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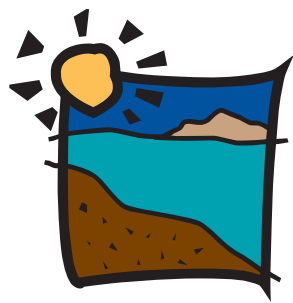
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Saltair Spaces by Charles Uibel



FRIENDS of *Great Salt Lake*

P.O. Box 2655, Salt Lake City, Utah 84110-2655

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Water Ballet 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.

www.fogsl.org

EXECUTIVE DIRECTOR'S MESSAGE

PROTECTING THE GREAT SALT LAKE ECOSYSTEM FROM EXPANDED MINERAL DEVELOPMENT - THE LAKE DESERVES BETTER FROM THE STATE AGENCY SWORN TO PROTECT

"I am a photographer, primarily of the Great Salt Lake. I've photographed, hiked, slept in the area called Clyman Bay dozens of times. To me, it is the crack in the sand where heaven starts; the escape from the known. It is the point at which "way out there" begins. It is the crazy moonscape that Moab is to other people. Although it is without Southern Utah's beautiful red rocks, it is nonetheless full of stirring scenery found no where else in the world, thankfully hidden behind a discouraging reputation of lake stink and brine flies."

Charles Uibel, professional photographer

On July 23rd, FRIENDS of Great Salt Lake, Audubon Council of Utah (Bridgerland Audubon, Great Salt Lake Audubon, Red Cliffs Audubon and Wasatch Audubon); Utah Chapter of the Sierra Club; League of Women Voters of Salt Lake and the League of Women Voters of Utah; National Audubon Society, the Nature Conservancy of Utah; Utah Airboat Association, Utah Rivers Council and the Utah Waterfowl Association appealed the Record of Decision issued by the Division of Forestry, Fire and State Lands (the Division) to issue a mineral lease to Great Salt Lake Minerals to expand their operation in Clyman Bay, Great Salt Lake.

We did this because the Division has completely failed to undertake the necessary public trust analysis relative to the existing leases in Bear River Bay and new lease in Gunnison Bay. It acted inconsistently with its constitutional and statutory duties relative to diking and mineral extraction of sovereign lands of Great Salt Lake.

The Division has a core obligation, required by Utah law, to ensure that any use of Great Salt Lake does not interfere with navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality on or in the lake. The law also requires that protection of these "public trust values" trumps any other use on sovereign lands. The law cannot be superseded in the name of economic development.

Unfortunately, the Division has just done exactly that. On July 2nd, the Division awarded a 10 year mineral lease of 23,088 acres (36 square miles) on the west side of the lake to Great Salt Lake Minerals. The lease will

allow the company to build many miles of dikes and nearly double its production of potassium sulfate, a fertilizer. Coupled with an 8,000 acre (12 square mile) lease already held by the company in Bear River Bay, when added to their existing operations, the footprint of development will be about the same size as Salt Lake City –119 square miles. That's 13 % of the total area of the lake when waters are low and about 7 % at average lake level.

Without the benefit of any actual research or analysis, the Division justified its approval by relying on one or two random site visits, one interview with a GSL Minerals employee, and a "no response" from the Division of Water Quality. In assessing the wildlife habitat values, the Division concluded that Gunnison Island's colonial bird populations would not be harmed. The scientific evidence? A solo photographer once visited and was able to photograph the birds. With all respect to the Division, the brief visit of a lone photographer hardly compares with a large scale commercial operation covering 36 square miles.

In the 1970's, the Utah State Legislature in cooperation with the concerned public helped secure Gunnison and Hat Island as wildlife preserves. The island hosts one of the largest breeding populations of American White Pelicans in North America and the lake is home to the world's largest breeding population of California Gulls. To breed, both species require strict isolation, and yet the Division would allow Great Salt Lake Minerals to operate within two miles of this remote and theoretically protected island. The noise of operations alone

could disrupt these nesting birds while the dikes the company will build will allow easy access for predators – avoiding predators was the very reason the birds found refuge here in the first place.

In a letter to the Division, Don Paul, who currently serves as the Great Basin Bird Conservation Region Coordinator, and who worked on Great Salt Lake and researched the birds associated with it for almost 40 years stated “Historically there were several other American White Pelican colonies associated with GSL and Utah Lake. These colonies have long since failed due to human intrusion and activity. Once sites have failed they have not been reoccupied even though in some cases sites are currently more secure. The failure to re-occupy these historic nest sites is reason for concern and increased vigilance for site conservation at Gunnison Island.”

Similarly, lake surveys conducted by Dr. Peter Paton and associates in the 1990's located significant Snowy Plover populations within the shoreline complexes of Gunnison Bay. The National Shorebird Conservation Plan and the Intermountain West Shorebird Conservation Plan ranked the Snowy Plover as a high priority species for conservation.

A letter from Dr. John Cavitt, Assoc. Professor in the Dept. of Zoology at Weber State, who is conducting Snowy Plover research observes “It is my judgment that additional survey data are required to ensure that the proposed activities will not remove critical habitat for this species of conservation concern. Snowy Plover, other shorebirds and waterbirds may utilize this area of the lake during the early spring and fall migrations as well as in other breeding seasons when lake levels are closer to the long-term average. Given the hemispheric importance of the Great Salt Lake to shorebirds, it is imperative that these decisions be made only after considerable deliberation and analysis.”

