

**APPLICATION NUMBER 12-
Farmington Bay Waterfowl Management Area
Project Title: Farmington Bay Waterfowl Management Area Artificial Islands
Proposal
(FBWMA's Third Priority Project)**

UTAH DIVISION OF WATER QUALITY
195 North 1950 West
PO Box 144870
Salt Lake City, Utah 84114-4870

Red Butte Creek Project Proposal Form

NOTE: Proposal must be no longer than 6 pages. Supplemental documents such as letters of support, information to demonstrate previous project implementation and other relative supportive documents may be submitted in addition to this form.

Applicant Name: Rich Hansen

Co-Applicant Name(s) (if applicable):

Project Title: Farmington Bay Waterfowl Management Area Artificial Islands

Agency or Business Name (if applicable): Utah Division of Wildlife Resources

Mailing Address: 1342 S. 1325 W. City: Farmington State: UT Zip: 84025

Phone: (801) 391-1454 E-mail: richhansen@utah.gov

Individual Non-Profit Govt. Agency Academic Commercial Other

1. Estimated Project Costs:

Labor	\$ <u>95,000</u>
Materials	\$ <u>150,000</u>
Equipment	\$ <u>5,000</u>
Administration	\$ <u>40,000</u>
Miscellaneous	\$ <u>155,000</u>
TOTAL	\$ <u>445,000</u>

Other sources of project funding:

Source	Amount	Source	Amount
--------	--------	--------	--------

Total project cost including other sources of funding: \$445,000

(please include bids for labor, equipment, rentals, etc.)

2. Describe the purpose and need of the project:

The purpose of this project proposal is to install artificial, floating islands in the Unit 1 pond of Farmington Bay Waterfowl Management Area (FBWMA). The floating islands (www.floatingislandinternational.com) will provide critical nesting habitat for redhead ducks and other waterbird species during the breeding season, as well as loafing areas during spring and fall migrations. In addition, the artificial islands are a natural water purification system that will reduce high nutrients loads in FBWMA. Floating islands provide many of the same ecological benefits as natural wetlands such as: improving water quality; producing large biomass of insects which are food for birds and fish; and providing habitat for birds, frogs and other species. By providing food and cover for fish and frogs, fish-eating birds will also benefit from the floating islands.

FBWMA is comprised of approximately 12,000 acres (with an indefinite west boundary into the Great Salt Lake) and is located at the base of the Jordan River delta

along the southeast bay of the Great Salt Lake in Davis and Salt Lake Counties. For management purposes, it is divided into four units; Unit 1, Unit 2, Turpin Unit, and the Crystal Unit. Private lands surround the majority of the WMA, with the Great Salt Lake bordering on the west.

Unit 1 at FBWMA, is a 2,100 acre unit. Of the 2,100 acres, about 1,500 acres is open water. This unit historically produced valuable sago pondweed, which migrating waterfowl depend upon. However, the excessive nutrients found within Unit 1 lead to the growth of extensive algal mats which precludes the growth of SAV (submerged aquatic vegetation; sage pondweed). With the installation of the islands, there would be valuable food in the seeds that will be produced from the emergent vegetation on the islands which will provide food for nesting waterfowl. Of the 1,500 acres of open water, about 400 acres is in the waterfowl rest area. There is no trespassing and no disturbances are allowed in the waterfowl rest area. As a result of no disturbance, there can be 30,000 to 80,000 ducks in the rest area during the hunting season until the pond freezes up and the ducks disperse to other suitable habitats. There is great species diversity amongst the ducks found in the rest area including: mallards, northern pintails, American green-winged teal, northern shoveler, American wigeon, gadwall, cinnamon teal, redhead, canvasback, Ruddy ducks, lesser and greater scaup, common goldeneye, ring-necked ducks, buffleheads and mergansers. The number of redheads found in this area can frequently exceed 4000 birds.

Historically, the eastern shores of the Great Salt Lake have been a very important nesting area for redhead ducks because of the quality nesting habitat found here. The emergent marshes are ideal habitat for redheads because the majority of the time they nest over water. According to Frank Bellrose (Ducks, Geese and Swans of North America, 1976), "The greatest concentration of Redheads in North America occurs in the marshes adjacent to the east and north sides of Great Salt Lake. The bulk of Utah's 130,000 redheads breed there, a density of 355 birds per square mile of wetlands". Today the eastern shores of the Great Salt Lake are still very important nesting areas for redheads, however with the intrusion of Phragmites, a non-native, aggressive reed, there is not as much suitable nesting habitat remaining and the number of nesting redheads has decreased considerably. Ideal nesting habitat for redheads is hard stem bulrush and cattail that is located in the middle of a pond. The redheads feel a sense of security when they are nesting over the water and these islands will provide that ideal situation. The vegetation on the floating islands will be able to be manipulated and controlled until the ideal habitat for the redheads is created. The habitat characteristics and nesting birds will be monitored to identify the ideal combination of vegetation type and cover needed to encourage nesting redhead ducks.

