2010

Patterns of Change

Documenting Habitat, Bird and Human Use in Bear River Bay, Particularly the Great Salt Lake Minerals Proposed Expansion Area.

Photo: Nicole M. Anderson

Nicole M. Anderson

Coalition to Keep the Lake Great

October 23, 2010

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“A thing is right when it tends to protect the integrity, stability, and beauty of the biotic community. It’s wrong when it tends to do otherwise.”

~Aldo Leopold, A Sand County Almanac

Introduction

In 2009, Great Salt Lake Minerals (GSLM) proposed a massive expansion of its operations that would cover 8,000-acres of Bear River Bay to extract potassium sulfate from the waters of the Great Salt Lake (the lake.) GSLM concentrates the salts in evaporating ponds, separated from the main lake by dikes. GSLM overall proposal would increase its footprint by 91,000 acres—a 194% increase over current operations. If allowed, GSLM's evaporating ponds would cover about 13% of the lake's total surface area. This paper addresses certain aspects of GSLM proposed expansion of its operations in the Bear River Bay (the bay). If approved, the proposal will come with potentially devastating consequences for wildlife and people.

Data from Great Salt Lake Waterbird Surveys[1] helped Bear River Bay gain recognition as a Globally Important Bird Area (IBA)[2] and analysis by Ducks Unlimited shows it to be one of the most productive areas in the nation for sago pondweed, critical forage for migrating waterfowl.

Due to natural fluctuation of water levels, the bay has always changed dramatically. However, ongoing growth and industrial development continue to threaten and potentially upset what is both a dynamic and a fragile ecosystem. The proposed expansion of GSLM in Bear River Bay would have both direct and indirect impacts on the 8,000-acres of wetland habitat, as well as the larger Great Salt Lake system. Bear River Bay is the smallest and freshest arm of the lake, it contains the most diverse species of wildlife, and even a small change will vastly affect water-flow and alter this delicate environment.

[1] Based on Division of Wildlife Great Salt Lake waterbird surveys taken between 1997 and 2001 - www.wildlife.utah.gov/gsl/waterbirdsurvey.
[2] www.audubon.org/bird/iba/utah)

The Great Salt Lake

The Great Salt Lake, a remnant of ancient Lake Bonneville, is located in northwestern Utah and is fed by four rivers: the Bear, Weber, Ogden, and Jordan. With no outlet and losing water only to evaporation, it is the largest terminal saline lake in North America. The balance between evaporation and the seasonal recharge of water from the four rivers maintains an average lake depth of 13 feet (4 m.). But the lake level fluctuates widely, producing an ever-changing shoreline with "ephemeral pools, expansive mud flats, and sandbars that warm quickly in the spring and easily reach temperatures around 84° in the summer."[3] At the same time, "surrounding the lake's rocky shorelines, playas, salt marshes, and extensive mudflats, is over 162,000 hectares (400,000 acres) of freshwater wetlands – over 75% of Utah's total."[4]

Between three and eight million waterfowl, feed and nest at the lake and wetlands annually. This is approximately thirty percent of the Pacific Flyway population. Also, Great Salt Lake supports roughly 1.4 million shorebirds annually, including a single day count of Wilson's Phalaropes exceeding 500,000[5] which is why this area is one of seventeen sites of Hemispheric Importance in the Western Hemispheric Shorebird Reserve Network (WHSRN). These numbers also qualify the lake as a Globally Important Bird Area (GIBA).

The lake is divided into four main water regions: Gunnison, Gilbert, Farmington, and Bear River Bays. Gunnison Bay has the lake's highest salinity levels and is located in the north arm of the lake. Gilbert Bay, the south arm of the lake, has the second highest salinity levels. (These two bays were separated by the construction of the Southern Pacific Railroad causeway in

[3] Great Salt Lake: an Overview of Change. Edited by: J. Wallace Gwynn. Ph.D Chapter on Avian Ecology of Great Salt Lake pg. 343 – 374. By: Don S.Paul and Thomas W. Aldrich.
[4] Western Hemisphere Shorebird Reserve Network. http://www.whsrn.org/site-profile/great-salt-lake
[5] Western Hemisphere Shorebird Reserve Network website: www.whsrn.org

1959 which left little flow of water between the north and south arm of the lake, resulting in the Gunnison Bay's higher salinity levels.) Farmington Bay, in the southeastern part of the lake, is the second freshest area. Finally, Bear River Bay is the freshest of the four and supports a diverse variety of plant life. It lies south of the boundary line of the Bear River Migratory Bird Refuge and west of the Willard Spur. These two areas are sometimes separated during the year by a natural land-bridge that occurs when the water levels are particularly low, creating a pool in the Willard Spur. [Refer to map A1 found in the appendix for a better understanding of these four unique regions of the lake.[6]]

There are currently two main industries that use the natural resources of Great Salt Lake. First, brine shrimp harvest companies "skim cysts from the lake and sell them around the world for use as food in aquacultural production of fish and table shrimp."[7] Second, mineral extraction companies, such as GSLM, own and/or lease large portions of the Great Salt Lake's mudflats in order to "produce commodities like salt, deicing salts, sulfate of potash fertilizer, and magnesium metal."[8]

These industries together with construction of dikes and causeways on the lake have come with many consequences, both intentional and unintentional. Nevertheless, the changes incurred will last much longer than the generations that created these dividing landmarks. Due to these factors and both regional and local differences in soils, topography, climate, hydrology, water chemistry, and vegetation, Great Salt Lake is currently in a threatened state.