Unfortunately, the rest of the Division's decision is equally devoid of even the barest attempt at scientific analysis or thoughtful scrutiny. Rather, the Division simply declared that “as in the past, it is expected that the bird populations will adapt accordingly as they have in past decades.” How precisely this will happen is left unclear. Given the increasing development pressures all around the lake and the constant fluctuations of lake level, it is unrealistic to claim that the birds will find anywhere comparable to “adapt.”

The value of the Great Salt Lake Ecosystem to migratory bird populations in the western US and the Western Hemisphere cannot be overstated. If we, as Utahns, truly cherish the natural landscapes and the diversity of life they support, and understand the value they add to the quality of our lives, then we must stand together and speak out against this decision. The lake deserves better from the State agency sworn to protect it. 🐦

In saline,

Lynn de Freitas

What You Can Do

Send letters to your local newspaper expressing your concern with the Division's decision.

Register with the Army Corps of Engineers for notification of public process associated with the EIS development of this proposal <http://www.spk.usace.army.mil/organizations/cespk-co/regulatory/pnlist.html>.

Check our website: www.fogsl.org for updates and further details as they develop.

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. 🐾

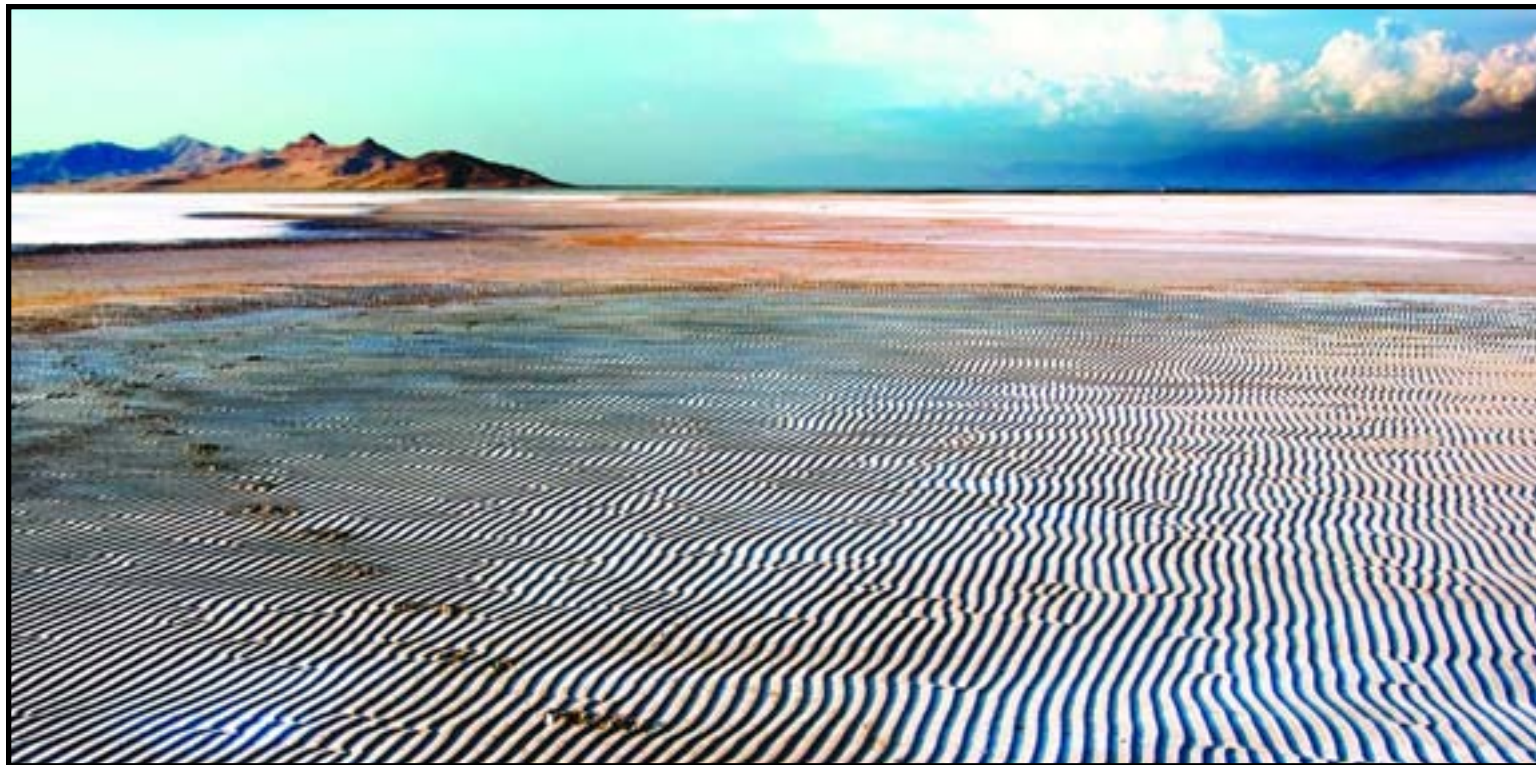
On the Cover

Water Ballet by Charles Uibel ©2007

This group of pilings is nearly all that remains of one of the old Saltairs. It is located within a few miles of the current Saltair. The spot is popular with photographers and beach combers in the area.

