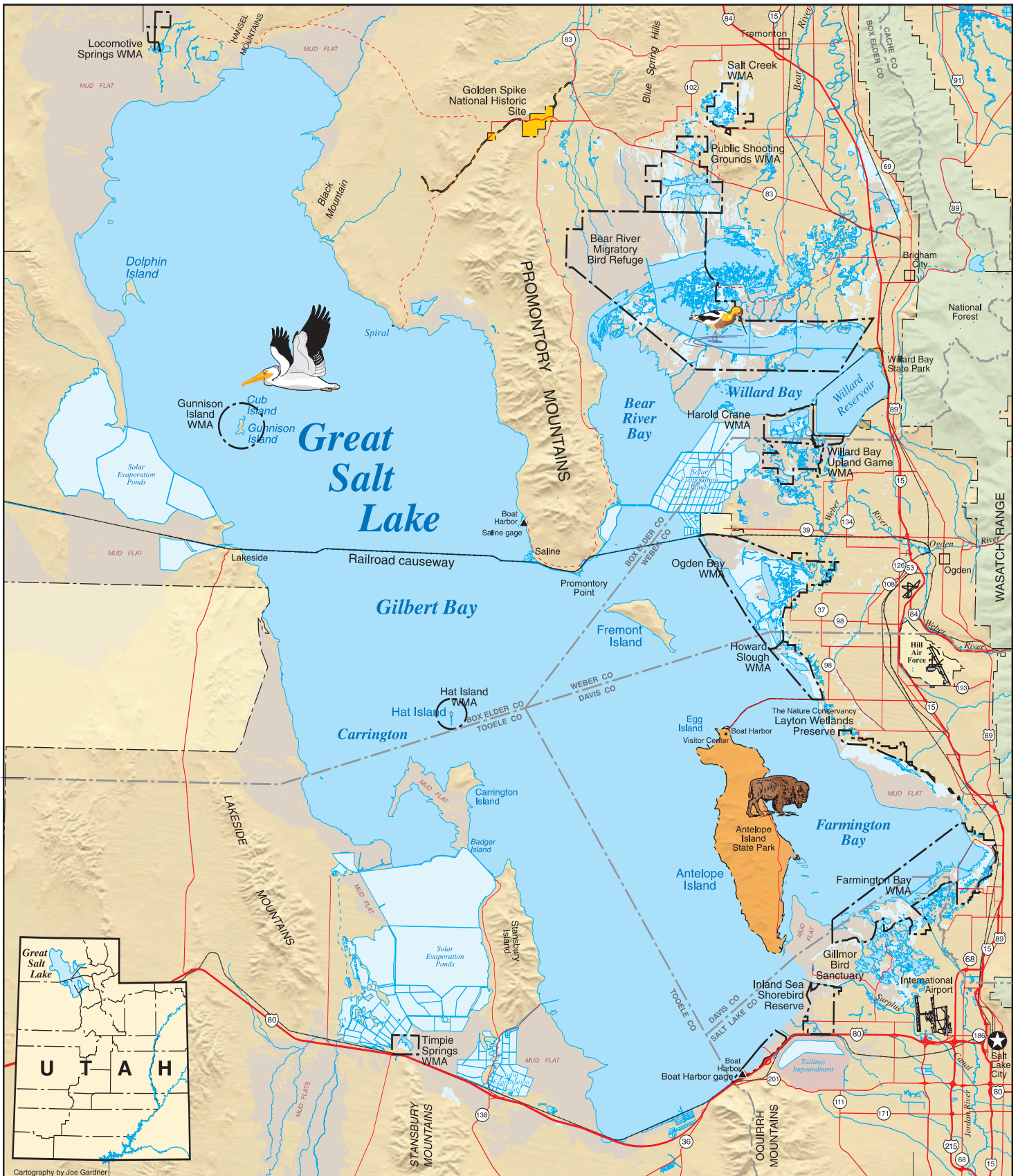
Each fall semester, I teach an upper-division ecology course for Zoology majors at WSU. This year I assigned a service-learning project for students in my class to teach 4th and 5th grade Grandview students about Great Salt Lake Ecology. Students were arranged into five groups with each group assigned a specific topics which related to the state science core standards for these grade levels; Utah's Environments, Properties of Water, Wetland Functions, Plant and Animal Adaptations and Animal Groups of the Great Salt Lake. We relied heavily on the FOGSL Project SLICE curriculum/activities as well as activities from the US Fish and Wildlife Service's, Shorebird Sister School Program.

