

Prospect Lake Aeration Project Update

City Council Work Session
March 27, 2023

Kim King, Assistant Director

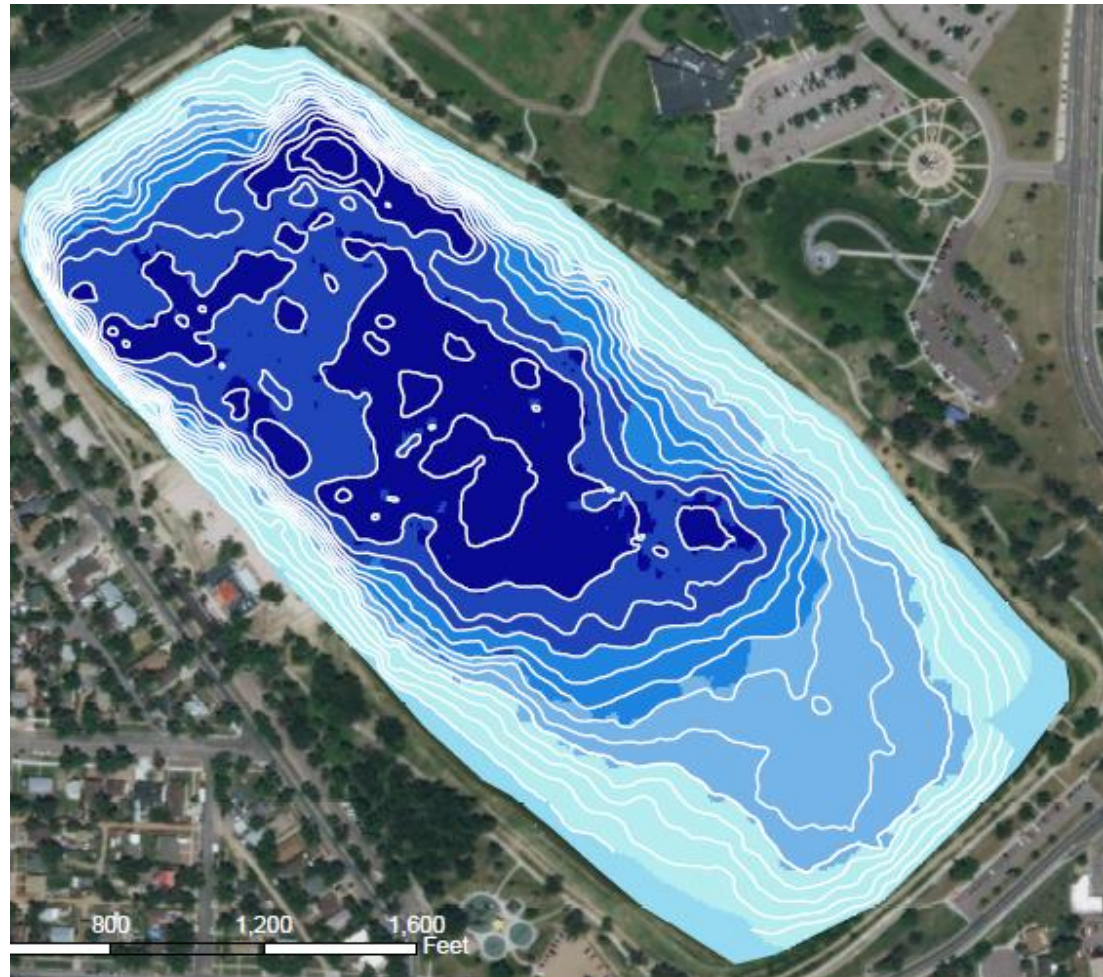
Erik Rodriguez, Environmental Safety and Health Specialist
Parks, Recreation and Cultural Services



Project Goals



- **Have an aeration system coupled with a treatment injection system**
 - Improve water quality treatments
- **Improve lake health through mechanized means**
 - Eliminate blue-green algae blooms
 - Improve environment for aquatic life
 - Ensure lake is accessible to both residents and visitors alike
- **Meet or exceed CDPHE's current water quality requirements**
 - Design system to achieve State's 10-year water quality road map



Background



- **2019 & 2020 seasons: Initial toxic algae blooms and subsequent closures**
- **2021 and 2022 Recreation Seasons: Healthy and open for activity**
 - Proactive lake treatments from shoreline
- **2021: \$459,036 appropriated from American Rescue Plan Act (ARPA)**
- **Jan 2022: Eco Resources awarded the design through a competitive bid process**
- **Apr 2022: Change order for 2 aeration designs**
 - Project delays due to supply chain delays and discontinued products
- **Feb 2023: 2 aeration designs submitted**
 - Includes an aeration system for the lake capable of injecting treatment into the lake

Blue Green Algae Effects on Lakes

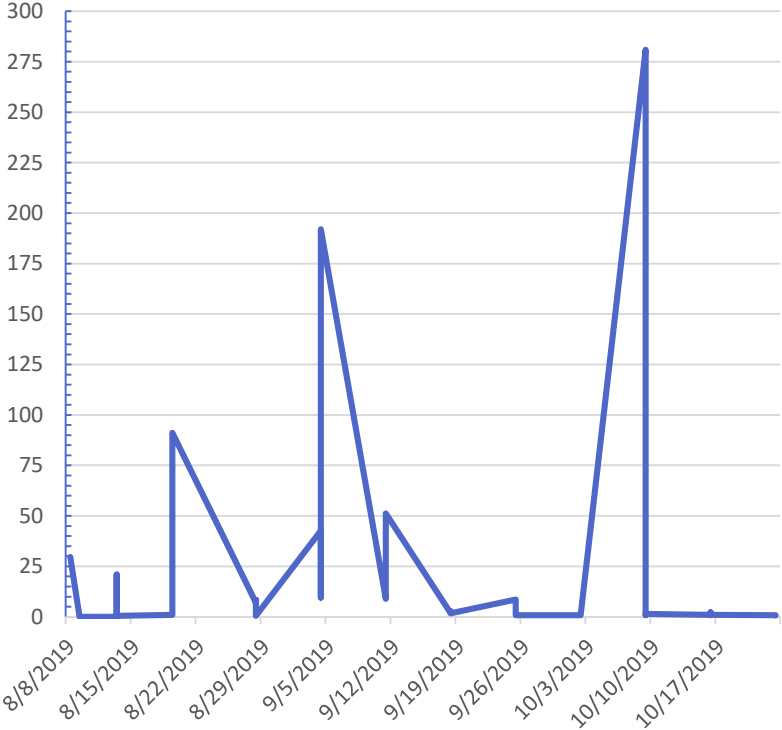
- Releases toxins (microcystin)
- Lowers Dissolved Oxygen
- Can be a contributor to fish kills
 - Other factors
 - High water temps
 - Cold water fish species stock in prospect