The Jordan River is the main water source for FBWMA and it has been documented to have poor water quality. There have been numerous water quality studies conducted at FBWMA and all of them have identified several water quality issues (Miller and Hoven 2007; Hoven 2009; Hoven and Miller 2009; Hoven 20010a, b; Hoven et al. 2011; Johnson et al. 2011; Miller et al. 2011). One of the main water quality issues is excessive nutrients (specifically nitrogen and phosphorus), which may explain large algal blooms that occur every year as well as other issues such as toxic metals that have accumulated in the sediment and toxic sediment sulfides. The algal blooms are so extensive that they cover the water surface with a dense mat of algae, which is not a food

source for waterfowl. Heavy metals and / or sulfide toxicity are believed to play a role in premature die-off of sago pondweed (Hoven et al 2011) an important food source for waterfowl. Lack of sustained growth of sago pondweed, or submerged aquatic vegetation (SAV), in the open water area of Unit 1 leads to reduced water clarity and purity that vegetation from floating islands can provide.

Floating islands and their associated microbial bio-films offer a natural, cost-effective means for converting deleterious nutrients into beneficial biomass, by shifting them from the water into the food web. Nitrogen and phosphorus can be progressively transitioned into the food chain, from bacteria and algae, to zooplankton, to insects, to fish and birds. As nutrients are assimilated, the majority of them remain sequestered from the waterway. The creation of artificial floating islands at FBWMA is anticipated to provide multiple benefits to waterbirds (waterfowl, shorebirds, wading birds) including providing secure nesting habitat, providing secure roosting habitat and providing additional food sources. Another benefit from island creation is the anticipated water quality improvements which will remove the excess nutrients and allow the growth of important SAV food for waterfowl.

The two Chevron Oil Spill events in 2010 discharged oil into Red Butte Creek, the Jordan River and Liberty Park Pond, and impacted both wild and domestic waterfowl. Some birds had direct mortality, some had to be euthanized due to their injuries, while others became coated with oil and were hand-washed. It is UDWR's understanding that 391 birds were recovered and 65 waterfowl died as a result of the spill. The majority of these birds were wild Canada geese and mallards. In addition, waterfowl nesting and feeding habitats in these waterways were also negatively affected by the oil spill. This project will greatly enhance waterfowl habitats on FBWMA and will provide some measure of compensatory mitigation for both the Chevron Oil Spill impacts.

3. Estimated time frame of the project with significant milestones (Note: Project must be completed with final reports filed by November 10, 2014):

The Utah Division of Wildlife Resources will work with Mr. Laddie Flock of Floating Islands West, to plan, design and engineer floating islands of appropriate size for Unit 1. This phase will be completed by December 1, 2012. The construction will begin in May of 2013 and is anticipated to be completed by September 1, 2013.

4. Describe the location of the project with attached location map, including details on the total area that will be directly enhanced by the project:

This project would be located in Township 2N Range 1W and occur in Sections 23 and 24. The project will take place in the rest area of Unit 1 at FBWMA. Please see the attached map. This is a 400 acre area that provides a loafing and feeding area for waterfowl that is off-limits to human trespass year round, but this off-limit area is especially important during hunting season.

The total area that will be enhanced by the project will around 86 acres. As far as water quality enhancement, the islands can treat 375 square feet of water per square foot of island and for \$400,000, we should be able to get 10,000 square feet of island.

5. Describe how the project will specifically enhance and protect waterways affected by the Red Butte releases and improve the conditions of one or more of the following: wildlife, habitat, natural vegetation, water quality or emergency response:

Beneficial uses of the Jordan River, which include warm water fish, water birds, and aquatic organisms in their food chains, are protected by a variety of water quality standards, but every segment of the Jordan River has been found to be impaired for one or more beneficial uses due to exceeding one or more water quality standards. Segments of the lower Jordan River are currently impaired due to low levels of dissolved oxygen, organic enrichment, total dissolved solids, high water temperatures, and *E. coli*. The Jordan River receives pollutants from many sources, including Utah Lake, wastewater treatment facilities, tributaries, stormwater, and diffuse runoff. While the quality of Jordan River water is not ideal for supporting the uses by fish and wildlife, it nevertheless serves as the life-blood of a series of ponds and wetlands at the lower end of the Jordan River and Farmington Bay. Management of the Jordan River is crucial to protecting the existing beneficial uses and potentially improving the condition of this waterway and wetland habitat that is supported by it.

