

2020 Summary

The initial water quality assessment of the lagoon was performed on May 13, 2020 (Appendix A). Recommendations for aeration/oxygenation, sedimentation management, stakeholder education and lagoon management was submitted for consideration on June 8th. Progress toward all of the recommendations was made over the course of the remainder of the year.

Pursuant to a request for lagoon management services, water quality monitoring of Peacock Gap Lagoon began in July 2020. Monthly monitoring was performed (ending in October '20) the 2021 management season runs from March - October. In addition to sedimentation management, water samples were also collected periodically during this time to gain a better understanding of the nutrient concentrations, specifically related to total phosphorous and total kjeldahl nitrogen (TKN). The data acquired will help set a baseline to compare future samples and measurements to and be useful to evaluate the effectiveness of ongoing and future management strategies. Monthly water quality data sheets were submitted for review throughout the monitoring season. The sample sites are located on the map below. The '20 monthly water quality updates can be found in Appendix B of this report.



Figure 1 PGL WQ sample locations

In August 2020, a resident of Peacock Gap Lagoon received permission from the City of San Rafael to introduce an oxygenation system for the lagoon. The recommended equipment installed was a Clear 150 Enriched Nanobubble Generator made by Moleaer that is designed to run 24hrs/day at a low noise level (62Db). The purpose of this installation was primarily to increase dissolved oxygen DO concentrations in the lagoon. The unit that was purchased is designed to adequately oxygenate between 30 to 40 acre feet of water within a 30-day period (PGL contains approx. 80 acre feet).

2020 Peacock Gap Lagoon
Annual Water Quality Report

Monthly monitoring did reveal that DO concentrations increased across the lagoon, however the data does not suggest this can be attributed solely to the nanobubbler. Continued monitoring will reveal the extent to which the single unit is affecting the entire lagoon. Particular attention should be paid to the field measurements of Oxidation Reduction Potential (ORP) which is a more direct measure of the presence of nanobubbles and their oxidative effect. Monthly water quality summary sheets (Appendix B) show the positive increase in levels that will aid the lagoon in returning to a healthy body of water supporting marine life and minimizing unwanted levels of aquatic vegetation. Below are pictures taken prior to, and approximately 8 weeks post oxygenation system commissioning.



Figure 1 PGL aeration location 8/2020



Figure 2 PGL aeration location 8/2020



Figure 3 PGL aeration location 10/2020



Figure 4 PGL aeration location 10/2020

A beneficial bacteria product called Muckbiotics was introduced to the lagoon on a monthly basis beginning in July. This product is designed to saturate the surface of the sediment layer with rare earth stimulants and a broad spectrum of natural bacterial cultures. This establishes a healthy microbiota at the water-to-sediment interface that accelerates the digestion of organic matter. The microbiota functions as a biofilter, reducing harmful nutrient loading from both internal and external sources. Evaluation of the sediment layer in 2021 will reveal the effectiveness of this product in the lagoon and adjustments will be made to the application rates and areas treated accordingly. Below is a map of the lagoon sea floor hardness. Lighter in color indicates higher volume of Bio mass/Bio sedimentation.



Figure 5 Bio Density (Hard Pan) Mapping

No BMPs for erosion or runoff were performed in 2020 and is recommended to continue monitoring. Special attention should be paid to the creek inlet in the north entering the lagoon from the golf course. It is still a recommendation that a combination of BMPs such as silt screens, check dams, bio-swales or a sediment deposition basin should be considered to address this source of sediment. In addition, stabilizing unprotected shorelines around the islands and along the golf course should be addressed.

Lastly, significant progress was made toward encouraging involvement from the residents around the lagoon. Once a sufficient group of stakeholders have become invested in the lagoon, the newly formed Friends of Peacock Gap Lagoon organization should begin disseminating stakeholder education information. Materials specific to the lagoon will be informative and interesting to the residents but additional materials to promote learning should be a focus.

2021 Lagoon Management

Foth is currently under contract for lagoon management services through the 2021 season. Often times with lagoon management plans, certain components are modified based on the data and visual observations from the prior management season. This holds true for Peacock Gap lagoon for the following items.

1. Lab Sampling – Modify nitrogen sample analysis requested
 - a. Point source determination
 - b. Composite sample vs. four individual sites
2. Bio Sedimentation Management – Treatment area modification
 - a. Proposed application area will consist of a 100' entire shoreline band
3. Communication with City staff on circulation/lowering events
 - a. City has committed effort for management communication

At the close of the 2021 season, Foth will provide another annual summary and recommendations for the future. Our team looks forward to another management season continuing to improve the lagoon's health, overall balance, collaboration with residents and City of San Rafael staff.

Best regards,

Foth & Van Dyke and Associates, Inc.



Adrian Cormier
Project Manager

Appendix A
June 9 2020 Water Quality Assessment



384 Bel Marin Keys Blvd., Suite 140
Novato, CA 94949
(415) 884-8011
www.foth.com

July 9, 2020

Mr. Bill Guerin
Director of Public Works
City of San Rafael Public Works
111 Morpew St.
San Rafael, CA 94901

Dear Mr. Guerin:

RE: Water Quality Assessment – Peacock Gap Lagoon

1. Introduction

Pursuant to our proposal dated January 29, 2020, Foth Infrastructure & Environment, LLC (Foth) is pleased to provide the following *Draft Peacock Gap Lagoon Water Quality Assessment (Draft WQA)* to the City of San Rafael (City). Foth was retained for professional consulting services to provide field services and field investigations and to deliver a scientific-based assessment and report of Peacock Gap Lagoon (Lagoon). This *Draft WQA* summarizes the results of the onsite inspection conducted by Foth in tandem with E-limnology on May 13, 2020. Foth conducted a conference call with Peacock Gap Lagoon Committee member, Mr. Sean Barron, on May 29, 2020, to discuss the initial findings and recommendations on next steps for monitoring and managing the Lagoon waters to improve overall health.

