Bridging the Watershed

An Outreach Program of the Alice Ferguson Foundation
in Partnership with the National Park Service and Area Schools

URBAN POOLS

An Exploration of the Management of the Abiotic, Biotic, and Cultural Components of Urban Pools

Field Study at National Mall

Reflecting Pool

Constitution Gardens

Simon Bolivar Pool

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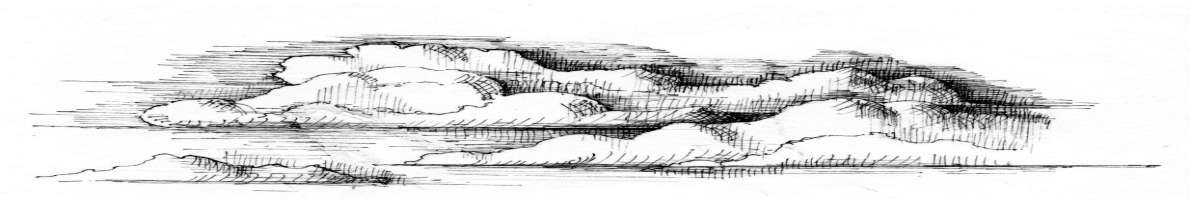

General Information			
Group Members			
Date			
School			
BTW Educator(s)			
Teacher(s)			
Ranger(s)			
Volunteer(s) *(specify organization)*			
Site(s)		Latitude ^{o}N	Longitude ^{o}W
	Reflecting Pool		
	Constitution Gardens		
	Simon Bolivar Pool		

Weather Data					
Air Temperature			°Celsius		
Cloud Cover (circle symbol)	○	◔	◑	◕	●
	0%	25%	50%	75%	100%
	Clear	Partially Cloudy			Overcast
Current Precipitation (Circle one of the choices to the right)	None	Mist	Rain	Thunderstorm	Snow

Description of Three Urban Pools on the National Mall			
	Reflecting Pool	Constitution Gardens	Simon Bolivar Pool
Photos			
Pool Design and Construction	The Reflecting Pool was designed by Henry Bacon, the architect of the Lincoln Memorial, and was completed in 1922 just after the dedication of the Lincoln Memorial. The Reflecting Pool acts as the visual link between the Lincoln Memorial on the western edge of the reclaimed land and the Washington Monument, the symbolic heart of Washington, D.C. The area around the Reflecting Pool is landscaped in a way that makes it both open and sheltered to optimize the reflective qualities of the pool.	President Richard M. Nixon, shocked that the "temporary" military buildings he had served in as a naval officer were still there when he became President, began lobbying for their removal. In 1971, when the Navy finally withdrew from the buildings, they were demolished. President Nixon ordered that a park be built on the land, leading to the creation of Constitution Gardens. The Gardens were dedicated in May of 1976 to celebrate the Bicentennial of the American Revolution. In July of 1982, the Fifty-Six Signers of the Declaration of Independence Memorial was dedicated on the small island in the lake.	A bronze equestrian statue honoring Simon Bolivar, hero and liberator of South America, was sculpted by Felix de Weldon on a granite pedestal and presented as a gift of the Venezuelan government (Bolivar's native country) to the United States. An act of Congress on July 5, 1949, authorized its erection on public grounds. It is located in front of the Department of Interior on Virginia Avenue. The statue is flanked by a marble walk, seats, and a six-jet spray fountain pool. Each jet represents one of the countries liberated. This memorial was dedicated on February 27, 1959.
Length (ft)	2,318	~ 1,000	
Width (ft)	160	~ 400	
Depth (ft)	3	3	3
Capacity (gal)	6,750,000	5,500,000	100,000
Drain/Fill Time	24 hours		
Management of Pool	Management of the water consists of draining and scraping the residue and/or debris from the bottom of the pool twice a year, two algal control methods to maintain the reflective quality of the water. Because the Reflecting Pool was built on reclaimed land and its supports do not go down to bedrock, settling and cracking in the pool's foundation cause both leaks of gasses, making small bubbles in the water, as well as cracks where water in the pool can leak out.	Design leads to unsightly algal blooms to form, which can result in the lake being covered with string-like algae. To address this issue, fish, plants, and other physical and chemical management techniques have been introduced to mimic natural cycles and reduce algal blooms. Cattails, bulrush, yellow iris, pickerel weed, and curly dock were introduced into concrete-rimed planter boxes filled with a clay and topsoil mix. The fish species stocked in the lake today are bluegill and bass. The same bacterial and chemical algal controls used in the Reflecting Pool are used here as well.	Management includes maintaining the water quality necessary for aquatic life, maintaining the appearance of emergent vegetation, and ensuring that conditions for algal blooms are minimized. The pond does not have as large of a problem with algae as the other pools because it has a good pump system and lesser amounts of nutrient input. However, the same bacterial and chemical algal controls that are used in Constitution Gardens Lake and the Reflecting Pool are still used here.