I've made photographing the Great Salt Lake a serious project since 2005. I shoot with a Nikon digital camera. I'll go out to the lake for a day or an evening and try to land somewhere compelling near sunset. Often I will walk for miles to reach the water, then I may walk another mile or two in the water. I love the smell of the lake and the brine flies, though these do not exist in all parts of the lake. Water ballet was shot mid-morning. I don't try to look for anything specific, I just like to be surprised.

I grew up in Brigham City. My father is a respected artist and my mother has a strong appetite for history and reading. My brother is an awesome artist and designer of theme parks. My wife is a strong and thoroughly good-hearted partner. More of my photographs can be seen at <http://greatSaltLakePhotos.com>.



Ripples by Charles Uibel

2008 GREAT SALT LAKE ISSUES FORUM INTERNATIONAL CONFERENCE ON SALT LAKE RESEARCH & MANAGEMENT

SALT LAKE CITY, UTAH, USA, MAY 12-16, 2008

The International Society of Salt Lake Research (ISSLR) will hold its 10th International Conference on Salt Lake Research in Salt Lake City, Utah, USA, May 12-16, 2008 at the University of Utah which overlooks the Great Salt Lake, one of the largest and most ecologically important salt lakes in the world.

The conference will showcase recent microbial research in saline environments, bird use of salt lakes, and an array of other topics.

The biennial Great Salt Lake Issues Forum sponsored by the FRIENDS of Great Salt Lake will be held jointly with the ISSLR conference, providing a stimulating mix of scientists, environmental groups and managers with a common interest in the conservation and scientific management of saline lake ecosystems.

The conference will include interesting mid-conference field trips in the local area and an optional post-conference exploration of saline lakes and national parks in the southwestern U.S.

Co-sponsors of the meeting include Utah State University, The University of Utah, and U.S. Geological Survey.

Proposals for Special Sessions will be considered until December 15, 2007 and can be sent to Wayne Wurtsbaugh (wurts@cc.usu.edu). Questions about the Issues Forum can be sent to Lynn de Freitas (ldefreitas@earthlink.net). For more information see <http://www.isslr.org/> and www.fogsl.org.

ADAPTIVE MANAGEMENT AND OUR LEGACY

MEET THE LEGACY NATURE PRESERVE MANAGER



Eric McCulley by Al Trout

My name is Eric McCulley and, with assistance from the Legacy Parkway Team, I manage the Legacy Nature Preserve. When I first set foot on the Preserve, I saw a lot of opportunity for habitat improvement. The land had been managed by a wide variety of different individuals, and each had their own special way of caring for the land. My background is in geology and watershed science, so I could see through many years of land-use at what the landscape had to offer.

The Preserve is located in a very unique environment, where the shores of Great Salt Lake itself once covered

parts of the historic Jordan River Delta. The shoreline processes of Great Salt Lake have changed lands on the Preserve through time due to climatic variation and tectonic activity. Thousands of years of human inhabitation have also influenced the landscape. I manage lands adjacent to about two miles of the Jordan River that were under salt water just twenty years ago. Piecing together the history of the land proves to be challenging.

I look at the land trying to envision what it was like tens, hundreds, thousands and even millions of years

ago. Through study of recent activities on the land, the Legacy Team and I have discovered changes due to human and natural disturbance. These factors influence the decisions we make on how to manage the land for the maximum benefit of wildlife.

Over the last few years, a series of plans has been developed to meet mitigation requirements for impacts to wetlands and wildlife due to development of the Legacy Parkway. In the Army Corps of Engineers 404 permit that was approved in 2006, UDOT was required to develop these management plans. The guidance provided in these plans helps me to decide how to manage the land.

In 2005, a diverse group of stakeholders, including UDOT and FRIENDS of Great Salt Lake, created an Adaptive Management Plan for the Preserve. This plan outlined many goals for the management of the Preserve and provided the basis for development of three other plans on how to manage water, habitat, and people*. I will discuss how the Legacy Team and I have utilized these plans to develop detailed lists of activities for the benefit of wildlife "into perpetuity".

The adaptive management approach emphasizes the testing of hypotheses, adaptation of management actions, and learning from past activities. On the Preserve, field forms have been developed to gather the necessary data to help guide management decisions. I have visited with many other preserve managers to determine what has worked for them. The studies will provide information to guide our activities and will be used to develop models for future wildlife habitat preservation.

Water is essential to all life on earth, and all ecosystems are created through the interaction of water, soils and life forms at the surface of the earth. The Comprehensive Water Management Plan details the available water resources we have to maintain, restore, enhance and create habitats. It also outlines strategies for mimicking natural patterns of wetting and drying of habitat features on the Preserve. Through field-testing of these guidelines, we have been able replenish long-dry wetlands, and I have changed water levels to provide foraging, resting and nesting areas for resident and migratory birds. Our team of resource specialists is currently helping me determine the best way to manage water levels.