[6] Map compliments of United States Geological Survey. May be viewed at http://www.fogsl.org
[7] Western Hemisphere Shorebird Reserve Network, http://www.whsrn.org/site-profile/great-salt-lake
[8] Western Hemisphere Shorebird Reserve Network. http://www.whsrn.org/site-profile/great-salt-lake

Bear River Bay: A Nutrient Rich Region

With the highest volume of fresh water in all of Great Salt Lake, Bear River Bay's salinity level is similar to its major water source, the Bear River. This unique mixing of fresh and saline waters allows the bay to support lush vegetation such as sago pondweed, widgeon grass, bulrush, and salicornia. Dragonflies, damselflies, mosquitoes, brine flies, and midges also thrive here.

The bay serves as a key link in the Pacific Flyway between North and South America, providing a critical foraging habitat for many species of birds. Some of the largest gatherings of wildlife ever recorded on Great Salt Lake have been observed here. "The avian community at [nearby] Willard Spur is exceptionally complex, with its species richness, diversity, and overall abundance, this area continually provides one of the most magnificent displays of bird life on the lake. Although the smallest region on the Lake, it makes an exceptional contribution to the lake's avian population."[9]

Bear River Bay not only serves as an important resting area for aquatic birds on their seasonal migration but is an important recreational area used by hunters, members of several nearby duck clubs, and the Utah Airboat Association. Bear River Bay has been recognized by Ducks Unlimited as "the most important waterfowl hotspot in the Intermountain West"[10]. This area is home to numerous species of waterfowl that annually use the diversity of this wetland ecosystem for migration and breeding and has drawn hunters to its shores and wetlands since ancient times.

[9] Great Salt Lake: an Overview of Change. Edited by: J. Wallace Gwynn. Ph.D Chapter on Avian Ecology of Great Salt Lake pg. 343 – 374. By: Don S.Paul and Thomas W. Aldrich.
[10] Ducks Unlimited Website, http://www.ducks.org/Page3269.aspx

Since John C. Fremont's first description of it in the 1800s, the bay's diverse habitat has changed considerably. Water resources have been drained and diverted with the creation of dikes and causeways dramatically altering water-flow. *Phragmites australis*, an invasive sod-builder by nature, is rampantly taking over many of the wetland areas on the lake, making it difficult for migrating aquatic birds to find a safe haven for molting and breeding.

Bear River Bay is still a relatively healthy ecosystem however; it remains large enough to support a continental population of birds, and provides aquatic birds a valuable stopping place on their intercontinental migration. "The Great Salt Lake is of particular importance for Northern Pintails, Cinnamon Teal, Gadwall, Green-winged Teal, Tundra Swans, Redheads, Ruddy Ducks, Common Goldeneyes, Mallards, and Canada Geese (the Rocky Mountain Population)."[11] For other aquatic birds, such as American Avocet, Black-necked Stilt, and White-faced Ibis the bay is an ideal resting place because of its combination of shallow sheetwater and abundant vegetation.

Plant life of Bear River Bay

Plant life found in Bear River Bay is a tremendous dietary food source for aquatic birds in every season. Some of the most common perennials are sago pondweed (*Potamogeton peetinatus L*), widgeon grass (*Ruppia maritime*), bulrush, (*Scirpus spp*.) and Utah pickleweed (*Salicornia utahenis*). All are known to be within GSLM's proposed 8,000 acre expansion area.

Sago pondweed and widgeon grass appear to be very similar and to the untrained eye are very difficult to identify. Sago pondweed spreads through rhizomes in its root structure, is fully

[11] Ducks Unlimited Website, http://www.ducks.org/Page3269.aspx

submerged, and has no floating leaves. Like sago pondweed, widgeon grass can live in fresh or brackish water.

Several species of bulrush are also present around Great Salt Lake, and can be found in Bear River Bay. These plants generally grow from four to six feet in height although giant bulrush can grow even taller and has a noticeable triangular stem.

Pickleweed is another well-adapted plant found in the playas surrounding Great Salt Lake. Able to withstand high levels of salt, pickleweed requires a steady source of water throughout the growing season due to its small root system. Like many plants in this dynamic ecosystem, the "complex distribution pattern of pickleweed on the saline playa of Great Salt Lake changes from year to year, depending on the interaction between precipitation, water depth, and salt concentration." [12]

After an aquatic plant dies off in the colder season it still remains useful as its decomposition by bacteria and fungi creates a food detritus for many invertebrates, which will in turn become food for aquatic birds. These perennials undergo changes both seasonally and as lake levels fluctuate throughout the year, mostly due to seasonal irrigation for agricultural use upstream.

After the farming season ends for the year, water once again flows downstream through the Bear River Migratory Bird Refuge and into the bay, bringing life back to the dry lakebed. If GSLM proposed expansion plan is approved, much of the plant-life and surrounding wetlands found both in and outside of the proposed expansion area would be destroyed.

[12] http://people.westminstercollege.edu/faculty/tharrison/gslplaya99/pickleweed.htm

Bird Counts: A Brief Summary of Aquatic Bird Surveys

The combination of diverse vegetation growth in Bear River Bay and its surrounding wetlands creates a perfect habitat for thousands of birds year-round. "Even in the dead of winter we will still have a couple thousand birds," said Tom Aldrich, the Migratory Game Bird Coordinator of the Utah Division of Wildlife Resources. "They are mostly on the Bear River Duck Club and between there and Unit One of the refuge."