2. Project Understanding

Foth has performed visual observations along with City staff and has confirmed that the Lagoon is currently inundated with aquatic vegetation and algae. Foth understands the City wishes to determine the existing water quality and overall health of the Lagoon in order to plan for implementing strategies for improving it. The Foth team provided a comprehensive plan for completing a lagoon assessment and data acquisition program to better understand the current condition of the Lagoon's biological health and provide professional recommendations on implementing best management practices to improve and then maintain a healthy lagoon. The Foth team, including a licensed biologist, Eli Kersh of E-limnology, prepared the following scope of work for the Lagoon water quality condition assessment.

1. Lagoon Mapping (depth soundings and plant volumes).
2. Soil and water samples and complete laboratory analysis at four locations.
3. Physical water quality samples at four locations.

3. Onsite Data Acquisition Overview

The Foth team performed the lagoon assessment on the morning of May 13, 2020. City staff had raised the water surface elevation to full capacity prior to this site visit to allow more access to Lagoon locations. The team collected water and sediment samples, recorded water quality data, and conducted bathymetric measurements (water depth) to provide the owners with an initial assessment of the Lagoon's conditions.

The Lagoon is approximately 17 acres with a maximum depth of approximately 7 feet and an average depth of 4.5 feet (Figure 1). Salinity in the water column ranged from 18 PSU (Practical Salinity Unit) near the bottom, similar to San Francisco Bay (Bay), to 9 PSU at the surface. This gradient was likely a result of a light rain event the previous day that temporarily stratified the water due to differing water density (i.e., salt water is more dense). It is likely that the salinity of this system is more homogeneous throughout the Lagoon and mimics that of the Bay more closely. The salinity of similar muted, tidally-influenced lagoon systems in the region tend to fluctuate seasonally, with runoff during the rainy season, and mimic the salinity of the Bay in summer, with water exchange being a common management practice to control temperatures and surface water elevation.

The Lagoon's water temperature was approximately 18 degrees Celsius (°C) with little variation at depth (17.9°C to 18.9°C), and dissolved oxygen (DO) levels were high at the surface (9 milligrams per liter [mg/L], greater than (>) 100% saturation), and dropping below optimal conditions by around 4 feet of depth (below 4 mg/L). Anoxic conditions were present at the very bottom of the Lagoon. Visibility of the water was also poor below depths of 1 foot throughout the Lagoon.

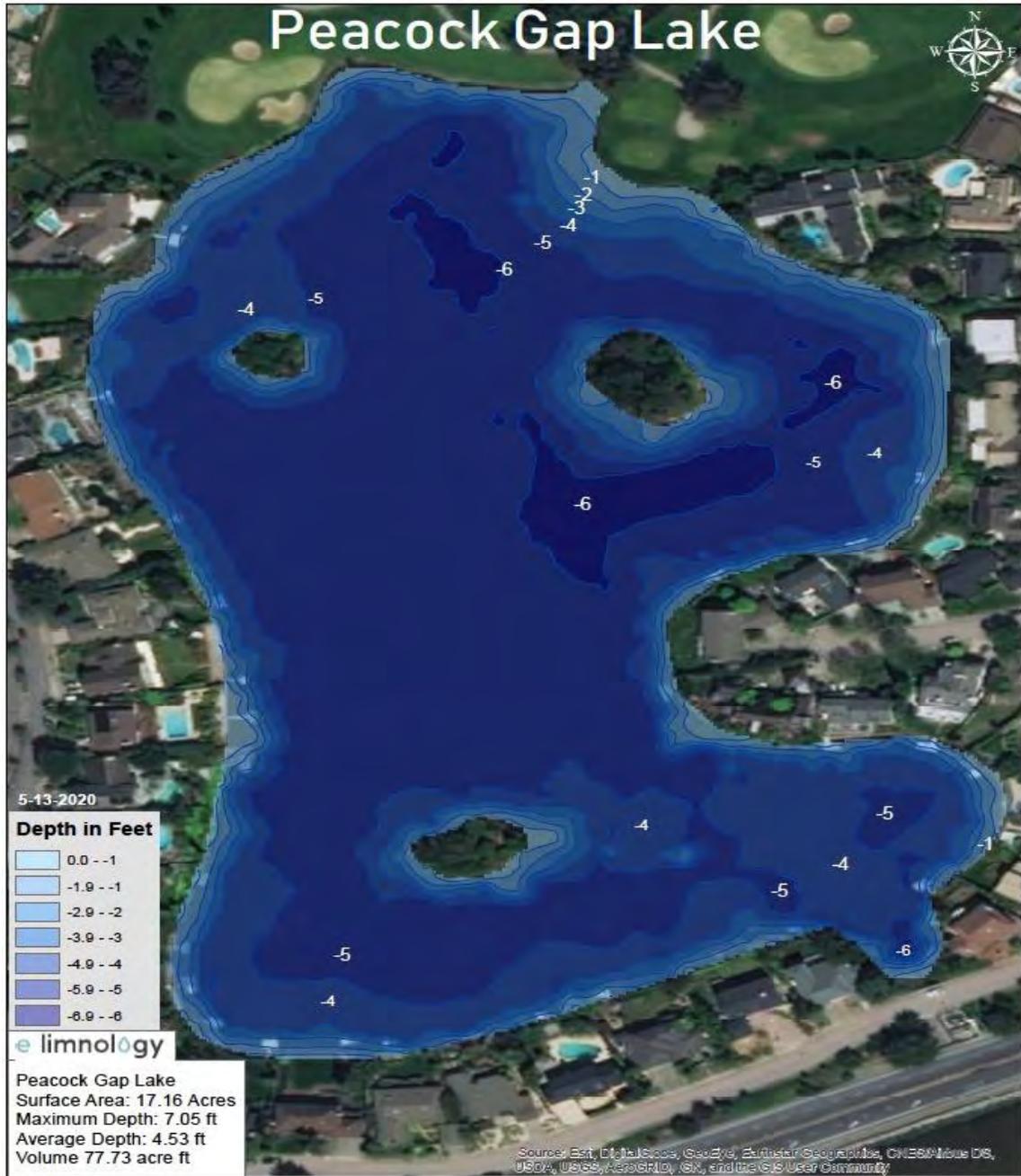


Figure 1 Peacock Gap Lagoon Bathymetric Mapping

4. Present Aquatic Vegetation Observed

Based on the overall size of the Lagoon, four sample sites were selected (Figure 2). Abundant algae was present, especially in the southeast cove. There were mats of Filamentous Cyanobacteria consisting of Lyngbya and Oscillatoria (Figure 3). Only one species of aquatic plant was collected, horned pondweed (*Zannichellia palustris*,