The water levels are being changed to try to mimic natural patterns of inundation and drawdown and create dynamic conditions for maximum diversity of habitat.

The Habitat Management Plan provides a general outline for desired state of the habitat, but the specific actions are still being learned. Our working hypothesis is that the proper timing and seasonality of water dispersal will lead to a diverse and healthy ecosystem. The habitat plan also provides guidance for integrated pest management of noxious weeds, and we are now working on follow-up ecosystem restoration activities, with help from a variety of agency and university staff.

Water and habitat provide the basis for our management, but we cannot forget people. The Education and Access Plan discusses the interaction of the Preserve and people. Ultimately, we are managing for quality wildlife habitat because it benefits humanity and many of our human values such as open space, biodiversity, and educational opportunities. Access to the Preserve is limited because it has been set aside for mitigation of impacts related to the development of the Legacy Parkway.

I am working on a volunteer program to provide a way for interested individuals to visit the Preserve and to gain community support for Our Legacy, so please call me if you are interested in learning more. Also, check out the management plans on our website, and be sure to look at the Nature Preserve Interactive Map to get an idea of where we are.** 🐾

Eric McCulley
Legacy Nature Preserve Manager
801-383-3126

*http://www.udot.utah.gov/legacy/preserve_overview.php

**http://www.udot.utah.gov/legacy/flash/NP/NP_map.php

AVIAN NOISE STUDY

FOR THE LEGACY NATURE PRESERVE



Collection of baseline noise at Farmington Bay by M. Sipos

The Science Advisory Committee's (SAC) first research involvement on the LNP is with the ongoing Avian Noise Research project that was initiated by UDOT as an additional mitigation measure for the Legacy Parkway Project. During the environmental permitting process, the U.S. Fish & Wildlife Service and Utah Division of Wildlife Resources noted the lack of an appropriate methodology for assessing indirect impacts (e.g., noise, light, disturbance.) on wildlife species. As a result, UDOT committed to fund five years of a study to evaluate noise impacts on breeding bird populations in the Great Salt Lake

Ecosystem (GSLE), with the eventual goal of developing a "tool" to help make such assessments on future proposed projects.

A team of agency and Legacy Project specialists worked collaboratively over a number of months to develop the objectives, experimental design, locations, and sampling protocols for the study. Its primary objective is to determine the cumulative effects of noise on the density, diversity, distribution, and productivity of breeding avian communities in the GSLE.



Lead Biologist making an avian point count while recording noise levels at Timpe Springs WMA by M. Sipos

The study, which is being conducted by BIO-WEST, Inc. of Logan, is currently in its second year of breeding season field sampling. The first season was conducted as a pilot study, and represents the Legacy Parkway pre-construction period. The first year's methods and results are briefly summarized in the 2006 Annual Report for the Legacy Avian Noise Research Program (available on the BIO-WEST website, www.bio-west.com). The Legacy Team is actively searching for additional funding to expand the study for additional years, and is in the process of determining which years (construction / post-construction) to collect data with the existing funding.

In addition, the UDOT Research Division has funded a separate effort for the development of a Habitat Quality Index to provide a quick field assessment of habitat to support the Avian Noise Study. This study, also conducted by BIO-WEST, is currently in field verification and will be finalized in 2008. 🐦

Dr. Thomas Twedt,
BIO-WEST, Inc.
And the Legacy Project Team

LEGACY NATURE PRESERVE

AND THE SCIENCE ADVISORY COMMITTEE



Stansbury Island by Charles Uibel

The Legacy Parkway Settlement Agreement between the Utah Department of Transportation (UDOT), the Federal Defendants, and the project plaintiffs required the establishment of a Science Advisory Committee (SAC) for the Legacy Nature Preserve (LNP). The purpose of the SAC is “to provide advice to UDOT on the management of the Legacy Nature Preserve.” The immediate emphasis of the SAC will be to recommend priority areas of research on the LNP, encourage appropriate research and researchers to utilize the LNP, and establish a program to review and evaluate proposed research. Refining and tracking mitigation success criteria for the Legacy Parkway 404 Permit is not a function of the SAC, but encouraging and facilitating research efforts that address general mitigation procedures, processes, and reporting (see below) is appropriate.

The SAC was formed early in 2006 with the goal of obtaining representation from the major universities and the primary State and Federal resource agencies in Utah. The Settlement Agreement specifies that the

SAC include 6-12 members who will be appointed by and serve at the pleasure of the UDOT Executive Director. Potential members were identified by their organizations and invited to participate. Qualifications for membership were defined as follows:

- professional scientist,
- acknowledged expertise in the natural or physical sciences,
- graduate degree(s) and 5 or more years of professional experience,
- field research skills,
- demonstrated interest in LNP concept,
- willingness and ability to work with other SAC members, and
- availability for meetings / reviews.

Members are expected to become familiar with the LNP background and objectives as specified in the Legacy Section 404 Permit and Adaptive Management Plan, and to attend SAC meetings as scheduled (maximum

four times per year initially). They will be expected to facilitate accomplishing SAC objectives (listed below), review and comment on proposals for research, and support and encourage participation in the SAC program.