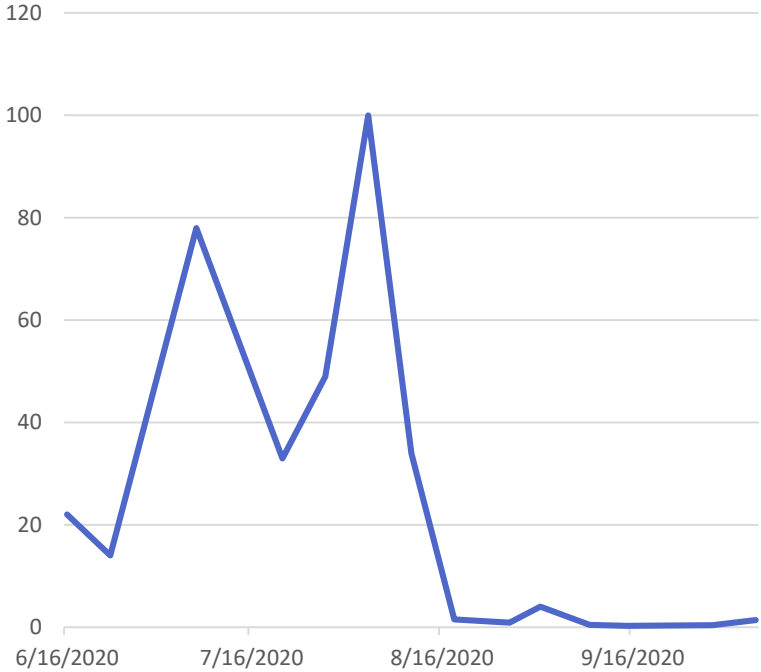
Blue Green Algae Blooms at Prospect Lake