Each group was given 30 minutes for their presentation to each of five different classes. The students did an excellent job of incorporating many of Project SLICE's activities to illustrate key concepts about the functioning of the Great Salt Lake. They also took specimens from the WSU Zoology collections to illustrate the diversity of life the lake supports. In total, 26 college students taught 150 elementary students. Needless to say, the Grandview students loved the hands-on activities and games presented in each topic.

I think the WSU students gained just as much from the experience as the elementary students. It has been said that teaching allows you to share your wealth while at the same time increasing your own. This certainly was the case with this project. One student commented that she "learned more in this one project than many entire courses". Others agreed that they also developed a much better sense of community and the importance of sharing one's talents and time. 🐾

Dr. John Cavitt, Associate Professor, Dept. of Zoology,
Weber State University

GREAT SALT LAKE AT A GLANCE



Courtesy of 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 Lynn de Freitas at ldefreitas@earthlink.net

Understanding Toxicity

When dealing with water quality, scientists and toxicologists use terms that to the lay person can seem confusing or even downright incomprehensible. Terms such as LC50, EC10, NEC and NOEC are tossed about with ease within the scientific community, yet even among “experts” meanings and interpretation can be biased by an individual’s level of knowledge or personal experiences. Still, anyone can learn the vocabulary and develop a basic understanding of what these terms mean, including their subtle differences.

One of the first concepts is the LC50 (or LD50). This is the concentration (or dose) that is lethal to half of the organisms tested (think of LC50 as “Lethal Concentration - 50 %”). To understand “concentration” and “dose,” I think of the former as the amount of chlorine in my tap water and the later as the two aspirin I occasionally take to alleviate my headache.

In water quality, we are mostly concerned with “concentrations” since it is the amount of an element or compound (“substance” used hereafter) in water or diet that we typically deal with rather than a single exposure (e.g., birds eating a granular form of a pesticide in a corn field one time). In addition to the LC50, any number of numerical options are available such as the LC10 or LC5 which is the concentration of some substance that is lethal to 10% and 5% of the organisms, respectively (i.e., “Lethal Concentration- 10%”, or “Lethal Concentration- 5%”).

Lethality (or mortality) is only one effect (and a severe one) that a substance can have, but there are a number of other effects that can be measured such as a decrease in growth, a reduction

in reproduction, or even changes in behavior, just to name a few. These “effects” can also be displayed in a manner similar to the LC values; therefore, an EC20 is the concentration of some substance that causes an “effect” in 20% of the organisms tested (“Effects Concentration- 20%”). The “effect” should be defined along with the EC value so that everyone knows what the effect is. For example, the effect being used to set the selenium (Se) standard for the Great Salt Lake (GSL) is the hatchability of bird eggs, but more on that in a moment.

Besides LC and EC values, the terms “no effect concentration” (NEC) and “no observable effect concentration” (NOEC) are often used. The NEC is (or should be) synonymous with an EC0; in other words, the concentration caused the effect in none of the organisms tested. Determining a NEC can be difficult since not all effects are studied, not all species are studied, sub-lethal effects are often difficult to detect, and there may be issues with statistical treatment of the data due to small sample size.

Rather than a true NEC, we often talk about a NOEC. The NOEC is important because it includes the word “observed” which expresses the concept that there might be an effect, it just wasn’t observed. People will sometimes use a NOEC as the NEC, but remember that a NEC = EC0 whereas a NOEC might equal an EC0 but could also equal some other number either greater or less than zero. Recognizing that there might be an effect (NOEC) and stating that there is no effect (NEC) are distinctly different; therefore, it is incorrect to blindly assume a NOEC is the same as a NEC.