The project will specifically enhance the water in Unit 1 of FBWMA. Constructed of post-consumer polymer fibers and vegetated with native plants, Floating Treatment Wetlands mimic the ability of natural wetlands to clean water by bringing a “concentrated wetland effect” to any water body. Oil and other organic materials can be removed from water through the same natural processes. Reduction of nutrients, metals and organics and filtration of sediment particulates from the water column by the vegetation on the floating islands will enhance water quality conditions.

Native vegetation that is preferred as nesting habitat for redheads will be planted on the islands which will also provide a great natural vegetation habitat for many species of birds. Some of the preferred nesting habitat species include hard stem bulrush, Olney’s three square, alkali bulrush, native cattail, and salt grass. Following island installation, UDWR will monitor the islands to document bird usage. UDWR also anticipates working with water quality researchers to document any water quality improvements associated with island creation. Hopefully, there would be an increased number of nesting and migratory redheads at FBWMA due to these islands.

The other advantage to these islands would be during the fall, when there are 30,000-80,000 ducks in this area. The islands would provide a much needed loafing and rest area in the middle of the pond.

6. Describe project’s connectivity to other natural areas or projects that further enhance wildlife, habitat, natural vegetation, water quality or emergency response:

The GSL is of hemispheric importance to migratory waterbirds (waterfowl, shorebirds and wading birds), and many species use the GSL as nesting, feeding and staging areas. At times, millions of birds may be found on the GSL and the surrounding wetland/upland habitat complexes. Since the GSL is a dynamic system with the lake elevation changing seasonally and annually, the abundance and location of salt, brackish and freshwater habitats continually change over time. These changes create a continual diversity and continuity of available habitats, such that wildlife, especially waterfowl and shorebirds, will move around the GSL to find those habitats that supply their needs. It is because of these habitats that the GSL has become so critically important to wildlife, with the Lake sometimes supporting over 50% of the worldwide populations of some avian species.

Since the floating islands will assimilate much of the excess nutrients during the growing season, it is likely that the water quality will improve enough to prevent or

reduce algae blooms adjacent to the islands. By preventing an algae bloom, the SAV production should be excellent in these areas. With good sago pondweed production, there will be more food available and more waterfowl should be attracted to the area. Also, the project area is immediately adjacent to the Great Salt Lake (GSL) and thus should enhance water flowing into the GSL.

7. Describe any additional social benefits of implementing this project:

Some social benefits of implementing this project will be from birdwatchers and photographers, but hunters will also benefit from the increased numbers of redheads and other ducks using the rest area and adjacent hunting units. The islands will attract migrating birds and provide a quality loafing area. As the fall progresses and the ducks and water birds migrate out of the area, bald eagles are anticipated to also utilize the islands as loafing areas.

The success of the islands will be evaluated both for bird usage and water quality, and if it is determined that they are successful, the project could be expanded in the future and more islands added to FBWMA.

8. Project plans and details, including rights to work on specified piece of land:

The FBWMA is owned and managed by the Utah Division of Wildlife Resources (UDWR). An RFP will be released requesting bids for this project.

The project would be designed by consulting with an engineer from Floating Islands West. The idea is to design several small islands that will provide wildlife habitat and enhance water quality at FBWMA. The islands have an indefinite lifespan and the engineered islands will be designed to handle environmental factors such as: wave action; ice build-up; water drawdown; wave action; and flooding events.

Based on initial review of optimal redhead duck habitat, 10,000 square feet of BioHaven floating islands will be proposed to be placed in an archipelago configuration within the rest area portion of Unit 1 of FBWMA. Several different naturalized island shapes, with island square footage ranging from 64 to 250 square feet of top surface, would be tethered and anchored together. The islands will be designed to maximize edge effect, with island perimeters tapering into the water. The islands will be eight inches thick, with an average freeboard of four inches. This is a standard BioHaven design which has proven extremely durable and winter hardy. Minimal island maintenance is required. When fully vegetated with desirable native wetland and terrestrial plants, which normally takes a single growing season, abundant suspended nesting sites, preferred by redheads, will be available. The projected costs for the island component of this project are \$400,000. UDWR also anticipates working with water quality researchers to document water quality improvements and food production associated with island creation. Specifically, Dr. Hoven of The Institute for Watershed Sciences will monitor baseline conditions (2012) and the success of the vegetated islands during 2013 and 2014. Unit 1 will be coordinated with an existing water quality sampling schedule and protocol conducted by the Jordan River / Farmington Bay Water Quality Council to capture source water and in situ water quality. Light transmittance through the water column, species composition, cover, and food production of a subsample of the islands will also be monitored. Projected costs of the monitoring component of the project is \$45,000.