Tom Aldrich explained that the state of Utah has a responsibility to monitor birds at the Great Salt Lake. When monitoring tundra swans, for instance, Aldrich and his crew fly everywhere they are known to exist every week of the year. Surveys taken in fall 2007 along the Willard Spur and Bear River Bay below the boundary, also known as the D-line on Great Salt Lake indicate that in this area alone there were 3,782 tundra swans. This number increased exponentially in 2008 to a number of 19,970 and in 2009 the team counted a whopping 21,653 tundra swans migrating through this region of the lake. Although Aldrich isn't counting ducks, he commented that by his professional judgment there are times when there are tens of thousands of ducks, if not hundreds of thousands that are out in the Willard Spur and Bear River Bay.

Aldrich and his crew also complete a count of Canada Goose breeding, production and molting populations in Utah every year in June. These records date from June of 1997 to June 2010 and show the number of pairs, young, and molting birds in West Bear River Bay.
Below is a table showing count numbers from taken in June from the years 1997 to 2010:

West Bear River Bay: Canada Goose Breeding, Production and Molting Populations in Utah.

Year	Pairs	Young	Molters
1997	4	50	7,252
1998	3	17	11,893
1999	0	0	8,480

2000	1	5	10,324
2001	0	0	9,288
2002	1	3	7,611
2003	0	0	2,199
2004	3	18	120
2005	2	11	1,863
2006	13	65	2,372
2007	1	8	1,176
2008	0	0	1,298
2009	4	20	1,307
2010	0	0	760

Source: Tom Aldrich, Utah Division of Wildlife Resources.

Surveys of Bear River Bay have also produced bird count records for the area that would be affected if GSLM proposal to expand their evaporation ponds in Bear River Bay were approved. Since 1997, aerial flights have covered 13 different transects that are spaced one mile apart[13], alternating in both an east and west direction over the bay. The following table provides the totals for transects 7 through 11, the proposed GSLM expansion area. As the table shows, there is a large variety of species that had the highest bird counts throughout the years and oftentimes there are thousands of birds on the site. Also noteworthy are the large differences in survey counts within a year, as well as between years. [14]

The area surveyed consists of roughly one-half of the impact site for each transect. The total number of birds seen in the impact area would be roughly half of the numbers provided. However, it is important to keep in mind that each transect is spaced one mile apart and the observers in the plane count the birds only about 1/8 of a mile from each side of the plane. In

[13] Additional summary information for Bear River Bay for the years 1997 through 2001 may be found at www.wildlife.utah.gov/gsl/waterberdsurvey

[14] Surveys were not conducted in this area in 2002 and 2003. Also, survey data for 1997 and 1998 is not available by transects nor is it easily accessible for 2000 and 2004. The survey information that is summarized in the table uses transect data from survey periods for each year that was readily available and easy to calculate. This survey information was provided by the Utah Division of Wildlife Resources, after a Utah Government Records Access Management Act request was made.

other words, the total count may be roughly 1/4 of the total number of birds in the area. This means that the numbers in the table could be doubled for the birds that are in the impact site. Another consideration is that birds are not evenly distributed across the bay as well as throughout the transects.[15] Therefore, the numbers and species provided should not be viewed as an exact count of birds in the impact site. Given this explanation, the numbers below are likely higher in the impact site than the counts provided.

Great Salt Lake Waterbird Survey Data for Proposed Expansion Site for Great Salt Lake Mineral Ponds in Bear River Bay for various years from 1999 -2010

Year	Date -First Spring Count	Total	Date - Highest Count	Total	Date – Lowest Count	Total
Number of surveys for year	Species with Highest Count	Total	Species with Highest Count	Total	Species with highest Count	Total
1999	5-13-99	326	6-10-99	2,309	7-28-99	115
14 surveys	Eared Grebe	176	Canada Goose	2,148	California Gull	76
2001	4-11-01	1,360*	8-8-01	25,705	7-26-01	493
17 surveys	Unidentified Duck	692	Wilson's Phalarope	23,827	California Gull	352
2005	5-2-05	7,347	7-13-05	8,703	8-30-05	31

[15] The following explanation is from John Neill, Avian Biologist, Great Salt Lake Ecosystem Program, Division of Wildlife Resources: Wading birds (i.e., shorebirds) tend to be in shallow water, so when the lake level is high, they tend to congregate on the western shore of the bay where there is a natural shoreline with a shallow gradient. Shorebirds cannot use the eastern shore of Bear River Bay at this time because it is a rocky dike with a steep gradient (i.e., deep water right next to shore). When the lake is lower, sheet flow from Willard Spur creates good shorebird habitat along the eastern edge of Bear River Bay in the impact area. California and Franklin's gulls, diving ducks, and eared grebes will extend throughout the whole bay at high water, while dabblers tend to stay near the western shore.