Understanding the intricacies of the NOEC might take a greater discussion of statistics than what is presented here, but suffice it to say that NOEC values are driven by experimental design and statistical power, both of which can be deficient. Researchers often use a significance value of 0.05 to determine if something is statistically different (i.e., there's only a 5% probability that the effect is due to chance alone); however, this means that the conclusion is not 100% guaranteed (there's still a 5% chance). Furthermore, sample size is often small in toxicity tests which can have a dramatic impact on a type of error known as "Type-II error" which might be as high as 40% or more, instead of a more reasonable 10%. Type II errors (in this case) are the chance of accepting the outcome as a no effect when in fact there was an effect. When the Type II error goes up, the probability of missing an effect is greatly increased.

Another complicating factor is that the further away one gets from the median EC value (EC50), the greater amount of uncertainty there is. This is simply because there are fewer data points near the tails (the ends) of a sample distribution. In other words, while we can be confident about the accuracy of the EC50 it may be necessary to apply more caution to the EC10.

The endpoint being used for setting a selenium (Se) standard for the GSL is egg hatchability, specifically mallard eggs, and was selected to protect birds that feed on invertebrates such as brine flies and brine shrimp. The relationships between mallard egg hatchability and Se concentrations in diet and Se concentrations in eggs are fairly well established, and the range of EC values in these relationships has been accepted by the GSL Se Science Panel and the Utah Division of Water Quality.

What is still being discussed, however, is the level of protectiveness to apply to the GSL. Options "on the table" range between an EC10 and a NEC (or EC0). For the EC10 we would expect 10% fewer mallard eggs to hatch than would otherwise hatch normally, if taken to full term. These

are eggs that have not been lost to predation or weather events or abandonment, and are in addition to the percent of eggs that normally do not hatch (e.g., they are infertile). For an EC3 we would expect 3% fewer mallard eggs to hatch than would otherwise hatch normally and for the NEC we would expect no reduction in hatchability.

Selecting an appropriate level of protection to apply to the GSL is a topic that is beyond the scope of this short article, but I hope that you now have a basic understanding of the terms like LC50, EC10, NEC and NOEC, and that this gives you the tools understand toxicity (or threshold) values and to be engaged in the process of developing a Se standard for GSL. 🇺🇸

Nathan Darnall,
US Fish and Wildlife Service

DISCOVERING OUR LAKE

Stansbury Island



A Look Down Stansbury Island by Charles Uibel

Stansbury Island is the second largest island (22,314 acres) in Great Salt Lake, second to Antelope Island (23,175 acres). If you know and love Antelope Island, discovering Stansbury Island is like recognizing the odd beauty and quiet intelligence of a stand-offish younger sibling of a handsome, accomplished, friend you've known forever. Antelope Island is the old friend. Stansbury Island is the inconspicuous sibling.

Although most of the island is public land, "no trespassing" signs abound. However, if you appreciate the subtle beauty of ranges of the Basin and Range, and if you like going where most folks don't go, then Stansbury Island may be a place for you.

If you like rocks, love Lake Bonneville's shorelines, and respect private landowners' rights to keep you on public

lands and off their lands, consider visiting the still-not-quite-constructed Howard Stansbury Visitor Overlook at the un-named bay just west of the un-named point at the northernmost tip of the island.

In the next few months, the visitor overlook will have kiosks that explain where survey parties of the 1849-50 Stansbury expedition around Great Salt Lake camped and set up stations along the island's shores; recount how the island was named for Capt. Howard Stansbury, leader of the expedition; identify major shorelines of Great Salt Lake and Ice Age Lake Bonneville; and recount the most-recent 30,000 year story of climate change documented by Stansbury Island's many shoreline expression. An interpretive trail designed for teachers and students of the Tooele School District, is a scaled model that mimics the rise and fall of Lake Bonneville and Great Salt Lake.



A Fabulous Set of Moments by Charles Uibel

Located between Tooele and Grantsville, north of I-80 West, Stansbury is called a sometimes-island. This is because of historic high stands of Great Salt Lake that have isolated the island from the mainland where it is connected by the Stansbury bar. The island's northern and eastern shores border Gilbert Bay, the southern part of the western part of Great Salt Lake. The island's western and southern shores are complexes of evaporation ponds.