Figure 4), although it is likely that Wideon grass (*Ruppia maritima*), which is common in brackish water in this region, is also present.



Figure 2 Peacock Gap Lagoon Sample Locations

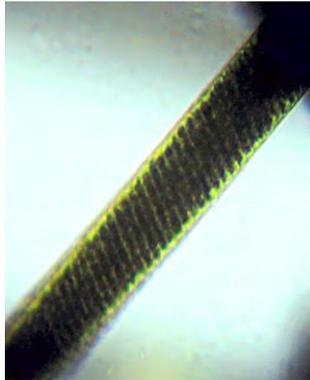


Figure 3 Oscillatoria



Figure 4 Zannichellia palustris

5. Physical Sample Observations

Plant biomass was restricted to nearshore areas with a majority growing in depths shallower than 3 feet. The primary species identified can grow to depths of 10 feet; therefore, it is likely that the water in this lagoon has consistently exhibited low visibility this spring, preventing the plants from migrating toward the center of the lake. The largest colony of plants was in the northeast corner of the Lagoon at the mouth of the creek exiting the golf course.

Sedimentation was mostly uniform throughout, approximately 1 to 2 feet thick throughout most of the bottom of the Lagoon (Figure 5). Harder, shallower sediments were identified by the inlet and outlet of the Lagoon, where scouring occurs. Softer, deeper sediments were encountered around the islands and along some of the shorelines. The water was too shallow near the larger island in the northeast; therefore, the team was unable to gain access to map the sediment depth in that location (Figure 6).

The sediment was anoxic, black in color, and odorous with abundant detritus. Rake samples revealed a high percentage of leaves that were not decomposed (primarily pine needles and some deciduous leaves), as well as a lot of what appeared to be coiled calcareous tubes, likely from a species of tube worm (*Serpulidae sp.*). Biomass accumulation appears to be heavily concentrated at the northerly end of the Lagoon, adjacent to the golf course, and the southeast corner cove, where the pump system is located (Figure 7).