9. Describe your experience in implementing projects of similar scope and magnitude:

This project would be different from any other projects that have been implemented at FBWMA, however we have created dirt islands within our wetlands. We have a great understanding of wetlands and their functions, and can implement this project without a problem. With over 4500 floating islands in place around the world, demonstrating significant nutrient removal when required, floating islands are one of the best solutions available.”

Floating Islands West (FIW) has built two of the largest BioHaven habitat islands launched to date, a 22,000 square foot Caspian Tern floating rookery in Duchy Lake, Oregon, and a 39,800 square foot island in Sheepy Lake, California. In addition to setting an efficacy record relative to usage by the Terns at Sheepy Lake, compared to over ten land based Caspian Tern island projects, both island projects also have proven extremely effective at minimization of ground based animal predation. Currently a 51,000 square foot island is launching in New Zealand. Mr. Laddie Flock of FIW was the project coordinator on both the Sheepy Lake and Duchy Lake launches and is prepared to work closely with project managers on the FBWMA launch. This primary purpose of the current proposal is to address eutrophication issues which are also a critical factor at FBWMA.

Dr. Hoven has been conducting research in impounded and emergent wetlands around Great Salt Lake since 2004 with focus on wetland condition and support of beneficial use. She has developed monitoring protocol for both SAV and emergent species, which are currently being implemented by the Utah DEQ, Division of Water Quality. She is part of a multidisciplinary team of scientists who are working toward understanding the driving causes of ecological imbalance in wetland systems with respect to algal blooms, SAV die-off, and spread of invasive species such as Phragmites.

10. Describe how ongoing maintenance of the project will be funded and carried out: There will be minimal maintenance associated with the project. If maintenance is required on the island, volunteers can be utilized to assist with the project. A small amount of money will be requested in the FBWMA annual budget to cover annual maintenance costs.

11. List consultants or agency partners that have participated in project development:

Ducks Unlimited supports the project and is willing to help out with engineering and Technical Assistance. Although these mitigation funds cannot be used to leverage additional federal funds, Ducks Unlimited can use these monies as non-match and show support towards a NAWCA grant that would benefit additional wetlands of the Great Salt Lake ecosystem. Please see the attached letter of support.

The following organizations also support this project. Please see the attached letters of support:

- USFWS
- Utah Airboat Association
- Delta Waterfowl
- Utah Mud Motor Association
- Utah Waterfowl Association

Signature Richard O Hansen Date 12/13/11
Applicant

References

- Hoven, H.M. 2009. SAV assessment method metrics development for impounded wetlands of Great Salt Lake. The Institute for Watershed Sciences, Kamas, Utah. 38 pp.
- Hoven, H.M. 2010a. Submerged Aquatic Vegetation of Impounded Wetlands of Farmington Bay, Great Salt Lake: Final Report to DWQ for the 2007 EPA Wetland Program Development Grant. 71 pp.
- Hoven, H.M. 2010b. The 2009 Report on SAV Condition in Farmington Bay and other Impounded wetlands of Great Salt Lake. The Institute for Watershed Sciences, Kamas, Utah. 39 pp.
- Hoven, H.M. & T.G. Miller. 2009b. Developing vegetation metrics for the assessment of beneficial uses of impounded wetlands surrounding Great Salt Lake, Utah, U.S.A. In: Saline lakes around the world: unique systems with unique values. Oren, A., Naftz, D.L., and Wurtsbaugh, W.A. (eds.); The S.J. and Jessie E. Quinney Natural Resources Research Library, published in conjunction with the Utah State University College of Natural Resources.
- Hoven, H.M., D.Richards, W.P. Johnson, G.T. Carling. 2011. Plant Metric Refinement for Condition Assessment of Great Salt Lake Impounded Wetlands, Final Report: June 7, 2011. The Institute for Watershed Sciences, Kamas, Utah.
- Miller, T.G. and H. M. Hoven. 2007. Ecological and Beneficial Use Assessment of Farmington Bay Wetlands: Assessment Methods Development Progress Report to EPA, Region VIII and Final Report for Grant: CD988706-03. Draft, April 10, 2007.
- Miller, T.G., D. Richards, H.M. Hoven, W.P. Johnson, M. Hogset & G.T. Carling. 2011. Macroinvertebrate communities in Great Salt Lake Impounded Wetlands, Their Relationship to Water and Sediment Chemistry and to Plant Communities and Proposed Modifications to the MMI, Draft Report to Jordan River/Farmington Bay Water Quality Council.

