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Memorandum

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To: Meghen Quinn, Hargreaves Jones

From: Sheri Mayta – GPA Consulting Senior Biologist

Subject: Silver Lake Reservoir Complex Master Plan Project
FLOATING WETLANDS MEMO

FLOATING WETLAND/HABITAT ISLANDS

Wetlands are areas of transition between terrestrial and aquatic habitats. Wetlands provide a variety of functions and values beneficial to the health, safety, and welfare of the general public. Some of the functions and values that wetlands provide include water storage, water quality protection, erosion control, fish and wildlife habitat, habitat for sensitive plants and animals, education and research, recreation and economic benefits, and open space. Floating wetlands, while a somewhat novel idea, provide many of these benefits. There are limited opportunities for creation of traditional wetlands along the edges of Silver Lake Reservoir. Floating wetlands could provide 1) more total wetland area and habitat diversity at the site, 2) wetlands that are more resilient to water level fluctuations, 3) gain wetland area without grading to lay back steep slopes on the edges of the reservoir, and 4) safer nesting habitat for birds due to less disturbance from humans and lower predation from wildlife. For these reasons, floating wetlands would be an excellent complement to land-based wetlands.

BENEFITS OF FLOATING WETLANDS FOR WILDLIFE

Within the Silver Lake Reservoir Complex here are multiple benefits of floating wetlands as compared to land-based wetlands for wildlife, including an increase in habitat diversity, predator protection, and improved water quality.

Increased Habitat Diversity

Increased habitat diversity is important for wildlife because many species have complex life cycles. Within species, there are a range of ages and sizes that have different needs for different habitat types. A wide range of habitats will support an increasingly diverse array of birds, fish, amphibians, invertebrates, and other aquatic wildlife.

There is also a wide range of diversity within wetland habitats. Above the soil surface, wetlands provide cover, food resources, and nesting opportunities for birds, amphibians, turtles, and insects, primarily from

vegetation. Below the soil surface, in the root zone, macrophytes provide an environment for microorganisms that helps to take up nutrients into plant tissue.

In addition, floating wetlands offer an additional habitat component: aquatic. Unlike land-based wetlands, the floating wetlands create habitat underneath them within their below-the-water root zone which is topmost zone of the water column. Because of this root zone layer, the water column around floating wetlands is a highly ecologically productive area that attracts fish and many other aquatic species. Microorganisms live within this root zone, such as, algae (like diatoms), rooted and floating aquatic plants, grazing snails, clams, insects (egg and larvae stages only), crustaceans, fishes, and amphibians. These organisms provide food for fish and other aquatic organisms as well as shaded and sheltered spawning habitat.

Compared with land-based wetlands, floating wetlands also maximize the ecological efficiency of wetland habitat. While the extent of land-based wetland areas is controlled by the steepness of the shoreline slope and the adjacent water level, the entirety of a floating wetland is a continuous and highly productive wetland habitat.

Providing Increased Predator Protection for Nesting Birds

Many birds are most vulnerable to predators when nesting. Birds that nest in wetlands are particularly vulnerable because their nests tend to be close to the ground. Floating wetlands increase nesting opportunities since they are isolated from the shore providing protection from terrestrial predators.
The isolation that floating wetlands provide, greatly reduces predation on nesting birds by land predators such as raccoons and rats. These predators typically eat or destroy nest contents rather than kill adult birds. A small number of mammalian predators can devastate an entire bird colony by destroying nests and eating eggs and chicks or by causing adult birds to abandon the colony (Beaver et al. 1980; Rodgers 1987).

Although many potential predators can swim, this is a large energy expenditure for many terrestrial species. It's less likely that predators would choose to pursue waterfowl nesting on floating wetlands, especially with plentiful resources available to them onshore.

Improved Water Quality

Wetlands are shown to improve water quality through uptake of nutrients from the water. Although there are few studies comparing the increased effectiveness in improving water quality of floating wetlands to land-based wetlands, floating wetlands are considered an effective best management practice (BMP) for improving water quality. Because the underwater roots of wetland plants provide a large surface area ideal for underwater microbial communities that rapidly process contaminants, they are thought to be more productive at processing contaminants than land-based wetlands. Floating wetlands also reduce algae and cycle phosphorus and nitrogen to reduce eutrophication. Floating wetlands can also reduce total suspended solids which cause cloudy water.

RECOMMENDATIONS FOR DEVELOPING/DESIGNING FLOATING ISLANDS

The value of an island to birds varies according to its location, size, shape and surface cover. In addition, to maximize the value of floating wetlands to birds, it is helpful if they provide a balance of feeding areas with nesting areas. Low, flat islands are usually the most attractive to birds. The ideal cross-section is a shallow dome; the edges can absorb any wave action while the top provides areas safe from flooding on which birds can build their nests.

In general, the further an island is from the shore, the more attractive it is likely to be to birds, particularly nesting waterfowl. Recent work has shown that the shorter the distance from a nesting brood to a feeding area, the higher the survival rate of the chicks (Garrick, 2015). To enhance a floating wetland's value in this respect, it can be designed to include shallow, sheltered areas or a small pool within it. The best size for floating wetlands varies according to the species being targeted. For instance, species that are territorial by nature may occur at higher densities if provided with several small floating wetlands, rather than a larger one of equivalent area.

Providing wetlands on floating islands not only increase habitat for nesting birds, like waterfowl and waders, the habitat would be also be higher quality. In addition, floating wetlands may be preferred nesting sites by many species of wading birds as most wading birds nest in woody vegetation either submerged or surrounded by water (Ogden 1991; Rodgers et al. 1996).

Setback Distances of Nests from Disturbance

Buffer zones or set-back distances to reduce disturbance during the nesting season should be based on the most sensitive nesting bird species (see Rodgers and Smith 1995). In general, the farther offshore an island is the higher the chances are of successful nesting. Floating wetlands with nesting birds should be located as far from shore as possible in areas of human activity. However, if a large enough buffer distance is not possible for the floating wetland, there may be other possible alternatives (e.g., vegetation barriers with tall emergence or shrubs to prevent direct visual contact with the nesting birds; Rodgers and Smith 1995). In addition, there are many characteristics that may modify the ability of birds to tolerate human disturbance. A replicated study at seven prairieland impoundments in Alberta, Canada (Giroux 1981), found that islands were most productive when small, far from shore and with high vegetation cover.

Design Considerations: Shallow and Deep Water Areas

Floating wetland construction should include a very shallow (5–20 cm) area that extends 5–30 m into the water in selected areas around the island. This habitat enhancement has two major benefits for the nesting birds. First, it will promote the growth of emergent vegetation that will help to visually screen the island and provide seclusion. Second, shallow areas provide young birds an area to learn how to forage and capture prey. However, shallow water areas tend to be colonized quickly by emergent vegetation and will most likely require maintenance to thin the vegetation and keep these areas attractive to foraging wading birds.

Considerations for Nesting Birds and Shoreline Wetlands for the Silver Lake Reservoir Complex

A final consideration of including floating wetlands in the Master Plan design is related to the stability of water levels within the reservoir complex. Historically, the water level has fluctuated approximately up to 5 feet per year. The new design target water level for the Master Plan project limits the annual water level fluctuation to 2 feet. If wading birds do not have access to floating wetlands and were to nest near the shoreline, at some point vegetation along the shore would dry out as the water levels drop thus becoming less suitable for nesting birds. Dried out vegetation is not only less suitable for nesting but increases the potential for predation (Ogden, 1991). Therefore, the floating wetland islands also provide the most reliable habitat for local and migratory waterfowl.

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