Figure 3 Organic sedimentation found on the lagoon floor

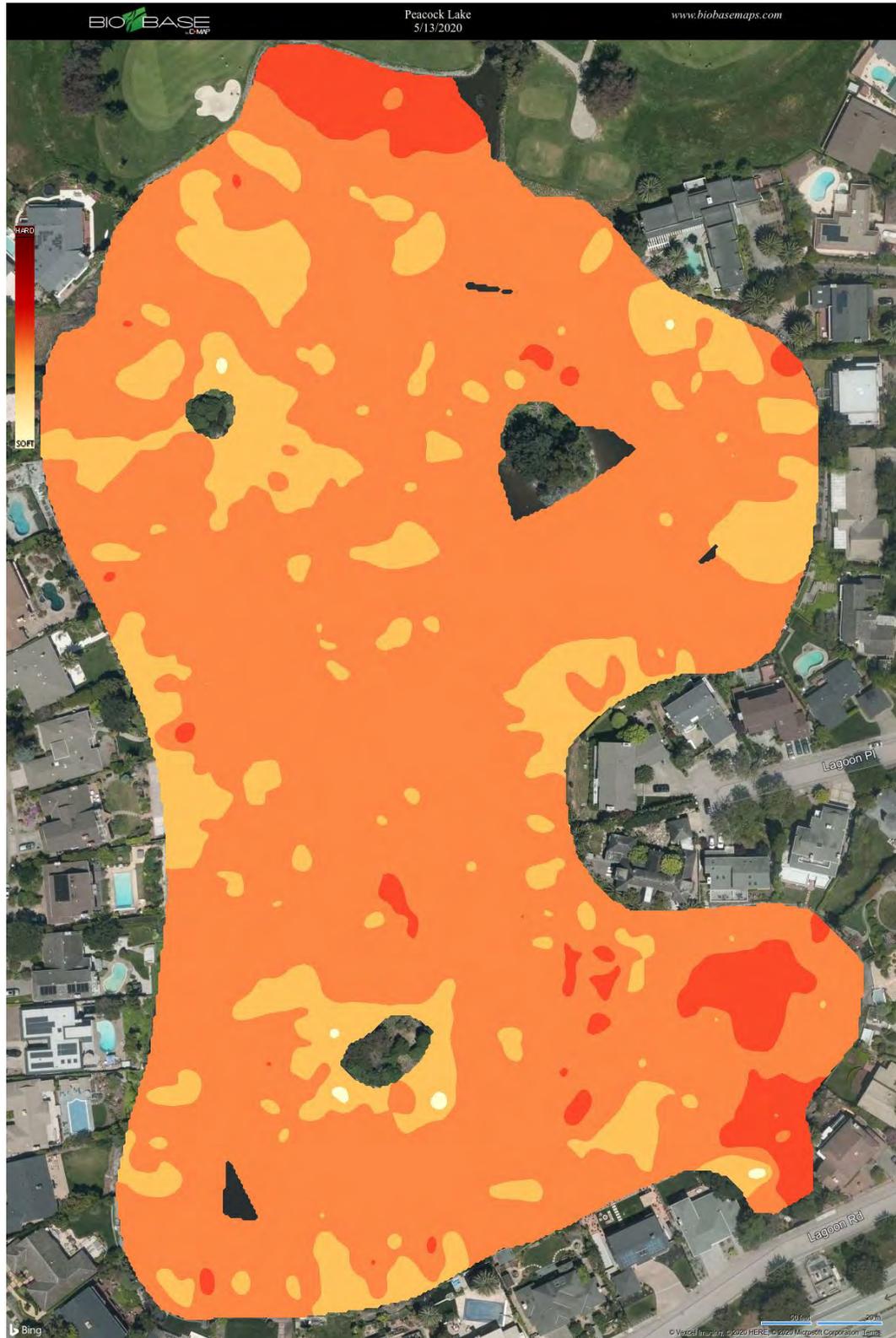


Figure 4 Hard Pan Mapping

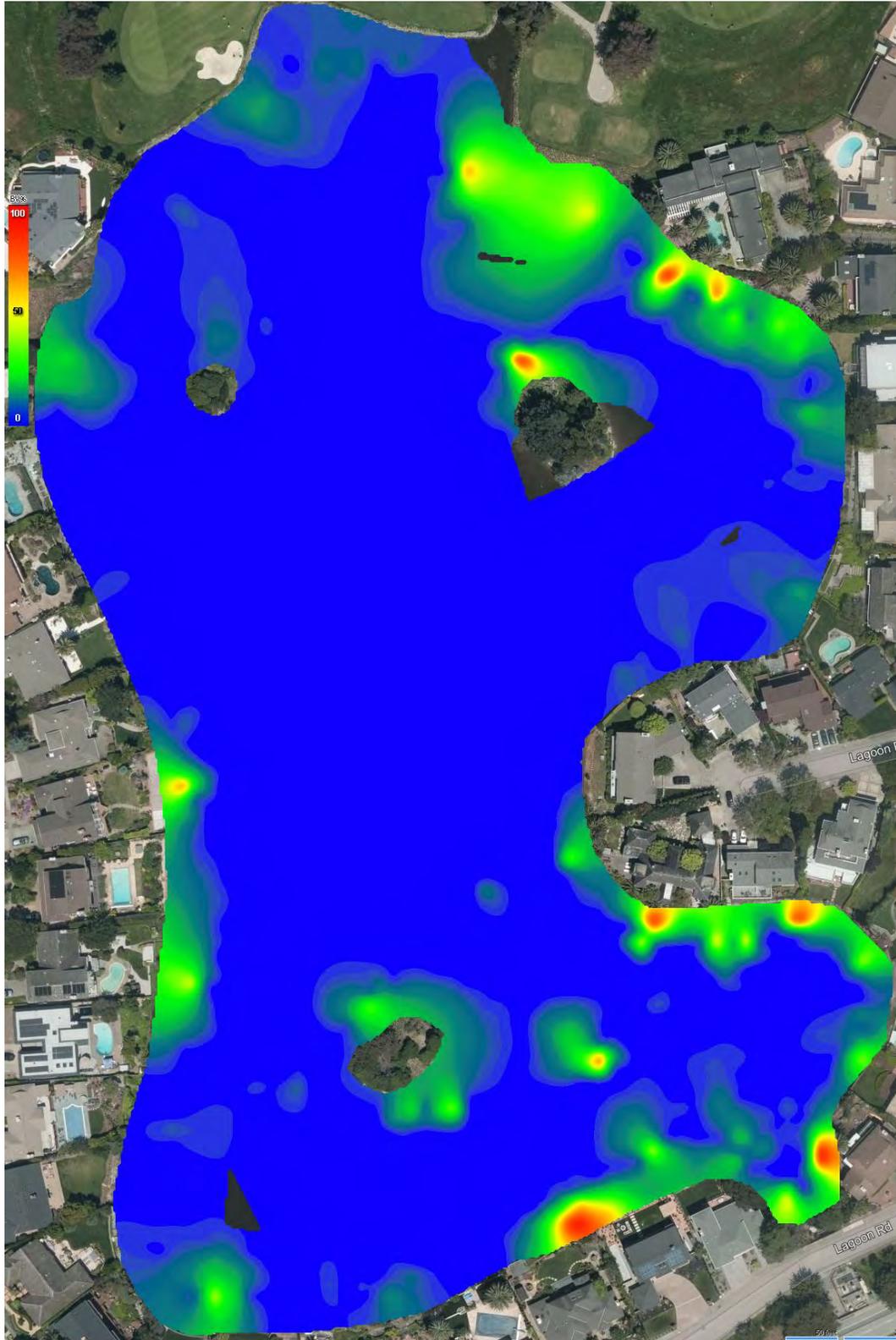


Figure 5 Biomass Density Mapping

6. Water Quality Samples (Physical and Laboratory)

Water quality data collected in the field included several chemical and physical parameters that are itemized in Attachment 1. This data provides a snapshot of the conditions in the Lagoon, which in conjunction with the other observable data, may be used to make recommendations for improving water quality in the Lagoon. However, long-term data collection is required to definitively identify water quality trends. Samples collected for laboratory analysis consisted of the following data:

1. Inorganic Anions (Nitrite, Nitrate, Nitrogen Dioxide [NO₂] and Phosphates);
2. Total Nitrogen (TKN); and
3. Total Phosphorous.

Low oxygen concentrations were measured near the bottom (less than 4 mg/L), which, when combined with the observable anoxic benthic layer, indicates low DO is likely a continuing problem for this system. The over-saturation of DO measured at the surface is likely a result of the algae blooms that were present at the time of measurement. Algae consume carbon dioxide during photosynthesis and release oxygen as a byproduct. This may, however, be deleterious as these algae respire in the absence of sunlight and consume oxygen. As a result of the algae-consuming oxygen, the DO levels could get to such a point that a fish kill could occur.