5 surveys	California Gull	4,102	American White Pelican	1,790	American Avocet	25
2006	5-2-06	929	7-31-06	10,920	8-17-06	845
5 surveys	California Gull	343	Phalaropes	5,840	Phalaropes	710
2007	4-16-07	15,169	4-16-07	15,169	7-27-07	0
5 surveys	Green-winged Teal	2.940	Green-winged Teal	2.940	-----	------
2008	4-18-08	3,746	4-18-08	3,746	8-20-08	0
5 surveys	Unidentified Duck	1,965	Unidentified Duck	1,965	------	------
2009	4-13-09	6,775	7-20-09	14,507	4-28-09	3,759
5 surveys	Unidentified Duck	3,028	White-faced Ibis	4,603	Unidentified Duck	1,305
2010	5-3-10	2,624				
1 survey available	Gadwall	921				

*Half of the transect data is missing for 4-11-2001

Source of data: Waterbird Surveys for Bear River Bay from John Neill, Avian Biologist, Great Salt Lake Ecosystem Program, and Utah Division of Wildlife Resources. The Summary of this data has been provided by Wayne Martinson.

Great Salt Lake Minerals: Proposed Expansion in Bear River Bay

GSLM proposed 8,000 acre expansion in Bear River Bay would be southwest of the Bear River Migratory Bird Refuge. GSLM current 22,000-acre Bear River Bay operation is on the east shore of the bay. The area where the proposed expansion is located has limited access and is not well known to the public. However, its ecological importance to the lake and its abundant bird use would be greatly impacted by this expansion. If approved, a total of "approximately

540,000 cubic yards of fill [dirt and gravel] would be discharged into Bear River Bay to create the dikes"[16] for these new evaporation ponds. This type of change would result in irreversible loss of habitat in the area.

For a visual overview of the site, see the maps [17] in the appendix. The first map (A2) shows GSLM expansion plans for the entire lake. The second map (A3) gives a close-up view of the proposed 8,000 acre expansion of their eastern pond in Bear River Bay.

Observations of Bear River Bay

During two recent visits to Bear River Bay, I was captivated by its natural beauty and the diversity of species that find refuge here. On the morning of April 21, 2010, I arrived at the Willard Spur boat ramp. The air was cold and damp with the occasional raincloud in the sky as I boarded one of two waiting airboats and bundled up for the ride out to see Bear River Bay and the proposed expansion site. We cruised down the Willard Spur past many different species of aquatic birds on the way to Bear River Bay. Some people say that the bay and its surrounding wetlands are barren and that nothing is there, but my experience proved this to be far from true. Even in the cooler temperatures of that early spring morning, the bay was calm and ready to provide a resting place, full of vegetation as well as aquatic birds that use this location as a stopover during their migration.

This area often dries up seasonally as water upstream is diverted for irrigation or other uses. Even during dry times, the wetlands of the bay hold within them roots and other organisms that are an important food source in this ecosystem. When the farming season is over and water

[16] US Army Corps of Engineers, Public notice Number: SPK-2007-00121. Date: June 17, 2009.
[17] These may also be viewed at the U.S. Army Corps of Engineers website (http://www.spk.usace.army.mil/regulatory.html) Please reference public notice number: SPK-2007-00121. Dated June 17, 2009.

once again flows into the bay it almost magically comes back to life, displaying its beauty and diversity of species.

On my next trip, just two short months later on June 23, 2010, Bear River Bay appeared very different. The landscape was now lush and full of green vegetation, and we observed several more species of waterfowl and other aquatic birds. R. Jefre Hicks, President of the Utah Airboat Association, took Wayne Martinson, Utah Important Bird Areas Coordinator for the National Audubon Society, Conor Provenzano, film-maker, (who has created a video complementing this paper, which may be viewed at www.keepthelakegreat.com) and me out to Bear River Bay to see how seasonal changes affect this area and contribute to its unique quality.

We boarded the boat and again navigated out to the bay by way of the Willard Spur. Just north of the Harold Crane Waterfowl Management Area, at approximately N 41 20.993 W -112 16.323 we stopped at a white-faced ibis colony and witnessed hundreds of birds nesting there, and a little further on observed an abundance of sago pondweed (*Potamogeton peetinatus L.*)

Hicks explained that Bear River Bay is a shallow and somewhat saline body of water, making it an ideal place for tundra swans to rest and feed on sago and bulrush tubers. "They can get the roots," said Hicks. "That is probably why there are so many swans here in the fall. Even in the winter, January and February, the swans are still out here. Wherever there is still an open patch of water; they dig it up and eat it."[18] Other birds may not utilize the sago in the spring and summer as a food source, but they take advantage of this tuber crop in the fall.

Continuing on, we stopped at the northernmost point of the GSLM dike, with a GPS location of approximately N 41.3550, W -112.2797. While there we saw several northern

[18] Quote from personal interview with R. Jefre Hicks, President of the Utah Airboat Association. June 23, 2010.

pintails flying overhead. We then traveled fairly extensively throughout the proposed impact site, which was covered with water approximately six inches to one foot in depth. Everywhere we went there was some form of plant-life present, primarily sago pondweed. Also, throughout the proposed expansion impact site, there were abundant large patches of bulrush, as well as pickleweed.

During one stop, at approximately N 41 20.988 W -112 15.952 within the proposed expansion impact site; there were large patches of bulrush and pickleweed. We counted birds at this location for roughly 20 minutes, and saw 267 birds of eight different species. Most were on the ground, with 71 of the total number flying overhead. The sheer number of birds we viewed in this area was impressive and only solidifies the importance of the area. Although it may change throughout the seasons it always contains life and is a local treasure to many.

Individual Historic Observations of Bear River Bay

Those people interviewed for this paper agreed that every season of the year is different in Bear River Bay. A bird count at one time will find very little, if anything, yet during another time of year, or the next year, the same area will be completely loaded with vegetation and birds.