The objectives of the SAC are as follows:

- develop operating procedures and guidelines,
- coordinate closely with the U.S. Army Corps of Engineers and LNP Manager,
- discuss and recommend desirable areas of research,
- encourage the involvement of appropriate researchers and students,
- establish a program to review and evaluate proposed research and research methodologies,
- respond to requests from UDOT for assistance on particular matters such as the noise study or issues that may arise from regulatory agencies, and
- track and report SAC and research activities annually.

The following organizations have been represented on the SAC: Utah State University, University of Utah, Weber State University, Brigham Young University, U.S. Army Corps of Engineers, U.S. Fish & Wildlife Service, U.S. Environmental Protection Agency, U.S. Bureau of Land Management, Utah Division of Wildlife Resources, and the Utah Reclamation and Mitigation Commission. Coordination and support will be provided by the UDOT Legacy Project Team.

The SAC has met four times to date, with primary emphasis on discussing and defining the group's organization and function. Basic ground rules and operating procedures have been developed and refined, and areas of research priority have been discussed. These priorities will serve as a basis for both encouraging appropriate research on the LNP and for evaluating and approving proposed research. The Legacy Team provided a draft research framework and the SAC members responded with more detail relative to their areas of interest, expertise, and perception of need. The framework was structured to address two broad concepts: UDOT's acknowledged information gaps relative to the Legacy Parkway project and other comparable projects in the future, and general areas of broader scientific interest to which the LNP would provide value as an "outdoor laboratory." Obviously, these are not necessarily independent or inclusive concepts, and the opportunity for overlap and synergism is clearly present.

As far as UDOT-acknowledged gaps, several problemat-

ic issues arose during the Legacy Parkway Project environmental process for which obvious answers were not readily available. These include:

- indirect and cumulative impacts to species and ecological systems from the construction and operation of a highway facility relative to such items as noise, light, human presence, air quality, and water quality;
- evaluation of habitat fragmentation, habitat modification, and weed invasion and control; and
- effects on natural hydrologic processes and water quality.

From the broader scientific perspective, areas of interest might be framed in terms of issues or unknowns relative to the following:

- water – ground and surface, quantity and quality;
- wildlife – monitoring, population dynamics and success, predator control;
- habitat – quality, monitoring, value, succession processes; and
- mitigation – developing, monitoring, reporting.

Other areas in this regard might include sociological items such as access and education management. Obviously, a wide array of topics under each of the above issues can be envisioned.

Thus the research framework envisioned for the SAC includes any or all of the areas noted above and many others of similar nature. Those that fit both concepts (and it would seem that most do) are of special interest and value. Once this framework is finalized, the SAC will work with the Legacy Team to select top priorities and coordinate research projects. 🐦

Dr. Thomas Twedt
BIO-WEST, Inc. and Legacy Project Team

For a listing of the current SAC see page 18.

GREAT SALT LAKE EDUCATION

PITCHING IN FOR THE LAKE :

DEDICATED VOLUNTEERS REALLY MAKE A DIFFERENCE

There are a few things I can count on hearing every clean bright morning that I meet a big yellow bus (or two) at the parking lot just before the entrance to Antelope Island State Park. The first is to view 70-80 excited, joy-filled faces of kids about to have a perfect day at Great Salt Lake. The energy inside is palpable and the windows just about vibrate trying to keep all that energy inside. The second comes a bit later, after we are all knee-deep in the salty water and have adjusted to the cold temperature. It is a chorus of squeals of delight as kids examine the contents of their dipping cup with their hand lenses and try to identify what they have found with their field guides.

Talk about the perfect outdoor classroom! From the salty-squishy soils of the playa, the matted carpets of brine fly pupal cases that line the edge of the causeway, to the beautiful oolitic sandy beaches of Bridger Bay, Antelope Island is the perfect place for kids to get outside to learn more about Utah's amazing and unique ecosystem. It is a place where everyone can experience the emotional thrill of exploring a natural landscape that is full of the unexpected.

This spring, there was one more thing I could count on: a solid team of dedicated, patient, enthusiastic and AMAZING volunteers. I'd like to introduce you to some of them.

Matti Harris is a college student who moved here from Montana and wanted to get involved teaching kids. She has been facilitating with us for three seasons now.

Jean Keller has worked with friends for almost 4 years. She is a recently retired nurse who fits a few of our Lakeside Learning field trips into her busy travel schedule.

Susan Martin is an ecologist working for a local environmental consulting firm. Her company supports volunteer activities in the community and encourages her to get out and get dirty to make a difference in the world.

Margie Nash is another new resident to Utah, although she has been playing hard every summer in Utah's amazing outdoors during her vacations. She is an avid birder and watershed warrior and loves to share her knowledge of the natural world.

Alisa Felton is a FRIENDS of GSL board member and teaches earth science at West High School. We are so fortunate to have her share her talents with us over the last year.

Becki Wright is a graduate student at the University of Utah working on a Master's Degree in Public Policy. She not only assisted FRIENDS with Lakeside Learning, but also served as an intern to gain valuable experience in the non-profit world.