The uniform temperatures in the Lagoon (18°C) are, in part, due to its shallowness. Typically, you can divide a water body's maximum depth by two to estimate the average depth of the basin; however, this Lagoon does not follow this general rule, indicating that the average depth more closely resembles the mode than the mean. Often lakes have a few deeper regions where cooler water can develop.

DO, unlike other constituents, has an inverse relationship with temperature. In other words, warmer water can dissolve less oxygen than cooler water. As a result, it is likely that this uniformly shallow basin gets very warm during the summer, and oxygen levels will be much lower than were measured during this site visit.

In addition to field measurements, the team collected sediment samples and water samples for analysis at McCampbell Analytical Labs in Pittsburg, CA (Attachment 1). These samples were combined into one composite (from four locations in the lake) in an attempt to provide results that were representative of the Lagoon's overall conditions. Results revealed higher than ideal concentrations (1.4 mg/L) of Nitrogen in the water column and a surprisingly low concentration (43 milligrams per kilogram [mg/Kg]) of total phosphorous in the sediment. Much of the other parameters tested were inconclusive due to the higher than expected salinity of the water at the time of sampling.

7. Recommendations

Of primary concern to the health of the Lagoon are two distinct and related components of the Lagoon: sedimentation and oxygenation. Best Management Practices (BMPs), sediment management, and oxygenation introduction will address the root causes of the odors, high nutrient concentrations, and the potentially dangerous cyanobacteria blooms that were present at the time of the assessment and reported by others to be present throughout the year at varying levels.

7.1 Recommended Lagoon Best Management Practices

Foth strongly urges a lake management plan be developed for the Lagoon. The Lagoon Best Management Practices (LBMPs) should consist of the following, but not be limited to:

1. Educate the residents about BMPs for the management of the Lagoon as well as for their personal properties.
 - a. Minimize the amount of yard waste that can enter the Lagoon.
 - b. Stop feeding waterfowl.
 - c. Eliminate unnecessary discharges and drainage into the Lagoon.
2. Develop a sediment management program.
 - a. Naturally eliminate sedimentation by adding beneficial bacteria and enzymes.
3. Determine appropriate vegetation and algae control methods (oxygenation).
4. Set a generalized schedule of activities.
 - a. Perform routine water quality monitoring and sampling.
 - b. Deploy sedimentation control.
5. Develop a Lagoon management committee structure (Peacock Gap Lagoon Committee).
 - a. Engage residents in improving and maintaining the health of the Lagoon.

7.2 Sediment Management

1. Prevention: Sediment transport from the creek in the north should be assessed and addressed. It is likely that runoff from the golf course and higher in the watershed

contribute a significant source of material to the Lagoon. A combination of Best Management Practices (BMPs), such as implementation of silt screens, check dams, bio-swales or a sediment deposition basin, should be considered to address this source of sediment. In addition, stabilizing unprotected shorelines around the islands and along the golf course should be addressed.

2. Maintenance: Small dredging operations can be employed in targeted areas with the spoils being used to rebuild/extend the existing islands. Building bulkheads around the islands that incorporate silt screens or other filter fabric could be used as a method to contain dredged material.
3. Restoration: Large scale dredging operations are not likely feasible at this site due to cost. However, a combination of maintenance dredging and sludge-degrading additives may restore a significant volume to the Lagoon. It is very common for lake managers to use biologically active products to target sludge on the bottom of ponds, especially those which contain high percentages of undigested detritus, such as in Peacock Gap Lagoon.

Sediment management recommendations consist of deploying beneficial bacteria and enzymes. There is no permitting and/or reporting to local and state regulatory agencies for applying bacteria/enzyme tablets into the Lagoon. Additionally, this product is not harmful to humans or animals.

7.2.1 MuckBiotics™ Tablets

Below is the monthly cost for purchasing the enzyme tablets, which can be handled through Foth. There are several different approaches for the application events and routine monitoring that will be reviewed during the report presentation meeting with City staff and Peacock Gap Lagoon Committee representatives.

Surface Area (acres)	Targeted Muck (low rate)	Targeted Muck (high rate)	Cost/month (low)	Cost/month (high)
1	20	50	\$200	\$450
4	80	200	\$800	\$1800

Data sheets for MuckBiotics™ Tablets are included in Attachment 2.

7.3 Oxygenation Introduction

Oxygenation devices are distinct from conventional aeration devices, such as fountains or compressed air bubble diffusers. Oxygenation devices deliver gas or water high in oxygen concentration, or even pure oxygen, directly into the lagoon. Due to the measured depth of this Lagoon, conventional systems would not be very effective; therefore, we

recommend a system that introduces an enriched or pure oxygen gas or water directly into the water of the Lagoon. Some systems, such as those made by Moleaer, offer a high oxidation potential system (e.g., hydrogen peroxide) which can directly impact algae growth.

There are two oxygenation introduction recommendations to consider. Foth recommends an oxygen inversion plate emitting oxygen at the Lagoon floor for the duration of the pilot study (1 year). The oxygenation plate is connected to a weighted airline with a 1/3 horsepower pump at the shoreline, 240 volt (v) power supply is required. A site visit to determine the best location will be required for the electrical connection which will be sufficient to accommodate a long term system.

Long-term oxygenation recommendations consist of Moleaer's patented Clear™ Nanobubble Generator is an all-natural, chemical-free solution for improving water quality and clarity in lakes and ponds. Clear™ is a hyper-efficient gas-injection technology that converts air into nanobubbles. Moleaer's technology produces trillions of negatively charged, neutrally buoyant nanobubbles that remain suspended in a water body to provide a reserve of oxygen throughout the water column. As aquatic life consumes oxygen from the water, the reserve of nanobubbles transfers oxygen throughout the water body to maintain DO levels. Maintaining DO levels at the muck layer reduces nutrient cycling from the sediment. The nanobubbles also produce a mild and effective oxidant to improve clarity and overall water quality. The Moleaer system, including installation and start-up budget, is \$30,000 to \$35,000. The electrical connection and location for the pilot study aeration compressor will be able to accommodate the Moleaer system, as well. Moleaer is currently working on a monthly service program with an option to buy after 24 months.