In trying to imagine what would happen if tomorrow an 8,000 acre area of the Bear River Bay was gone, former Utah State Senator Haven J. Barlow [19] suggested it would mean the loss of over 100,000 aquatic birds in one day. When habitats are radically changed, the alteration forces one or more species to move, affecting the entire food chain, and in turn, the entire Great Salt Lake ecosystem.

[19] Personal interview with Haven J. Barlow. July 9, 2010 in Davis County, Utah.

Wayne M. Winegar,[20] former Davis County Commissioner, recounted many challenges that the Great Salt Lake has faced over the past several decades. He was a key player in the construction of the Antelope Island Causeway and has been involved with the politics of water since before Utah's Water Conservancy Act became law in 1943. Winegar remembers Bear River Bay before the dikes of Willard Reservoir and the construction of GSLM original facilities. Both Barlow and Winegar remember, as do Wally Thompson and Jerry Kersey[21] (members of the Utah Airboat Association), when it was possible to hunt all the way from Highway 89 west towards Promontory Point. In their lifetimes, they noted that the entire landscape of Utah has changed along with Bear River Bay and surrounding regions of the lake. Habitat changes around the lake often result in changed migration patterns for aquatic birds.

Wally Thompson remembers several fall seasons when "there were ducks by the hundreds if not thousands" in the sky. While Bear River Bay is still a phenomenal area to hunt, he estimates that the waterfowl numbers have fluctuated over the years with changing lake elevation levels.

"Wally and I have hunted this area for years, long before the floods of 1982 and 1983 covered the entire bay with brine," Jerry Kersey said. "The floods took out everything; the duck clubs lost their houses and everything they had out in the bay. Where we hunt now was probably about six feet deep during the flood years. This year, the water isn't even a foot deep; on average you might get some areas that are two to three feet deep, the majority is about a foot deep or less than a foot."

[20] Personal interview with Wayne M. Winegar. July 9, 2010 in Davis County, Utah.
[21] Personal interview with Wally Thompson and Jerry Kersey. July 9, 2010 in Davis County, Utah.

”In the eighties when the lake came up, the duck hunting numbers dropped off dramatically,” said Hicks. ”That means that the Department of Wildlife Resources didn’t have money coming in from licenses. Without birds, hunters are not buying gas, groceries, ammunition, guns, waders, and the camouflage clothes we wear.”

Hunters and airboaters agree that the shallow sheetwater found in the bay is important for aquatic birds. The flood years demonstrated challenges that both aquatic birds and hunters faced during years of higher and faster water. Ducks and geese had to change their migratory patterns in order to find a food source. The common concern among hunters, birdwatchers, and citizens is that another dike or another change in the lake’s ecosystem could permanently destroy all forms of life in this area. If GSLM builds another dike out from the northernmost corner of the current dike, all of the sheet-flow that comes from the Willard Spur, which naturally creates a safe and shallow marsh, will instead be funneled and develop a deeper and faster current that would be unsustainable for aquatic birds currently using this area.

“That’s not good for anything,”[22] said Hicks. “There’s a big sandbar that comes out from the Bear River Bird Refuge just north of here and that will act as another barrier and keep squeezing the water down to a very small channel, backing the water up to the east. I’m worried about it. That’s where I hunt.”

Dikes and other causeways on the lake as well as some seasonal land-bridges have already created dramatic changes in Bear River Bay over the past several decades. Another dike in the system could possibly devastate this unique region of the lake. The collective analysis of

[22] Personal interview of R. Jefre Hicks. President of the Utah Airboat Association. June 23, 2010. Davis County, Utah.

these interviewees is that any change, regardless of how small, will be felt throughout the lake's entire ecosystem and surrounding wetlands.

Closing Remarks

The Great Salt Lake ecosystem, with its stark beauty and unrefined desert landscape, is composed of numerous and varied wetland, upland, freshwater, and saline water complexes that are home to millions of aquatic birds. Bear River Bay, including Bear River Migratory Bird Refuge and the proposed expansion site, is a vital component of a greater system. This area, recognized as both an international and local treasure, receives the largest volume of freshwater inflow coming into the lake from the Bear River. The lower salinity levels here support a diverse community of plant life. There are significant islands of emergent wetlands, especially in the Willard Spur just east of the Bear River Bay. The area where the proposed expansion is located has immense ecological importance to the lake and the birds that rely on it. It would be irreversibly impacted by this expansion. Life here is abundantly rich and diverse, ranging from microorganisms and insects, to vegetation and birds. Together, these various species create a complete food chain that has been able to sustain the cycle of life for thousands of years.

Approximately 30% of the Pacific Flyway population feed and nest at Great Salt Lake annually. With millions counting on the quality and quantity of water here in this uniquely precious region, it is imperative for the public to understand why its continued protection is so important.