I have one more story to tell. It isn't really my story, it is Margie's, but it is a good one. One morning, the bus pulled up to Ladyfinger Point to unload everyone. As we all gazed down at the beach we saw a lone coyote curled up on the shore, just enjoying the view. The bus unloaded and we all hiked down over the rocks to the beach and the coyote wisely headed off to safer, quieter ground. Margie overheard two boys chatting about how this was the first time they had ever seen a coyote. One boy wondered out loud, "Do coyotes eat people?" The other boy replied, "No, just werewolves." He looked up at Margie for affirmation and said, "right?"

There is always something to look forward to when you make the journey to Great Salt Lake. FRIENDS is always looking for volunteers to share their talents and who want to make a real difference in our community. If you are interested in joining us for our fall season, please give me a call or send along an email.

Katie Pearce, Assistant Director
801-322-3216
kdpea@comcast.net

"I was taught that the world had a lot of problems; that I could struggle and change them; that intellectual and material gifts brought the privilege and responsibility of sharing with others less fortunate; and that service is the rent each of us pays for living -- the very purpose of life and not something you do in your spare time or after you have reached your personal goals." - Marian Wright Edelman 🐾

A SLICE OF S.L.I.C.E.



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

Tiger Tracks: Tiger Beetles of Great Salt Lake

Hidden by a salt-encrusted plant fragment, the tiny hunter stands stock still atop six, slender legs. Except for twitches of the tips of its antennae pointing out in front of its scythe-like jaws, it could be easily overlooked.

A brine fly, one of countless millions along the lake shore, strays from the protection of the others in the swarm, and runs in short spurts over the salty sand. It is over in a second: the successful hunter's jaws crush and maim the victim's soft body to pulp even as digestive juices mix with fly blood. Finger-like mouthparts stuff the semi-liquified carcass into a gaping mouth. Soon, only a pair of shredded- wings lie on the sand as the diner carefully cleans its jaws, eyes, and antennae with its front feet. Then it moves off, searching for another hiding place from which it can ambush an additional course for its lunch.

This is a tiger beetle, a big-eyed, colorful predator whose common name comes not so much from its stripes but, rather, its ferocity. Any small animal, fly, ant, or spider, it can overwhelm, it will. And if it cannot find live prey, it will feed at carcasses of dead birds washed onto the Great Salt Lake shore.

Some 2000 species of tiger beetles exist worldwide, from above the Arctic Circle to the Straits of Magellan, the Cape of Good Hope, and New Zealand. Sun-worshipping humans can even share their vacations with them on Fiji and Tahiti. But they haven't made it to Antarctica, Iceland, Greenland, or Hawaii.

Utah has 24 species, maybe up to eight more in from Idaho, Arizona, and Colorado. A higher count than many states though fewer than speciose Texas with 51.

They range in size from the thumb-sized African Mantichore, named for a fierce monster in Greek mythology, which lives under rocks and eats lizards, to the tiny White-striped Tiger Beetle, red with a signature white stripe, shorter than a pinkie nail, which scuttles about like an ant.

Great Salt Lake is home to eight species, with, perhaps, a few additional. It is Biological Law that two species cannot occupy the same niche. These eight have carved up a habitat which seems about the same around the entire lake's circumference.

Just how they do this is a fascinating study.

Where the larvae develop may differ. Large species can subdue larger prey while likely ignoring the small prey taken by littler tigers. Proportional jaw sizes result in different abilities to overwhelm prey. Adults of three lakeside species hatch in late Spring, others having spent Winter in deep burrows. Some prefer damp sand near the water, others live farther back in the dune grass. One specializes in brine flies, another only in ants or rove beetles. The Short-legged Tiger Beetle eats Williston Tiger Beetles.

A tiger beetle begins life as an egg. The mother uses a pair of mitten-shaped structures, the ovipositor, at her rear to dig a series of holes into each of which she lays a single egg. The larva lengthens this into a burrow which becomes its home. It props itself at the burrow's neck at three points: legs, rear end, and a hook-bearing hump on its back. Its head and part of its thorax fit the mouth of the burrow and bear sensitive hairs. It waits, jaws open, until prey walks over the burrow mouth and brushes the hairs. The jaws snap shut. Eventually, the larva is

mature and closes its burrow. It goes through a “resting” or pupal stage, a pallid maquette of the adult. Even though the pupa stays put, it is hardly at “rest:” its insides break down into a cellular soup which then rearranges into adult structures. This is Metamorphosis.

Larvae are difficult to rear in captivity but can be kept in long tubes of soil which must be from their original habitat and fed fruit flies, maggots, and mealworms as they grow. Larvae are fascinating to watch as they capture prey but most die in captivity before pupation. There may be special moisture and temperature requirements we don’t know how to duplicate in the lab. Also, they require several months. In the wild, some species, particularly from high elevations, need two or three years.

Most Great Salt Lake species are indicators of salty soils. Others, elsewhere, as adults and larvae, are found only in clay or only in clean, salt-free sand. Some cannot tolerate disturbances like vehicles or cattle where their larvae develop, yet some can grow up on patchy lawns or the edges of school running tracks or golf course sand bunkers.