Data sheets for Moleaer's Clear™ Nanobubble Generator are included in Attachment 2.

7.4 Pilot Study

The Foth team recommends a pilot study in the southeast corner of the Lagoon for one year. The duration of the pilot study is to determine how the Lagoon responds to the improvement recommendations and establish data trends throughout seasonal changes. The ideal location is the southeast area, which is shaped like a cove, extending outward to the centrally located island. This area was chosen due to the observed volume of vegetation, wind direction, proximity to the pump station/electricity, and farthest distance from any runoff influence from the golf course (Figure 7).

8. Conclusion

The water quality is in fair to poor general condition. This condition does not support marine and other aquatic life long term and without intervention can lead to eutrophication. Foth has developed a list of recommended next steps to be considered for sediment management, oxygenation introduction, and routine monitoring:

1. Sedimentation:
 - a. Introduce bacteria/enzyme tablets.
2. Oxygenation:
 - a. Deploy an oxygenation diffuser plate.
 - b. Install a nanobubbler.
3. Pilot Study:
 - a. Observe the southeast corner of the Lagoon for one year to determine how the Lagoon responds to the LBMPs and establish data trends throughout seasonal changes.

There is a strong interest from residents to work with the City on recommendations outlined in this assessment. To improve the water quality beyond what standard BMPs can deliver, oxygenation and sedimentation are key components for restoring the Lagoon's marine life. The resident interaction and support for improving the health of Peacock Gap Lagoon should be commended. It is our experience with managing several lagoon communities that when you have a positive level of resident participation/support, goals can be reached. The return is a long term healthy lagoon system supporting marine life.

Foth appreciates the opportunity to provide this assessment. We look forward to discussing this document and collaboratively working with the City of San Rafael staff and Lagoon residents to improve the health of Peacock Gap Lagoon. If you have any questions please do not hesitate to call me at (415) 637-7282 or via email adrian.cormier@foth.com

Foth Infrastructure & Environment, LLC



Adrian Cormier
Project Manager



Kyle MacDonald
Lead Civil Engineer

Attachments

- Attachment 1 – Water and Sediment Sample Data
- Attachment 2 – Data Sheets
 - Moleaer Nanobubble Data Sheet
 - MuckBiotics™ Data Sheet

Attachment 1
Water and Sediment Sample Data



McC Campbell Analytical, Inc.

"When Quality Counts"

Analytical Report

WorkOrder: 2005659

Report Created for: Elimnology

122 Castro Street
Richmond, CA 94801

Project Contact: Eli Kersh

Project P.O.:

Project: PGL

Project Received: 05/14/2020

Analytical Report reviewed & approved for release on 05/20/2020 by:

Christine Askari
Project Manager

The report shall not be reproduced except in full, without the written approval of the laboratory. The analytical results relate only to the items tested. Results reported conform to the most current NELAP standards, where applicable, unless otherwise stated in the case narrative.





Glossary of Terms & Qualifier Definitions

Client: Elimnology
Project: PGL
WorkOrder: 2005659

Glossary Abbreviation

%D	Serial Dilution Percent Difference
95% Interval	95% Confident Interval
CPT	Consumer Product Testing not NELAP Accredited
DF	Dilution Factor
DI WET	(DISTLC) Waste Extraction Test using DI water
DISS	Dissolved (direct analysis of 0.45 µm filtered and acidified water sample)
DLT	Dilution Test (Serial Dilution)
DUP	Duplicate
EDL	Estimated Detection Limit
ERS	External reference sample. Second source calibration verification.
ITEF	International Toxicity Equivalence Factor
LCS	Laboratory Control Sample
LQL	Lowest Quantitation Level
MB	Method Blank
MB % Rec	% Recovery of Surrogate in Method Blank, if applicable
MDL	Method Detection Limit
ML	Minimum Level of Quantitation
MS	Matrix Spike
MSD	Matrix Spike Duplicate
N/A	Not Applicable
ND	Not detected at or above the indicated MDL or RL
NR	Data Not Reported due to matrix interference or insufficient sample amount.
PDS	Post Digestion Spike
PDSD	Post Digestion Spike Duplicate
PF	Prep Factor
RD	Relative Difference
RL	Reporting Limit (The RL is the lowest calibration standard in a multipoint calibration.)
RPD	Relative Percent Deviation
RRT	Relative Retention Time
SPK Val	Spike Value
SPKRef Val	Spike Reference Value
SPLP	Synthetic Precipitation Leachate Procedure
ST	Sorbent Tube
TCLP	Toxicity Characteristic Leachate Procedure
TEQ	Toxicity Equivalents
TZA	TimeZone Net Adjustment for sample collected outside of MAI's UTC.
WET (STLC)	Waste Extraction Test (Soluble Threshold Limit Concentration)



Glossary of Terms & Qualifier Definitions

Client: Elimnology

Project: PGL

WorkOrder: 2005659

Analytical Qualifiers

S Spike recovery outside accepted recovery limits
a14 Reporting limit raised due to the physical nature of the sample
c1 Surrogate recovery outside of the control limits due to the dilution of the sample.