2019 Microcystin Toxin

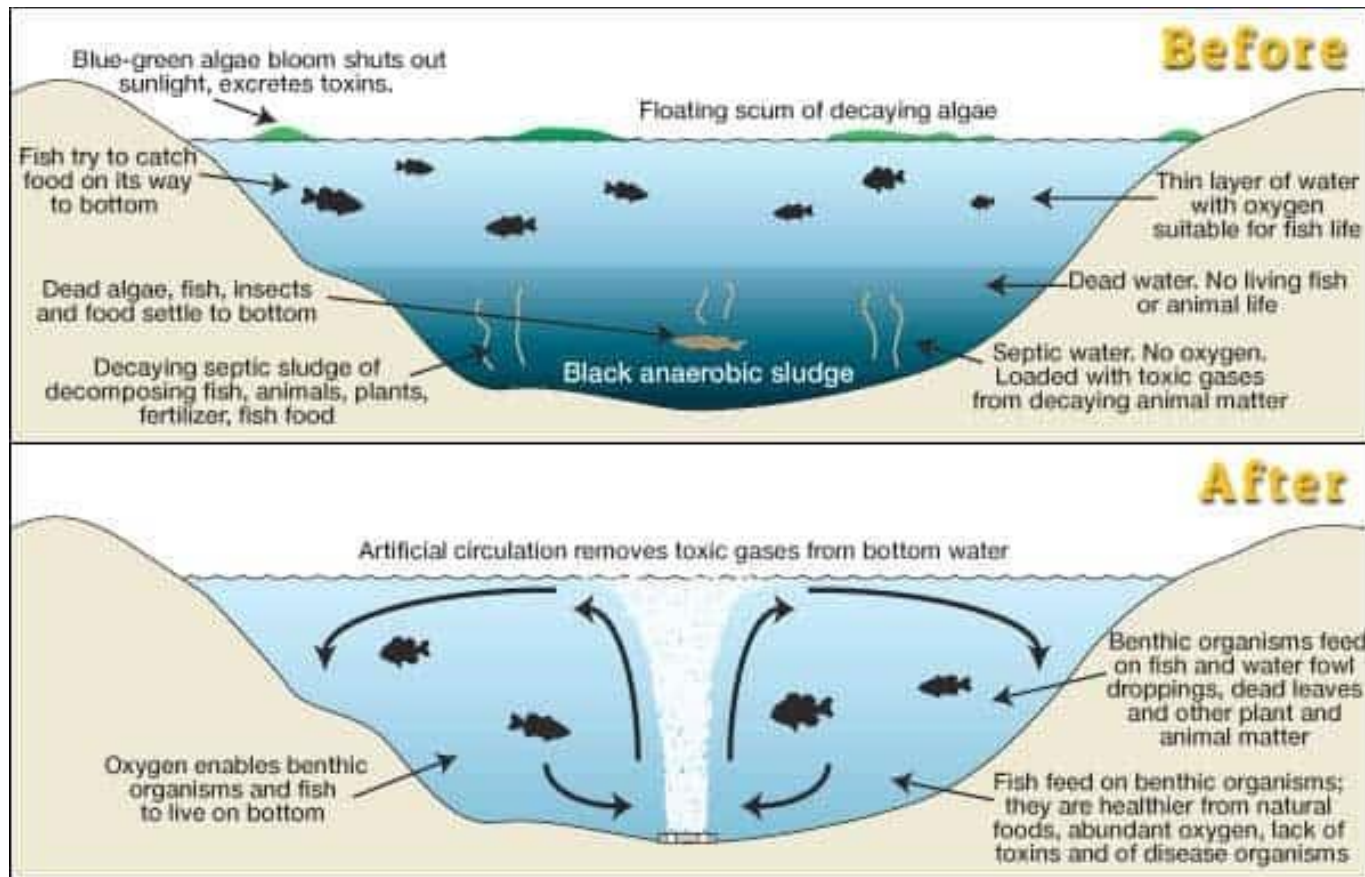


2020 Microcystin Toxin



Lake Aeration

- What aeration will do for the lake



Aeration System Lake Benefits



- Introduces oxygen into the lake
 - Increases available oxygen for aquatic life
 - Reduces possibility for fish kills
 - Less odor
 - Reduces the nutrient loading of the water body (eutrophication)
 - Improves water clarity
 - Reduces organic phosphorus
 - Limits algae blooms
 - Turns over the lake water
 - Ideal condition is in 24 hours
 - Reduces the anoxic layers of water



Water Quality looking ahead



- **10 Year Roadmap**
- **CDPHE is implementing changes to Regulations 32-38**
 - Rulemaking hearing April 10, 2023
- **Will regulate lake nutrients**
 - Chlorophyll a, Total Nitrogen, and Total Phosphorus
- **Implementation for all lakes 2027**

- **Revised Standard**

| Chlorophyll a | Nitrogen | Phosphorus |
|---------------|----------|------------|
| 20 | 600 | 36 |

- **Current Levels**

| Nitrogen | Phosphorus |
|----------|------------|
| 1100 | 93 |

| Chlorophyll a | 690 |
|---------------|-----|
|---------------|-----|

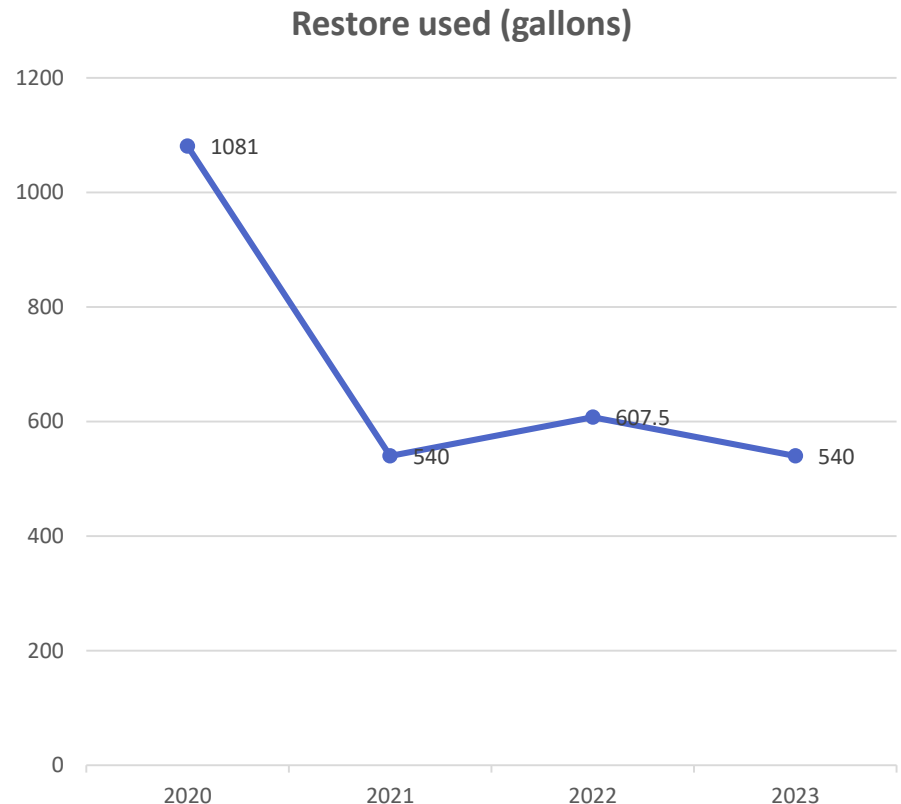
- **Sources**

- Geese increase Phosphorus load
- Fish and algae increase Nitrogen load

Treatments for Blue Green Algae



- **Restore by Solutions4Earth**
- **People, pet, and aquatic life safe**
- **Not a pesticide**
- **Phosphorus reducer**
- **Treatments started end of May 2020**