Habitat destruction has taken its toll of many species. Some environmental wreckage is on a grand scale: dune buggies, construction of housing tracts, flooding by dams. Or, damage can be insidious: Utah’s Coral Dunes State Park is home to a very tiny population of its own endemic species. Unwitting human visitors hiking between the dunes can potentially trample some of the small number of larval burrows dug each year.

But, next to habitat destruction, Great Salt Lake’s tiger beetles’ greatest enemies are leakage from septic tanks, household products, and pesticides. Water runoff from the mountains is sidetracked before it gets to the lake and dirtied by the time it does. Lethal materials empty into the lake, killing not only available food such as brine flies but the beetles themselves. Detergents cause changes in algal blooms whose effects on insect and, thus, bird life are rampant. Detergents also dissolve the beetles’ waxy cover making them vulnerable to abrasion by the very sand on which they live.

The lake is smaller and saltier than it has been for a long time. Identification and careful monitoring of every strand of the lake’s Web of Life will help repair weak spots before it breaks. The effects of the tiger beetle may be small in the overall scheme. A few thousand beetles make little dent in the brine fly population and the fast running and flying tigers are too much effort to catch for most birds. But, if any species of tiger beetle disappears from the shore of Great Salt Lake, we know something has changed, probably for the worst. And, Aesthetics are unmeasurable: these colorful, lively, and accessible little animals brighten the Earth. 🐞

Sanford Leffler, PhD
Utah Division of Wildlife Resources

Dr. Sanford Leffler has been a biologist since he was a little boy. He received his PhD in 1979 from the University of Washington with a dissertation on the biology of tiger beetles.

DISCOVERING OUR LAKE

Farmington Bay Waterfowl Management Area 101



The Three Musketeers of Farmington Bay - Justina, Rich and Jason by Charles Uibel

“I had no idea this was here.”

Those of us who work at Farmington Bay Waterfowl Management Area (FBWMA) hear that statement nearly every day. The phrase is uttered by international visitor, Utah road-tripper and Davis County resident alike. That such an important habitat conservation area is so unknown is rather surprising since the FBWMA was established in 1935—a joint design project of the National Park Service and the Utah Division of Wildlife Resources. Civilian Conservation Crews were recruited to help construct the first dikes and culverts that continue to preserve and restore wetland habitat to this part of the heavily encroached-upon Jordan River Delta.

At that time, wetlands around Utah were in danger of being filled in, so the Division of Wildlife Resources stepped in to preserve this important habitat-type around the state by creating Farmington Bay WMA and other waterfowl management areas including: Layton-Kaysville marsh and Timpie Springs WMA, Locomotive Springs WMA, Salt Creek WMA, Public Shooting Grounds WMA, Harold Crane WMA, Ogden Bay WMA, Howard Slough WMA, Desert Lake WMA, Clear Lake WMA, Bicknell Bottoms WMA, and Redmond WMA.

These waterfowl management areas were established primarily to make the water last on wetlands further into the year, thereby extending the productivity of the habitat for waterfowl, shorebirds and other beings dependent on these areas. Having the ability to manage water levels also gives the manager the ability to help keep water flowing, which decreases the frequency of devastating events like Avian Botulism outbreaks.

It should be noted that other entities around the state have undertaken wetlands conservation as well. The Nature Conservancy at the Great Salt Lake Shorelands Preserve in West Layton, Kennecott’s Inland Sea Shorebird Reserve, the Airport Mitigation site, the Audubon Society site and the 20+ private duck clubs are all great conservation sites because they are all conserving and improving wetlands.

Managers of these public and private sites communicate frequently with each other about best practices and it is not uncommon for crews from one site to help out with projects on another site if time and staffing permit. For example, FBWMA manager Rich Hansen and his fellow WMA managers help band wild geese populations at each other’s sites during molting season.

These united conservation efforts have preserved thousands upon thousands of acres of habitat that is critical to the survival of migratory birds. It is amazing to think that 5,000,000 birds use Farmington Bay annually. Biologists and birders have identified over 200 species of birds at Farmington Bay and nearly 60 of these species choose to nest at Farmington Bay. Therefore, you can always find interesting populations of birds at any time of the year at FBWMA.

You may like to come out for Bald Eagle viewing at the site during the late winter months. In order to make the wetlands more productive, site staff biologists do their best to remove invasive carp populations out of the system. Each winter they treat the waterways with rotenone which kills carp by putting a film over their gills and suffocating them. FBWMA staff have been treating for carp since 1997 and the eagles have become accustomed to feeding on these dead carp during February and March. We have attracted up to 400 Bald Eagles some years. FBWMA even has a special Bald Eagle Day the second Saturday in February.

If waterfowl are more your cup of brackish tea, come on out to the site in the Spring to take a "gander" at the 20 species of ducks that stop by the site to nest and/or fatten up for further migrations. We even hold a Tundra Swan Day the second Saturday in March for those of you who are partial to getting a good look at an Arctic waterfowl species.