Analytical Report

Client: Elimnology
Date Received: 05/14/2020 15:48
Date Prepared: 05/14/2020
Project: PGL

WorkOrder: 2005659
Extraction Method: E300.1
Analytical Method: E300.1
Unit: mg/L

Inorganic Anions by IC

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
Comp 1-Water	2005659-001A	Water	05/13/2020 12:00	IC4 05152022.D	198492

Analytes	Result	RL	DF	Date Analyzed
Nitrate as N	ND	1.0	10	05/14/2020 18:48
Nitrate as NO ₃ ⁻	ND	4.4	10	05/14/2020 18:48
Nitrite as N	ND	1.0	10	05/14/2020 18:48
Nitrite as NO ₂ ⁻	ND	3.3	10	05/14/2020 18:48
Nitrate & Nitrite as N	ND	1.0	10	05/14/2020 18:48
ortho-Phosphate as P	ND	1.0	10	05/14/2020 18:48
ortho-Phosphate as PO ₄	ND	3.1	10	05/14/2020 18:48

Surrogates	REC (%)	Qualifiers	Limits	Date Analyzed
Malonate	0	S	85-115	05/14/2020 18:48

Analyst(s): AO

Analytical Comments: a14,c1



Analytical Report

Client: Elimnology
Date Received: 05/14/2020 15:48
Date Prepared: 05/19/2020
Project: PGL

WorkOrder: 2005659
Extraction Method: E365.1m
Analytical Method: E365.1m
Unit: mg/Kg

Total Phosphorous as P

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
Comp 1-Sludge	2005659-002A	Sludge	05/13/2020 12:00	WC_SKALAR 052020B1_25	198764

<u>Analytes</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Date Analyzed</u>
Total Phosphorous as P	43	40	10	05/20/2020 12:06

Analyst(s): NM



Analytical Report

Client: Elimnology
Date Received: 05/14/2020 15:48
Date Prepared: 05/18/2020
Project: PGL

WorkOrder: 2005659
Extraction Method: E365.1
Analytical Method: E365.1
Unit: mg/L

Total Phosphorous as P

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
Comp 1-Water	2005659-001B	Water	05/13/2020 12:00	WC_SKALAR 051920B1_34	198694

<u>Analytes</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Date Analyzed</u>
Total Phosphorous as P	ND	0.10	2	05/19/2020 15:19

Analyst(s): NM



Analytical Report

Client: Elimnology
Date Received: 05/14/2020 15:48
Date Prepared: 05/18/2020
Project: PGL

WorkOrder: 2005659
Extraction Method: E351.2
Analytical Method: E351.2
Unit: mg/L

Total Kjeldahl Nitrogen

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
Comp 1-Water	2005659-001B	Water	05/13/2020 12:00	WC_SKALAR 051920A1_87	198590

Analytes	Result	RL	DF	Date Analyzed
TKN as N	1.4	0.30	1	05/19/2020 11:15

Analyst(s): RB



Quality Control Report

Client: Elimnology
Date Prepared: 05/14/2020
Date Analyzed: 05/14/2020
Instrument: IC4
Matrix: Water
Project: PGL

WorkOrder: 2005659
BatchID: 198492
Extraction Method: E300.1
Analytical Method: E300.1
Unit: mg/L
Sample ID: MB/LCS/LCSD-198492

QC Summary Report for E300.1

Analyte	MB Result	MDL	RL	SPK Val	MB SS %REC	MB SS Limits
Nitrate as N	ND	0.0530	0.100	-	-	-
Nitrate as NO ₃ ⁻	ND	0.230	0.440	-	-	-
Nitrite as N	ND	0.0470	0.100	-	-	-
Nitrite as NO ₂ ⁻	ND	0.150	0.330	-	-	-
ortho-Phosphate as P	ND	0.0900	0.100	-	-	-
ortho-Phosphate as PO ₄	ND	0.280	0.310	-	-	-

Surrogate Recovery

Malonate	0.101			0.1	101	90-115
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Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
Nitrate as N	0.970	0.972	1	97	97	85-115	0.190	20
Nitrate as NO ₃ ⁻	4.30	4.30	4.4	98	98	85-115	0.190	20
Nitrite as N	0.974	0.972	1	97	97	85-115	0.116	20
Nitrite as NO ₂ ⁻	3.20	3.20	3.3	97	97	85-115	0.116	20
ortho-Phosphate as P	0.969	0.901	1	97	90	85-115	7.24	20
ortho-Phosphate as PO ₄	2.97	2.76	3.06	97	90	85-115	7.24	20

Surrogate Recovery

Malonate	0.0993	0.0986	0.10	99	99	90-115	0.674	20
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Quality Control Report

Client: Elimnology
Date Prepared: 05/20/2020
Date Analyzed: 05/20/2020
Instrument: WC_SKALAR
Matrix: Soil
Project: PGL

WorkOrder: 2005659
BatchID: 198764
Extraction Method: E365.1m
Analytical Method: E365.1m
Unit: mg/Kg
Sample ID: MB/LCS/LCSD-198764

QC Summary Report for E365.1m

Analyte	MB Result	MDL	RL			
Total Phosphorous as P	ND	2.70	4.00	-	-	-

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
Total Phosphorous as P	42.3	39.8	40	106	100	80-120	6.03	20



Quality Control Report

Client: Elimnology
Date Prepared: 05/19/2020
Date Analyzed: 05/19/2020
Instrument: WC_SKALAR
Matrix: Water
Project: PGL

WorkOrder: 2005659
BatchID: 198694
Extraction Method: E365.1
Analytical Method: E365.1
Unit: mg/L
Sample ID: MB/LCS/LCSD-198694

QC Summary Report for E365.1

Analyte	MB Result	MDL	RL			
Total Phosphorous as P	ND	0.0350	0.0500	-	-	-

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
Total Phosphorous as P	0.806	0.792	0.80	101	99	90-110	1.71	20



Quality Control Report

Client: Elimnology
Date Prepared: 05/18/2020
Date Analyzed: 05/19/2020
Instrument: WC_SKALAR
Matrix: Water
Project: PGL

WorkOrder: 2005659
BatchID: 198590
Extraction Method: E351.2
Analytical Method: E351.2
Unit: mg/L
Sample ID: MB/LCS/LCSD-198590
 2005659-001BMS/MSD

QC Summary Report for E351.2 (TKN as N)

Analyte	MB Result	MDL	RL			
TKN as N	ND	0.280	0.300	-	-	-

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
TKN as N	12.1	12.0	12	101	100	73-119	1.01	20