Access to Stansbury Island is easy and there's no charge. A well-marked road leaves I-80 West at Exit 99. The road heads west and then east across the Stansbury bar along dikes of canals that divert brines to and from extensive evaporation ponds, and connects to the well-used road along the island's west shore. The west-side road is well-worn by haul trucks taking landscape boulders to the Wasatch Front; hauling quartzite for flux to

Kennecott Utah Copper's smelter; transporting brine shrimp cysts to processing for global shipment; and associated with U.S. Magnesium's extensive facilities and dikes across Stansbury Bay. This road also provides access to the Howard Stansbury Visitor Overlook and has potential to provide access to some of the BLM land of the central part of the island. However, until the signage is clear, please don't roam the island. Folks say that disrespect of private land could lock up access to the island again. So discover Stansbury Island with care and respect.

The best times to visit the island are October to April.

Dr. Genevieve Atwood, Assoc. Professor,
University of Utah, Dept. of Geology and Geophysics

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Lake Fact:

How many acres of the surface of Great Salt Lake are currently occupied by mineral evaporation industries?

Answer: Approximately 85,000 acres
comprising an area twice the size of San Francisco, CA.

WE want to thank Matt Crawley Design,
The Tooele Transcript Bulletin and Xmission.com.

SUBMITTING MATERIAL FOR PUBLICATION

Deadlines: Sept. 16 (Fall), Dec. 16 (Winter), Mar. 16 (Spring), and June 16 (Summer). Submit articles and images for consideration to Lynn de Freitas ldefreitas@earthlink.net or call 801-583-5593.

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Richard T. Johnson (carved shorebirds)
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Bigs hugs to

Jennifer Speers

GREAT SALT LAKE PEOPLE AND PEREGRINES

Class of '07 Peregrines: Butch, Cassidy, Gabby and Ed. Butch left the scene early and his fate is still unknown. However, his three siblings appeared to be ready, willing and able to make their way into the larger environs after successfully completing their downtown flight training. All eyes to the skies!

Congratulations to Merritt Fry, Executive Director of the Utah Rivers Council on her recent appointment to the Utah Water Quality Board. Merritt is an excellent addition to the Board, and will provide a strong voice for rivers throughout the state. You float, girl!

Wayne Martinson, Important Bird Area Coordinator for National Audubon is the environmental representative on the Jordan River Watershed Council. Wayne will serve the environmental community well.

Congratulations to Amy DeFreese, Utah Rivers Council, and D.J. Baxter, Director of the Redevelopment Agency of Salt Lake City, who were married on September 8th. Talk about a dynamic couple!

More wedding bells were heard, but this time in Scotland where Jeff McCreary, Intermountain Regional Biologist for Ducks Unlimited and his new wife Holly were married. Rumor has it that it all happened under umbrellas. Aye Scotland!

Congratulations to Robert Adler, Professor of Law at the S.J. Quinney College of Law, University of Utah, on his new book "Restoring Colorado River Ecosystems: A Troubled Sense of Immensity" published by Island Press. True to form, Bob is both a gifted educator and storyteller.

Farewell to Dr. Ty Harrison, Professor of Biology at Westminster College, who recently retired. Ty has been a driving force of environmental awareness, both on the Westminster campus and in the Greater Great Salt Lake Community. He will now be working "at large" to ensure that the sound principles of conservation remain at work in our community. Want to join the board, Ty?

Farewell to Dave Becker, attorney extraordinaire, and formerly with Western Resource Advocates. Dave is moving to Portland, Oregon where he will be the Staff Attorney for the Oregon Natural Desert Association. We will miss him – big time!

Babies on the Board, Alisa (FOGSL Director) and Ian Schofield are the proud parents of Kathryn Blanche Schofield. Kathryn was born on Thursday, Dec. 6th at 12:29 am and weighed 7 lbs. 10 oz. On August 19th, Vicky Peacey (FOGSL Director) and Michael became proud parents to Henry Melety Snihurowych, who weighed in a 7 lbs. Perhaps they will follow in their mothers' footsteps.



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Ducks Over Antelope Island by Charles Uibel