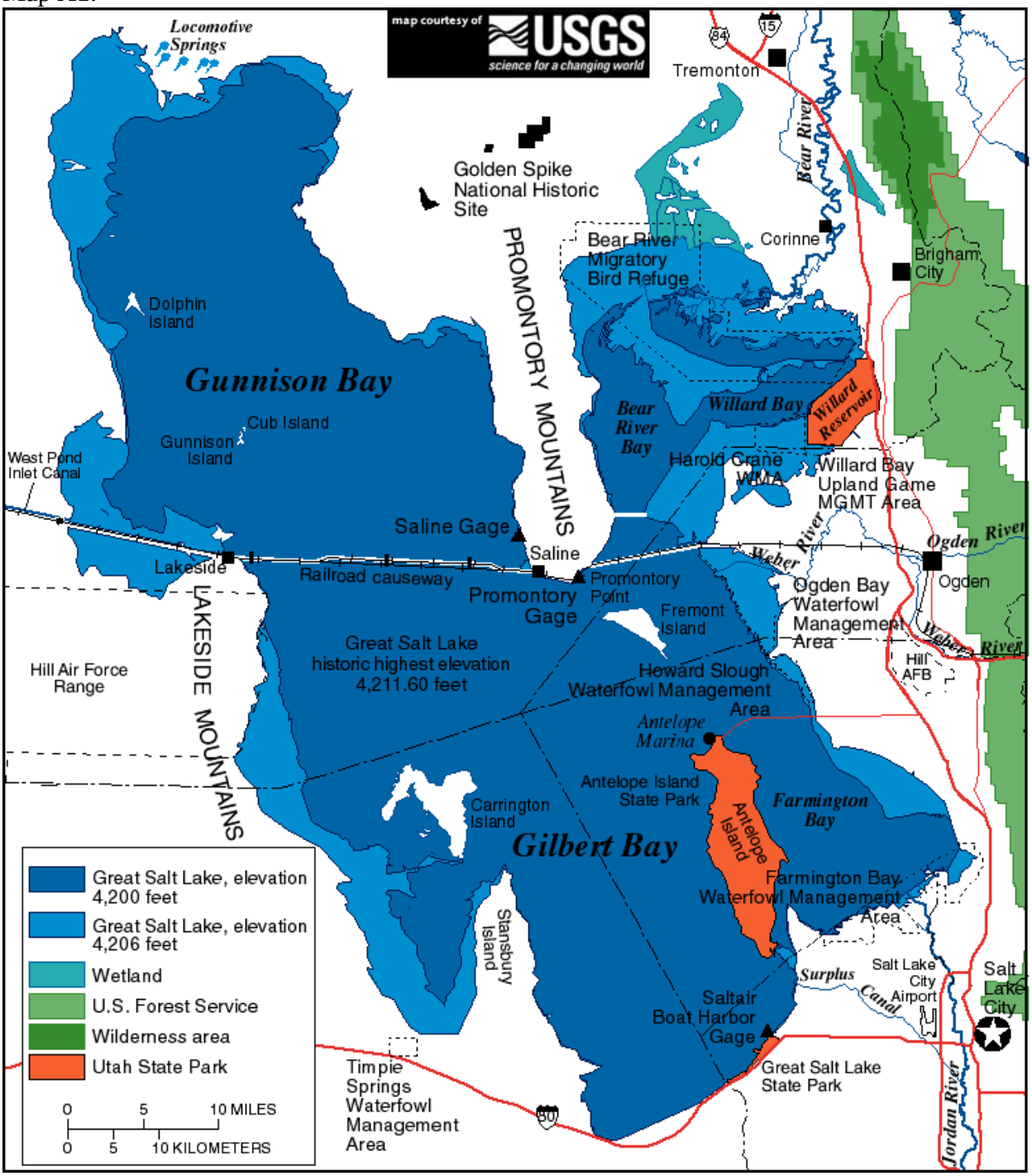
The proposed expansion of Great Salt Lake Minerals in Bear River Bay would have direct impacts on 8,000 acres of vital wetland habitat, as well as indirect effects on the larger

Bear River Bay area, such as changes in water depth, rate of flow, and salinity levels. All of these changes will negatively affect vegetation growth and bird use within this area.

Altogether these impacts would result in major losses in habitat for both birds and humans that use the area. “There is no place left on the lake like this,” said Hicks. “How can you replace something that is irreplaceable? How do you mitigate that?”