The spirit of partnering and cooperation has defined operations at FBWMA from its inception and continues to play an important part in the way the site is conducted today with regard to community relations. For example, FBWMA staff and DWR personnel worked with Davis County School District administrators, local high school students and instructors, a noted Salt Lake architect and a local contractor to design and build temporary classrooms that house our current Nature Center educational operations.

In March, the Division of Wildlife Resources hired me, Justina Parsons-Bernstein, to head up educational operations at FBWMA. In the months since, our wonderful Volunteer Naturalists and I have led fieldtrips for over 3,000 students from Davis, Salt Lake, Utah, Weber, Box Elder and Morgan county schools and conducted outreach to another 3,000 students off-site. We are actively looking for folks who still love to play in puddles and can tell the difference between a cinnamon teal and great blue heron to bolster our naturalist ranks.

We have just moved our classrooms just south of Glover Ponds and surrounded them with a huge deck that doubles as an outdoor classroom. The new classroom site will eventually be the location of a state-of-the-art permanent structure encompassing the Great Salt Nature Center which is a partnership project of the Utah Wildlife and Conservation Foundation (UWACF) and the Division of Wildlife Resources. The UWACF will begin a capital campaign this fall to raise funds for the permanent structure. You can find the new classroom site by traveling all the way west on Glover Lane and turning south onto the newly paved road, just about a block before Glover dead ends at the ponds.

We are also launching a new website to keep everyone up to date on educational programs, events and other happenings at FBWMA. www.greatsaltlakenaturecenter.org will be up and running by the end of August.

So, whether you visit us on the web or at the site, we will be happy to have you stop by! You are welcome to bicycle on posted areas along our dikes from August 1- February 28 each year and you can even bring your dog along with you from September 15- February 28. Gates will be open 8 a.m. to 5 p.m. 🐾

By Justina Parsons-Bernstein, PhD
Director, Great Salt Lake Nature Center at Farmington Bay WMA
(With Lots of Helpful Information from Rich Hansen, Manager Farmington Bay WMA)



Rich by Charles Uibel

HOW TO REACH US

FRIENDS of Great Salt Lake
P.O. Box 2655
Salt Lake City, UT 84110-2655
801-583-5593
email: mail@fogsl.org
website: www.fogsl.org

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ldefreitas@earthlink.net

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OTHER CONTACTS

Matt Crawley: Newsletter Layout
matt@celadonstudios.com

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Lynn de Freitas ldefreitas@earthlink.net or call 801-583-5593.

MAKING A DIFFERENCE

Special Thanks

to the following for support of our programs

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Doyle Stephens Scholarship

Lynn and Bradley Carroll
Scott Dwire and Elaine York
Joy Emory
Joe Gardner and Nancy Bush
Karl Kappe
Cid Seidelman
Donna and Bill Vogel

Special Thanks

Walbridge Family Fund

Maya Avery, who recently celebrated her 5th birthday. Instead of presents, Maya collected donations for FRIENDS from her party guests.

Lake Fact:

What is the chemical composition of Great Salt Lake?

Answer: sodium 32.8%, potassium 2%, magnesium 3.3%, calcium 0.2%, chloride 54.5%, sulfate 7.2%

GREAT SALT LAKE PEOPLE

Congratulations to Xico Vega, one of our Mexican Linking Partners, and internationally recognized and respected as one of Mexico's leading bird conservationists. Xico has accepted the position of Assistant Director with WHSRN (Western Hemispheric Shorebird Reserve Network), where he will be working with Charles Duncan, Director of WHSRN executive office. Xico has a vision of international cooperation for bird conservation and we wish him the very best as we continue to develop partnerships among our three North American countries (Canada, US and Mexico).

Wedding bells were ringing for Pam Kramer, DWR Northern Region Habitat Biologist on May 26th. Congratulations, Pam.

Kudos to Dr. Dianne Nielson, the former Executive Director of the Department of Environmental Quality, on her appointment as State Energy Advisor by Governor Huntsman. We wish Dr. Nielson all the best and look forward to great things coming from this new assignment.

Rick Sprott, the former Director of the Division of Air Quality will succeed Dr. Nielson as the Executive Director of the Department of Environmental Quality. We're excited about working with Rick.

Congratulations to Dick Buehler, newly appointed State Forester and Division Director of Forestry, Fire and State Lands. The Division is responsible for the management of Utah sovereign lands, which include those of Great Salt Lake. We welcome this opportunity to work more closely with Dick on Great Salt Lake management issues.

Congratulations to Eric McCulley, the new manager of the Legacy Nature Preserve. Eric is already up to his elbows implementing the Adaptive Management Plan for the Preserve. We are delighted that he will be overseeing this newly established Legacy mitigation/conservation area.

Dr. Lucy Jordan, USFWS biologist is retiring after 16 years of dedicated service to our fish and wildlife in Utah. Although we know that she is looking forward to spending more time in her garden, we hope that she will continue to advocate for these precious natural resources. Giddyup!

And here's to the Father – and Mother – of All Peregrines, Bob Walters, Coordinator of the UDWR Watchable Wildlife Program. Big hugs to Bob for his eternal vigilance in making sure that our resident peregrines and their fledges, make it through their maiden flight in the glass and concrete canyons of downtown Salt Lake City. Fly high, Bob!