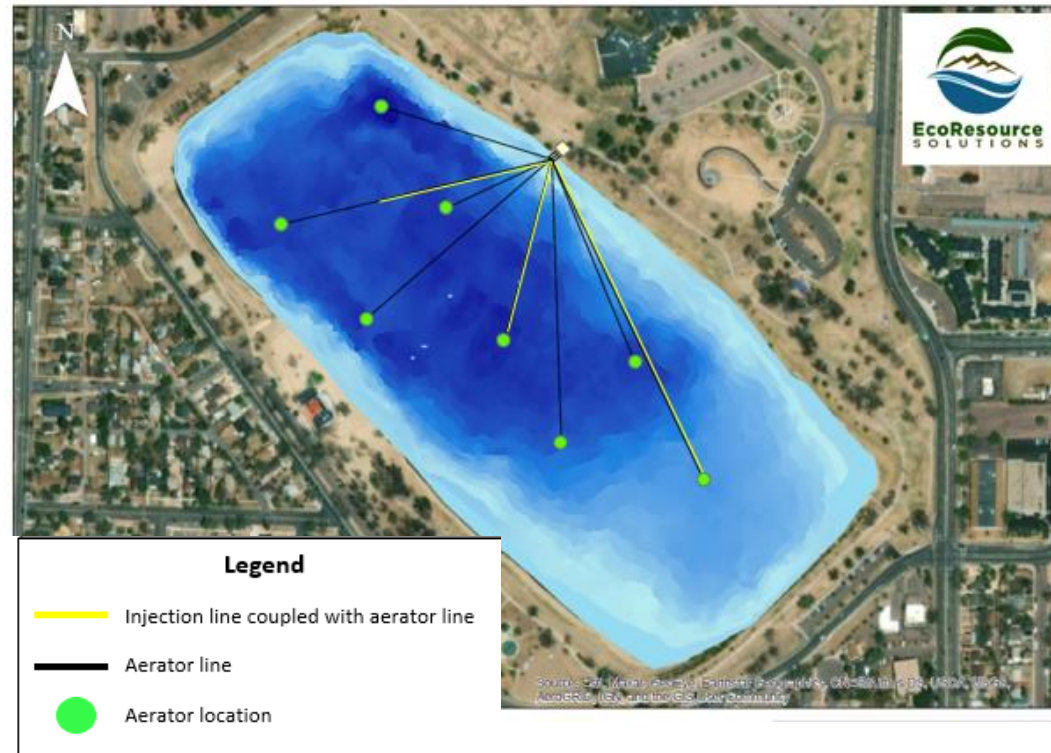


Prospect Lake Aeration Project



- **Design 1 Highlights:**

- Lake will be turned over in 53.39 hours (~2 days)
 - Will promote effective lake aeration
- Treatment injection integrated
- Supports motorized use
 - Diffusers strategically placed
 - Less infrastructure than design 2
- Results in less algae control
 - No LG Sonics
- Harder to reach CDPHE nutrient standards
 - Chlorophyll a standards

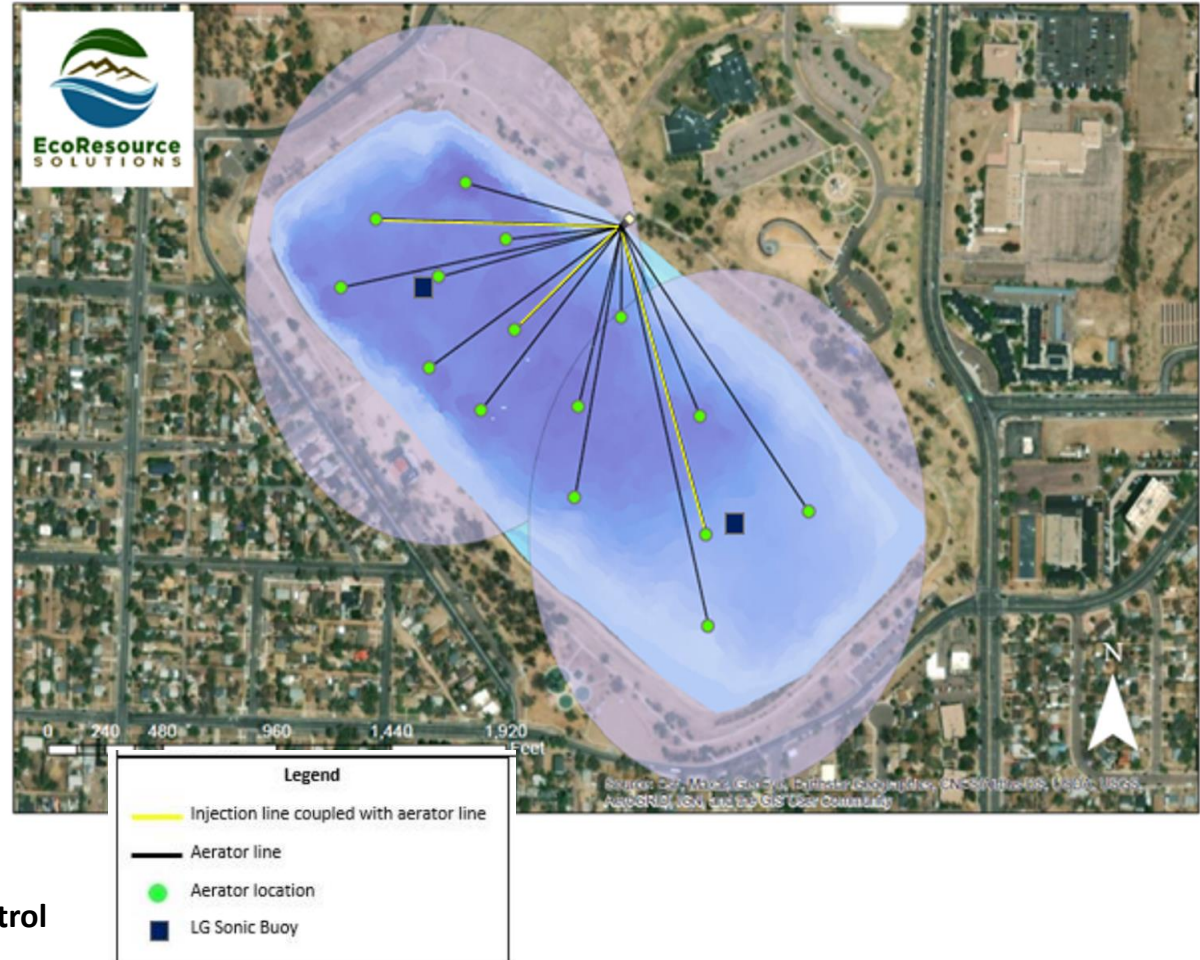


Prospect Lake Aeration Project



• Design 2 Highlights:

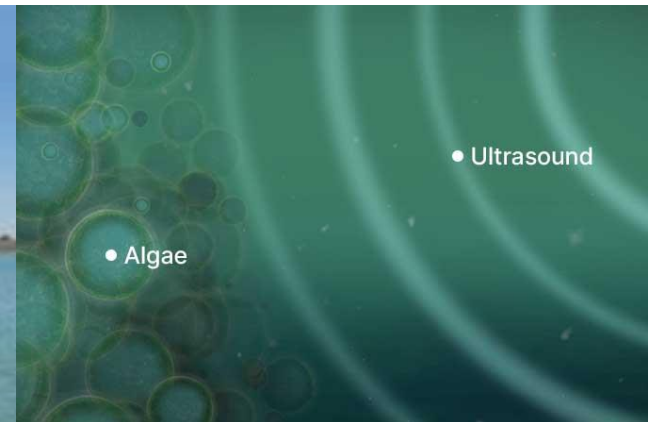
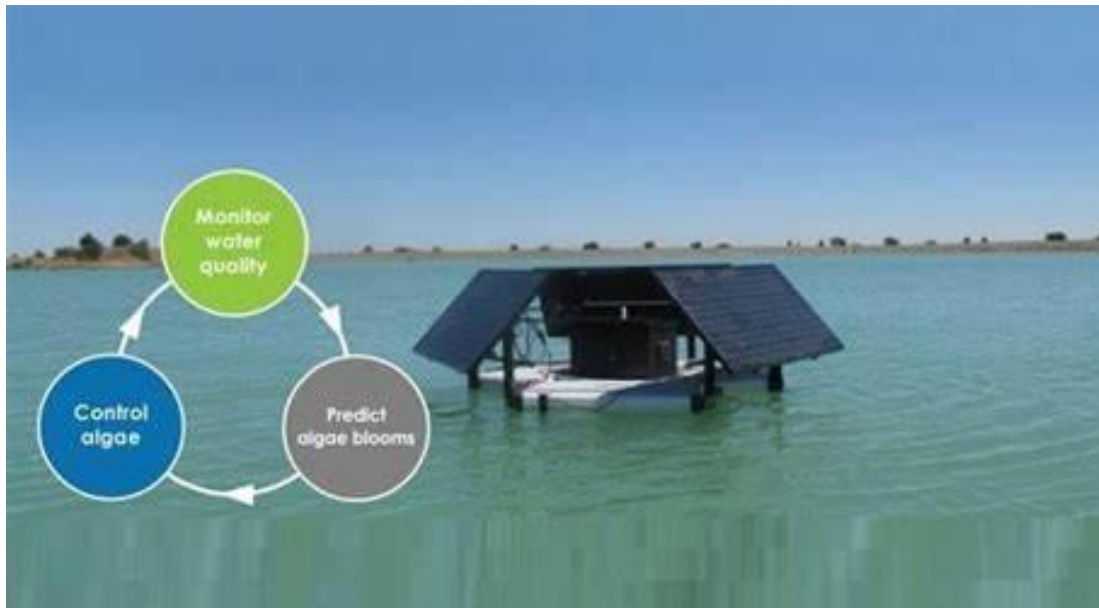
- Lake will be turned over in 28.48 hours (~1 day)
 - Increased number diffusers
 - Placed in shallower locations
- Treatment injection integrated
- Does not support motorized use
- Includes 2 LG Sonics
 - Results in more algae control



Ultrasonic Algae Control



- **How Ultrasonic Control Works**
 - Ultrasonic wave disrupt blue green algae gas vacuoles (buoyancy)
 - Micro adaption to frequency
 - Reduces Chlorophyll a
- **LG Sonic**
 - Active lake monitoring
 - Algorithm for treating lake conditions
 - Used through out Colorado with positive results