The Reflecting Pool - Observation Data			
Floating/Submerged Debris			
Water Color and Odor			
Algae Types			
Plants			
Animals			
Run-off Inputs			
Abiotic Measurements	**Value**	**Ideal**	**Actual Management**
Temperature (^{o}C)		**> 32°F or 0°C** To keep the pool from freezing and to maintain the reflection.	At this time, there is no management to control or maintain the temperature of the Reflecting Pool.
Dissolved Oxygen (mg/L)		**Any Value** No management for aquatic life.	**≥ 2.0 mg/L** To destroy algae and digest nutrients/fecal matter added to the pool, a bacterial agent is added to the pool that requires a certain amount of DO to survive.
Nitrates (mg/L)		**0** Algal blooms will not occur.	**As close to 0 as possible*** Actual nitrate levels will vary, but the closer to 0 they are, the less management will be needed to control algal blooms. ** Managed in part by the bi-annual draining and scrubbings of the pool.*
Orthophosphates (mg/L)			
Turbidity (JTU)		**0** Clear water provides the best reflection and is most pleasing visually.	**As close to 0 as possible*** Although turbid water would still reflect the buildings, pool aesthetics and how they affect park visitors must be considered. ** Managed in part by the bi-annual draining and scrubbings of the pool.*

Constitution Gardens - Observation Data			
Floating/Submerged Debris			
Water Color and Odor			
Algae Types			
Plants			
Animals			
Run-off Inputs			
Abiotic Measurements	**Value**	**Ideal**	**Actual Management**
Temperature (^{o}C)		**Winter: 50°F/ 10°C** At temperatures lower than this, bass and bluegill will stop growing, eating, and reproducing. **Summer: 80°F/27°C;** Optimum temperature for the bass lifecycle.	**Year Round: ≥ 32°F/0°C to ≤ 98°F/37°C** Though bass and bluegill can survive in bodies of water covered in ice, they will die if the pool freezes completely. At 98°F, the water will be too warm for the fish, and they will die.
Dissolved Oxygen (mg/L)		**≥ 9 mg/L** Spawning is supported at levels greater than 6 mg/L. Growth and feeding will occur at levels higher than 7 mg/L. At 9 mg/L, a healthy and abundant fish population can be supported.	**≥ 5 mg/L** Lower than this, bass and bluegill will be stressed and possibly die.
Nitrates (mg/L)		**5 mg/L** Average level of nitrates in natural systems.	**≤ 10 mg/L** Above this level, nitrates will be a problem, and the fish will become very stressed.
Orthophosphates (mg/L)		**1 mg/L** At this level, aquatic life can be sustained, yet the level is low enough to prohibit algal blooms.	**≤ 3 mg/L** Above this level, phosphates may trigger algal growths and surpass natural eutrophication rates.
Turbidity (JTU)		**≤ 10 JTU** Above this level, the water becomes aesthetically displeasing to the eye. However, it is beneficial to the fish to have somewhat turbid waters.	**≤ 40 JTU** Above this level, the particles in the water begin to clog fish gills and make it hard for them to find food.

Simon Bolivar Memorial Pond - Observation Data			
Floating/Submerged Debris			
Water Color and Odor			
Algae Types			
Plants			
Animals			
Run-off Inputs			
Abiotic Measurements	**Value**	**Ideal**	**Actual Management**
Temperature (^{o}C)		**Winter: 50°F/10°C** At temperatures lower than this, koi and goldfish will stop growing, eating, and reproducing. **Summer: 65°F/19°C to 80°F/27°C** The best temperature range for the koi and goldfish life cycle.	**Year Round ≥ 32°F/0°C to ≤ 98°F/37°C** Although koi and goldfish can survive in bodies of water covered in ice, they will die if the Bolivar Pond freezes completely. At 98°F, the water will be too warm for the fish, and they will die.
Dissolved Oxygen (mg/L)		**≥ 9 mg/L** Spawning is supported at levels greater than 6 mg/L. Growth and feeding will occur at levels higher than 7 mg/L. At 9 mg/L, a healthy and abundant fish population can be supported.	**≥ 5 mg/L** Lower than this level, and, at first, the koi and goldfish will gulp air at the surface, and then they may become stressed and possibly die.
Nitrates (mg/L)		**5 mg/L** Average level of nitrates in natural systems.	**≤ 10 mg/L** Above this level, nitrates will be a problem, and the fish will become very stressed.
Orthophosphates (mg/L)		**1 mg/L** Aquatic life can be sustained; however, the level is low enough to prohibit algal blooms.	**≤ 3 mg/L** Above this level, phosphates may trigger algal growths and surpass natural eutrophication rates.
Turbidity (JTU)		**≤ 10 JTU** Above this level, the water becomes aesthetically displeasing to the eye. However, it is beneficial to the fish to have somewhat turbid waters.	**≤ 40 JTU** Above this level, the particles in the water begin to clog fish gills and make it hard for them to find food.