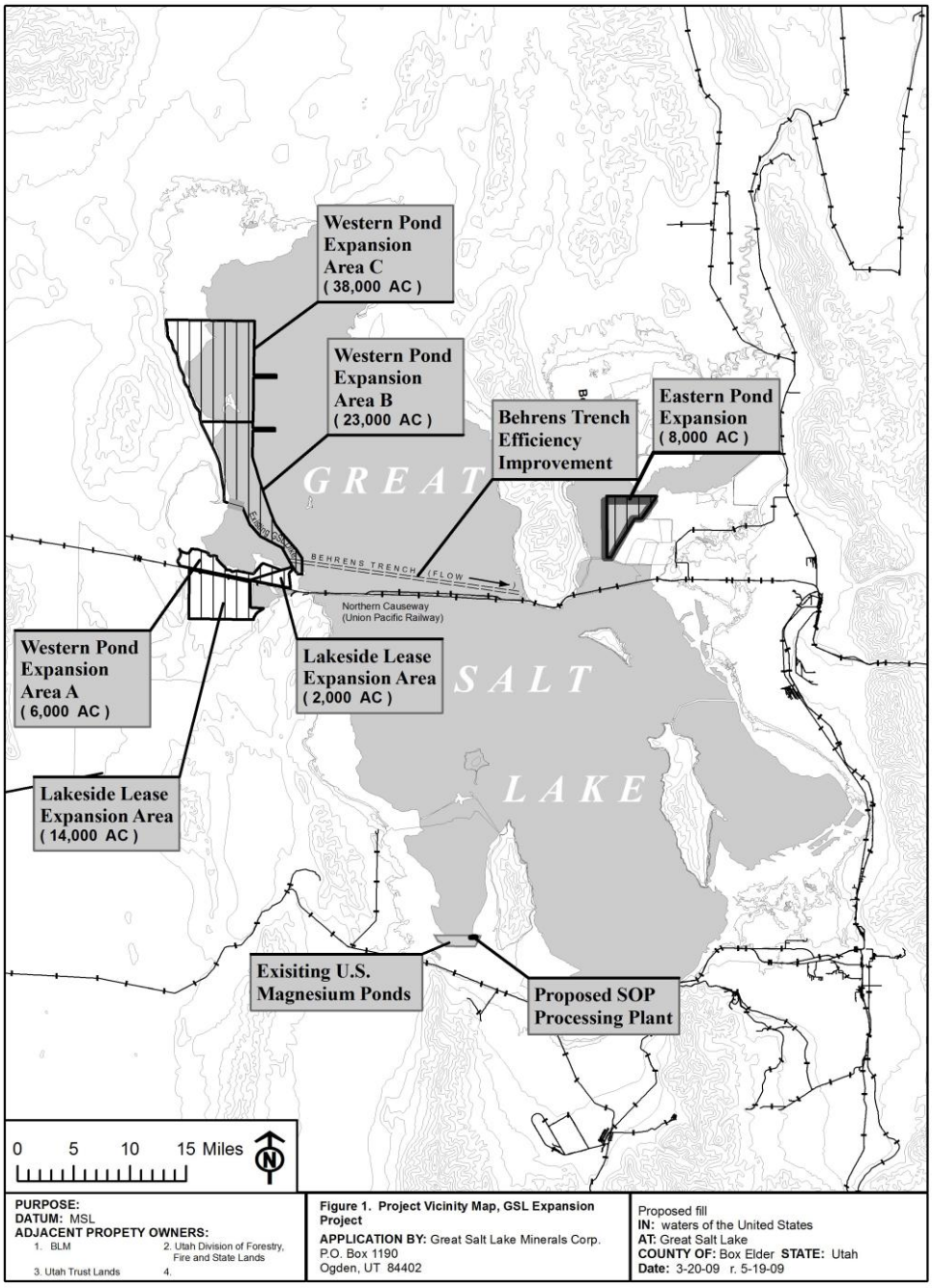
Appendix

Map A1:

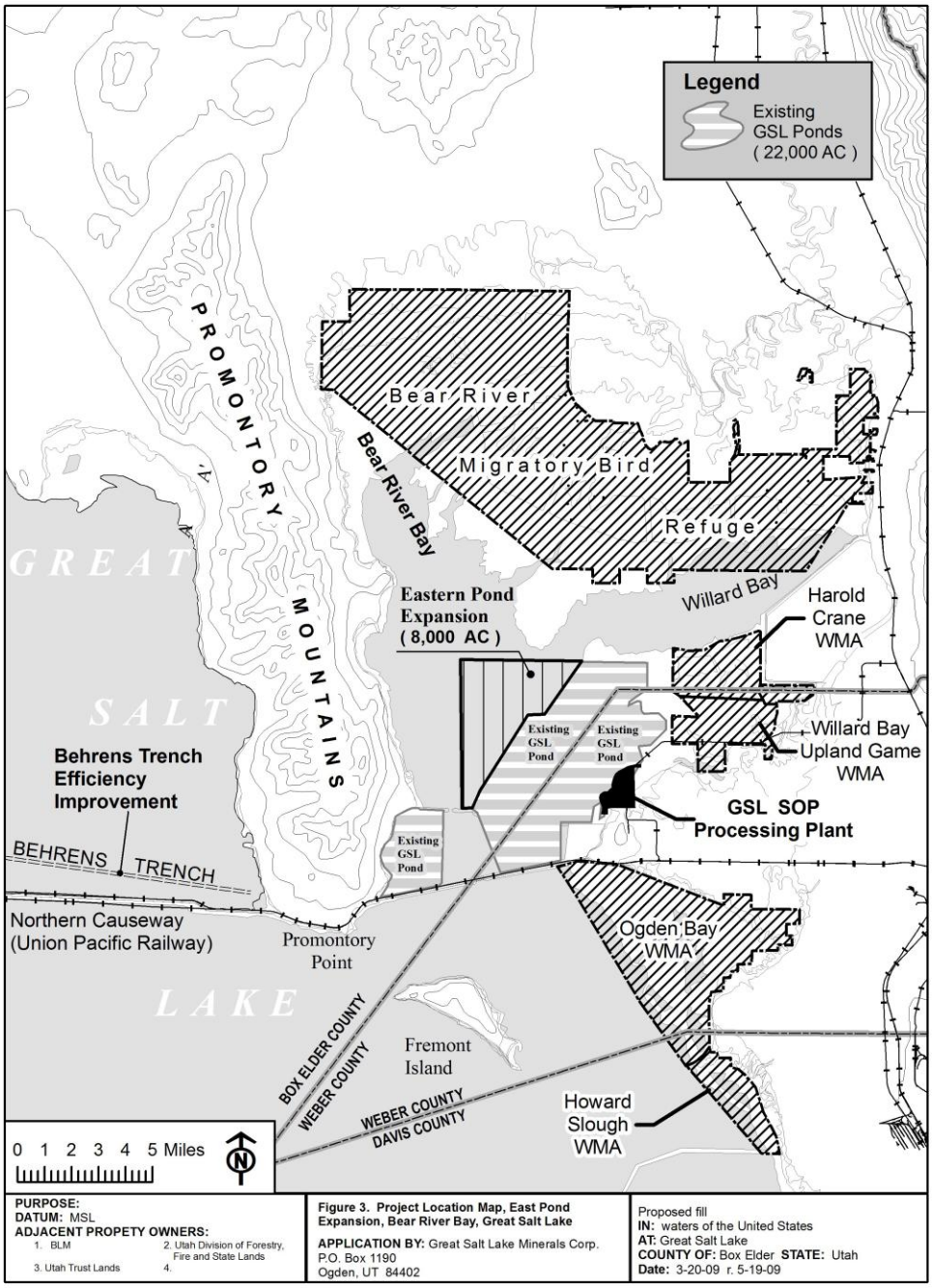


Source: USGS: http://www.fogsl.org/component/content/article/75

Map A2:


Western Pond Expansion Area C (38,000 AC)
Western Pond Expansion Area B (23,000 AC)
Behrens Trench Efficiency Improvement
Eastern Pond Expansion (8,000 AC)
GREAT
BEHRENS TRENCH (FLOW
Northern Causeway (Union Pacific Railway)
Western Pond Expansion Area A (6,000 AC)
Lakeside Lease Expansion Area (2,000 AC)
SALT
LAKE
Lakeside Lease Expansion Area (14,000 AC)
Exisiting U.S. Magnesium Ponds
Proposed SOP Processing Plant
0 5 10 15 Miles
N
PURPOSE:
DATUM: MSL
ADJACENT PROPETY OWNERS:
1. BLM
2. Utah Division of Forestry, Fire and State Lands
3. Utah Trust Lands
4.
Figure 1. Project Vicinity Map, GSL Expansion Project
APPLICATION BY: Great Salt Lake Minerals Corp.
P.O. Box 1190
Ogden, UT 84402
Proposed fill
IN: waters of the United States
AT: Great Salt Lake
COUNTY OF: Box Elder STATE: Utah
Date: 3-20-09 r. 5-19-09

Map A3:


Legend
Existing GSL Ponds (22,000 AC)
PROMONTORY MOUNTAINS
Bear River
Migratory Bird
Refuge
Bear River Bay
GREAT SALT LAKE
Eastern Pond Expansion (8,000 AC)
Willard Bay
Harold Crane WMA
Willard Bay Upland Game WMA
Existing GSL Pond
Existing GSL Pond
Existing GSL Pond
GSL SOP Processing Plant
Behrens Trench Efficiency Improvement
BEHRENS TRENCH
Northern Causeway (Union Pacific Railway)
Promontory Point
Ogden Bay WMA
Fremont Island
BOX ELDER COUNTY
WEBER COUNTY
WEBER COUNTY
DAVIS COUNTY
Howard Slough WMA
0 1 2 3 4 5 Miles
N
PURPOSE:
DATUM: MSL
ADJACENT PROPETY OWNERS:
1. BLM
2. Utah Division of Forestry, Fire and State Lands
3. Utah Trust Lands
4.
Figure 3. Project Location Map, East Pond Expansion, Bear River Bay, Great Salt Lake
APPLICATION BY: Great Salt Lake Minerals Corp.
P.O. Box 1190
Ogden, UT 84402
Proposed fill
IN: waters of the United States
AT: Great Salt Lake
COUNTY OF: Box Elder STATE: Utah
Date: 3-20-09 r. 5-19-09

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Works Cited

Aldrich, Thomas W and Don S Paul. "Avian Ecology of the Great Salt Lake." Department of Natural Resources, Utah.

Great Salt Lake: An Overview of Change. Salt Lake City: Department of Natural Resources Special Publication Utah Geological Survey, 2002. 343 - 374.

Aldrich, Tom. Migratory Game Bird Coordinator Nicole M. Anderson. 15 July 2010.

Barlow, Haven J. Former Utah State Senator Nicole M. Anderson. 9 July 2010.

Ducks Unlimited. 20 July 2010 <http://www.ducks.org/Page3269.aspx>.

Evans, Keith and Wayne Martinson. Utah's Featured Birds and Viewing Sties: A conservation platform for IBA's and BHCA's. Salt Lake City, Utah: Sun Litho, 2008.

Hicks, R. Jefre. President, Utah Airboat Association Nicole M. Anderson. 23 June 2010.

Kersey, Jerry. Member, Utah Airboat Association Nicole M. Anderson. 9 July 2010.

Thompson, Wally. Member, Utah Airboat Association Nicole M. Anderson. 9 July 2010.

US Army Corps of Engineers Sacramento District. http://www.spk.usace.army.mil/organizations/cespk-co/regulatory/index.html. 17 June 2009. 27 July 2010 <http://www.spk.usace.army.mil/organizations/cespk-co/regulatory/index.html>.

USGS Utah Water Science Center. 2010. 20 June 2010 <http://ut.water.usgs.gov/greatsaltlake/index.html>.

WHSRN. Western Hemisphere Shorebird Reserve Network. 2009. 13 July 2010 <http://www.whsrn.org/site-profile/great-salt-lake>.

Winegar, Wayne. Former Davis County Commissioner Nicole M. Anderson. 9 July 2010.