Component Comparison



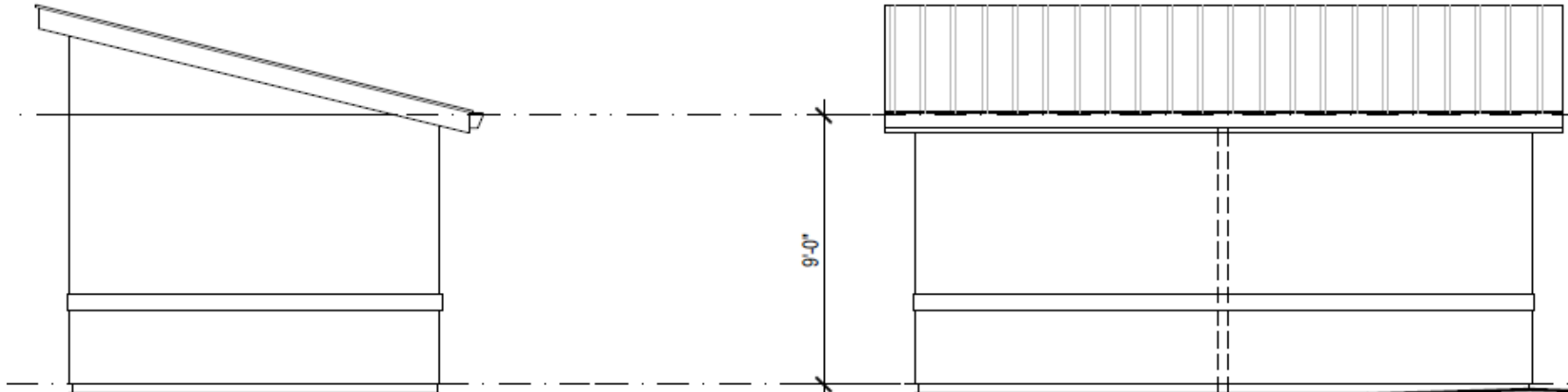
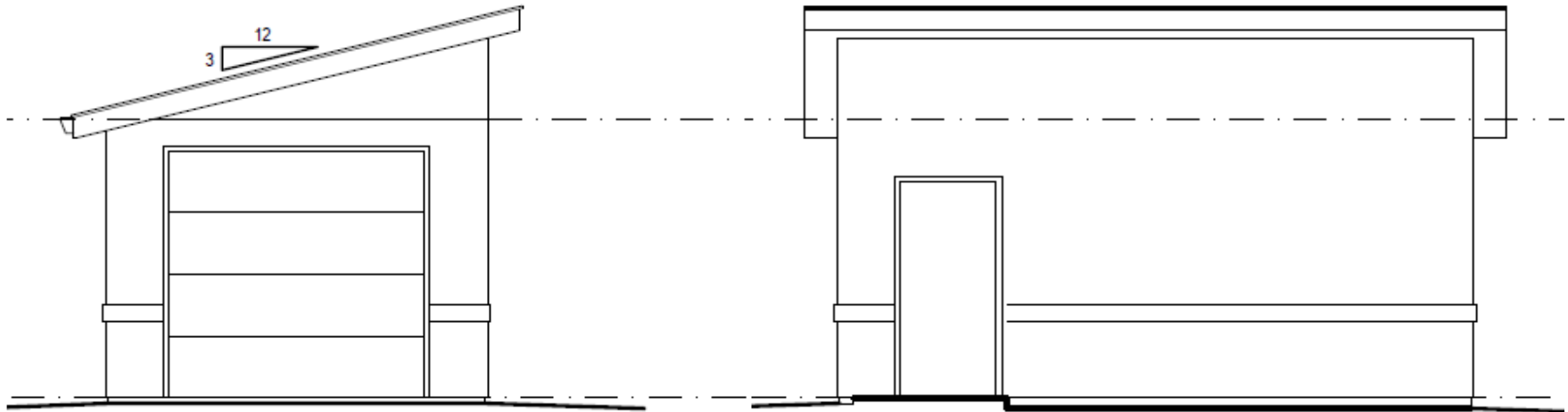
| | Design 1 | Design 2 |
|--|----------|--------------|
| 125 psi Air Compressor | 1 | 2 |
| Double Disk Diffusers | 8 | 15 |
| ½" x 10' Stainless Steel Braided Supply Line | 2 | 3 |
| ½" x 10' Copper Pipe | 6 | 10 |
| ½" x 300' 600 psi Braided Hose with Liner | 34 | 55 |
| MPC Buoy System | - | 2 |
| Lighted Buoy | - | 8 (optional) |

Effectiveness Comparison



| | Design 1 | Design 2 |
|--|---------------------|-----------------------------|
| Lake Turnover Rate | 0.45 days | 0.84 days |
| Circulate Lake Volume | 53.39 hours | 28.48 hours |
| Oxygen Transfer Rate | 28.92 lbs/hour | 54.23 lbs/hour |
| Corrected O2 Transfer Rate to Maintain 6 ppm in Lake Bottom | 1.08 | 2.02 |
| Algae Targeting | None | 2 LG Sonic Buoy Units |
| Estimated System Materials Cost (Labor and Shore structure not included) | \$23,000 for system | \$153,500 for system |
| Supports Motorized Use | Yes | No (surface structures) |
| Vandalism / Damage Risk | Low (only lines) | Higher (surface structures) |
| Injection System | Yes | Yes |

Building Design



Prospect Lake Use Comparison



- **Recent Use:**

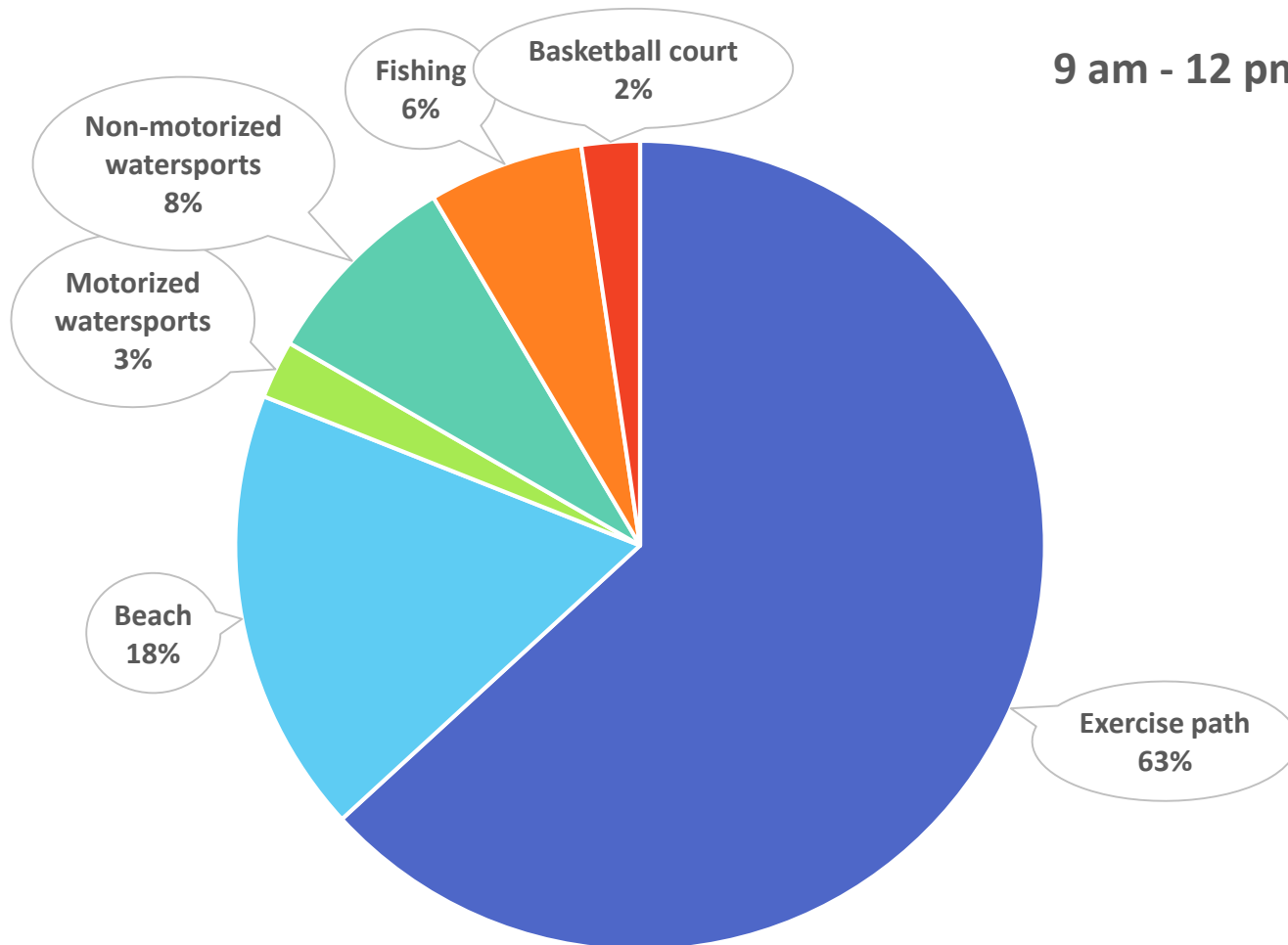
| | <u>2018</u> | <u>2021</u> | <u>2022</u> |
|---|-------------|-------------|-------------|
| – Annual Motorized Permits Purchased: | 60 | 47 | 32 |
| – Annual Non-Motorized Permits Purchased: | 73 | 82 | 102 |
| – Daily Motorized Passes Purchased: | N/A | 46 | 67 |
| – Daily Non-Motorized Passes Purchased: | 461 | 485 | 356 |



Prospect Lake Usage Sample



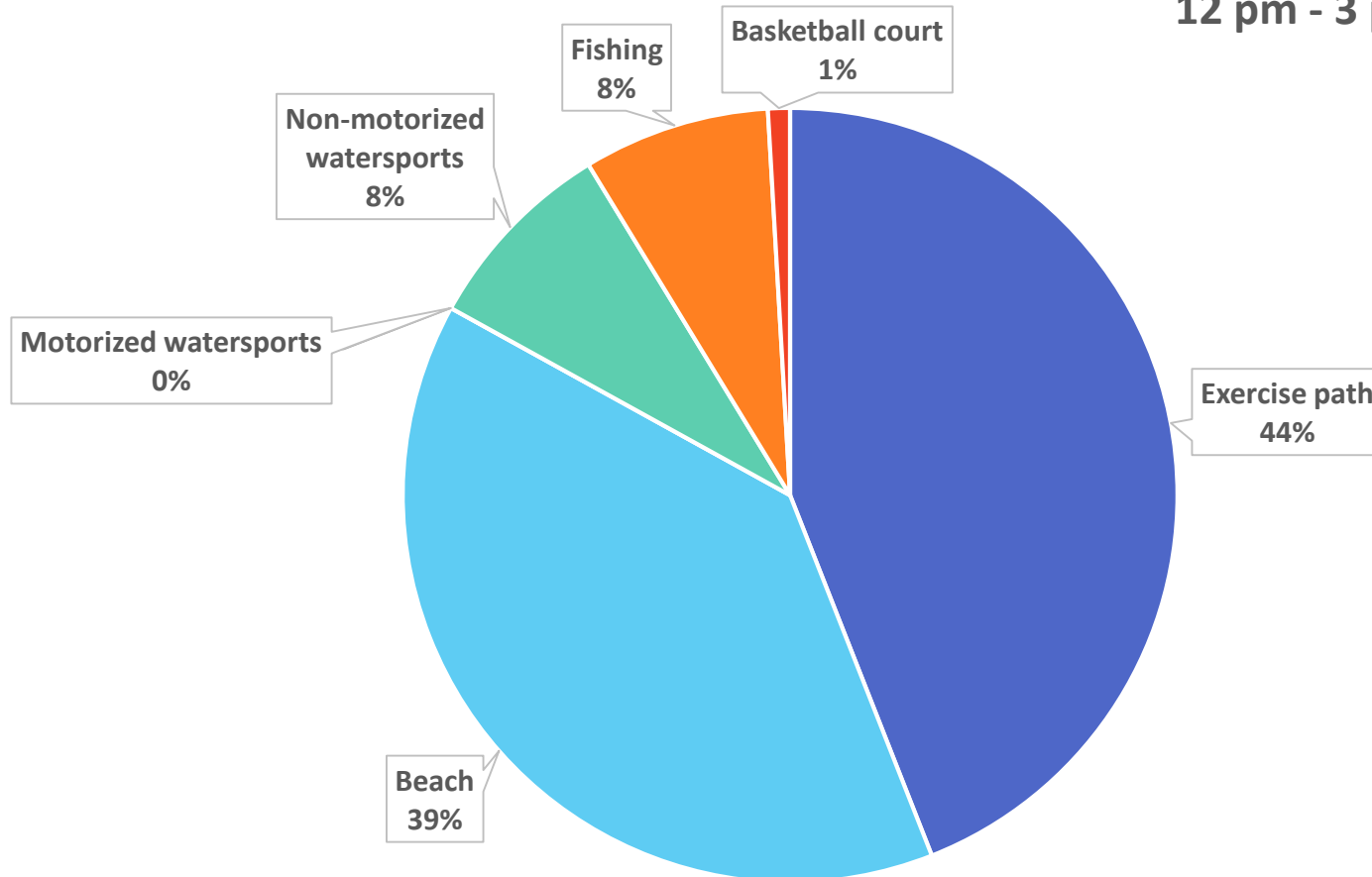
9 am - 12 pm – All days



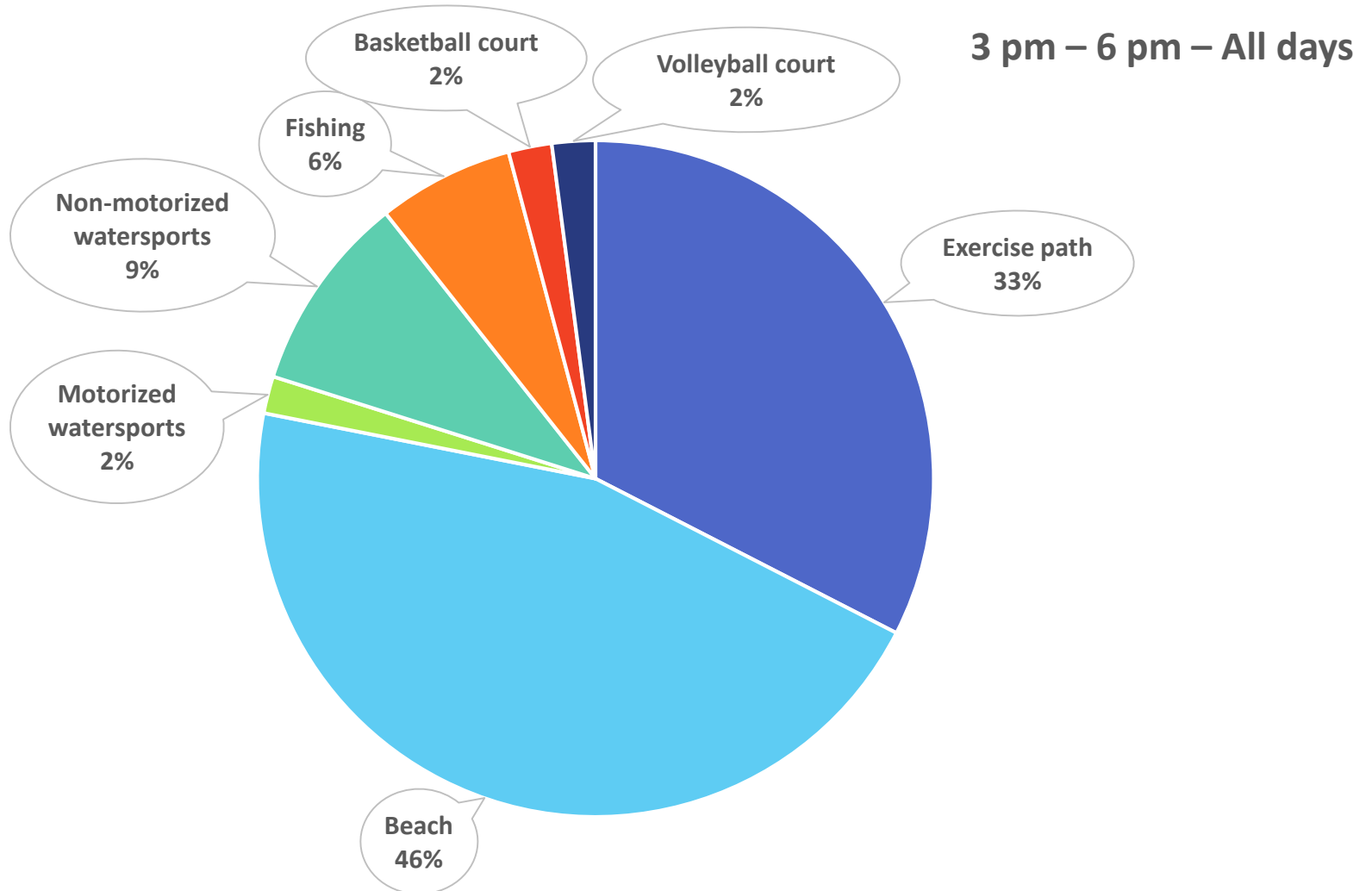
Prospect Lake Usage Sample



12 pm - 3 pm – All days



Prospect Lake Usage Sample



Prospect Lake Activation



- Continued contract with Lakeside Dawgs at the Beach House



Prospect Lake Activation



- Continued contract with SUP Colorado Springs



Prospect Lake Activation



- **No cost access with “swim at your own risk” model**
 - Designated swim beach area with roped buoys
 - Signage posted around the lake and on park entrances
 - No cost to access the beach areas



Communications Plan



| <u>Activity</u> | <u>Target Date</u> |
|---|------------------------------|
| Motorized Boating Representatives Meeting | Feb 16 th |
| Online Project Page and Survey Available | Mar 6 th |
| General Community Meeting | Mar 6 th |
| Parks Advisory Board Meeting | Mar 9 th |
| City Council Work Session | Mar 27 th |
| City Administration Recommendation | Week of Apr 3 rd |
| RFP for Construction Distribution | Week of Apr 17 th |
| Construction Contract Award | Week of May 15 th |
| Construction Completed | TBD |

Ongoing Updates and Survey



- The City's website will have an updated project page throughout the construction period at:
www.ColoradoSprings.Gov/EngageCOS
- An online survey regarding the project is available through March 31, 2023 at:
www.ColoradoSprings.Gov/EngageCOS
- Comment cards have been distributed. Please feel free to complete and drop off with staff after the meeting.

Questions?



Prospect Lake Specifications



Average Depth: 9.17 Feet

Surface Area: 47.69 Acres

Dams: North and South

Maximum Depth: 15.18 Feet

Volume: 373.04 Acre Feet

Lined lake: CSU Potable Water