Analyte	MS DF	MS Result	MSD Result	SPK Val	SPKRef Val	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD Limit
TKN as N	1	13.7	13.6	12	1.41	103	102	70-118	0.870	20



1534 Willow Pass Rd
Pittsburg, CA 94565-1701
(925) 252-9262

WaterTrax WriteOn EDF

CHAIN-OF-CUSTODY RECORD

WorkOrder: 2005659

ClientCode: ELIP

Excel EQulS Email HardCopy ThirdParty J-flag
 Detection Summary Dry-Weight

Report to:

Eli Kersh
Elimnology
122 Castro Street
Richmond, CA 94801
415-307-0943 FAX:

Email: ekersh@elimnology.com
cc/3rd Party:
PO:
Project: PGL

Bill to:

Eli Kersh
Eliminology
122 Castro Street
Richmond, CA 94801
ekersh@elimnology.com

Requested TAT: 5 days;

Date Received: 05/14/2020

Date Logged: 05/14/2020

Lab ID	Client ID	Matrix	Collection Date	Hold	Requested Tests (See legend below)												
					1	2	3	4	5	6	7	8	9	10	11	12	
2005659-001	Comp 1-Water	Water	5/13/2020 12:00	<input type="checkbox"/>	A		B	A	B								
2005659-002	Comp 1-Sludge	Sludge	5/13/2020 12:00	<input type="checkbox"/>		A		A									

Test Legend:

1	300_1_W
5	TKN_W
9	

2	PhosTot_S
6	
10	

3	PhosTot_W
7	
11	

4	PRDisposal Fee
8	
12	

Project Manager: Rosa Venegas

Prepared by: Agustina Venegas

Comments:

NOTE: Soil samples are discarded 60 days after results are reported unless other arrangements are made (Water samples are 30 days).
Hazardous samples will be returned to client or disposed of at client expense.



WORK ORDER SUMMARY

Client Name: ELIMNOLOGY

Project: PGL

Work Order: 2005659

Client Contact: Eli Kersh

QC Level: LEVEL 2

Contact's Email: ekersh@elimnology.com

Comments:

Date Logged: 5/14/2020

WaterTrax WriteOn EDF Excel EQUIS Email HardCopy ThirdParty J-flag

Lab ID	Client ID	Matrix	Test Name	Containers /Composites	Bottle & Preservative	De-chlorinated	Collection Date & Time	TAT	Sediment Content	Hold	SubOut
2005659-001A	Comp 1-Water	Water	E300.1 (Inorganic Anions) <Nitrate & Nitrite as N, Nitrate as N, Nitrate as NO3 ⁻ , Nitrite as N, Nitrite as NO2 ⁻ , ortho-Phosphate as P, ortho-Phosphate as PO4>	1	250mL HDPE, unprsv.	<input type="checkbox"/>	5/13/2020 12:00	5 days	Present	<input type="checkbox"/>	
2005659-001B	Comp 1-Water	Water	E351.2 (TKN)	1	250mL HDPE w/ H2SO4	<input type="checkbox"/>	5/13/2020 12:00	5 days	Present	<input type="checkbox"/>	
			E365.1 (Total Phosphorous as P)			<input type="checkbox"/>		5 days	Present	<input type="checkbox"/>	
2005659-002A	Comp 1-Sludge	Sludge	E365.1 (Total Phosphorous as P)	1	1LA, Unpres	<input type="checkbox"/>	5/13/2020 12:00	5 days		<input type="checkbox"/>	

NOTES: - STLC and TCLP extractions require 2 days to complete; therefore, all TATs begin after the extraction is completed (i.e., One-day TAT yields results in 3 days from sample submission).

- MAI assumes that all material present in the provided sampling container is considered part of the sample - MAI does not exclude any material from the sample prior to sample preparation unless requested in writing by the client.



Sample Receipt Checklist

Client Name: **Elimnology**
 Project: **PGL**

Date and Time Received: **5/14/2020 15:48**
 Date Logged: **5/14/2020**
 Received by: **Tina Perez**
 Logged by: **Agustina Venegas**

WorkOrder No: **2005659** Matrix: Sludge/Water
 Carrier: Client Drop-In

Chain of Custody (COC) Information

Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample IDs noted by Client on COC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Date and Time of collection noted by Client on COC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sampler's name noted on COC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
COC agrees with Quote?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>

Sample Receipt Information

Custody seals intact on shipping container/cooler?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>
Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper containers/bottles?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	

Sample Preservation and Hold Time (HT) Information

All samples received within holding time?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	NA <input type="checkbox"/>
Samples Received on Ice?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	

(Ice Type: WET ICE)

Sample/Temp Blank temperature	Temp: 1.4°C	NA <input type="checkbox"/>	
Water - VOA vials have zero headspace / no bubbles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>
Sample labels checked for correct preservation?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
pH acceptable upon receipt (Metal: <2; Nitrate 353.2/4500NO3: <2; 522: <4; 218.7: >8)?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>

UCMR Samples:

pH tested and acceptable upon receipt (200.8: ≤2; 525.3: ≤4; 530: ≤7; 541: <3; 544: <6.5 & 7.5)?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>
Free Chlorine tested and acceptable upon receipt (<0.1mg/L)?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>

Comments:

Attachment 2

Data Sheets

Moleaer Clear™ Nanobubble Generator Data Sheet
MuckBiotics™ Data Sheet

CLEAR™ Nanobubble Generator



APPLICATIONS

- Pond/Lake Aeration
- Aquatic Management
- Odor Control
- Turf Irrigation
- Iron & Manganese Control
- Chlorophyll a Reduction
- Improve Water Clarity

Moleaer's patented Clear™ is an all-natural, chemical-free solution for improving water quality and clarity in lakes and ponds. The Clear nanobubble generator is a hyper-efficient gas-injection technology that converts air into nanobubbles. Moleaer's technology produces trillions of negatively charged, neutrally buoyant nanobubbles that remain suspended in a water body to provide a reserve of oxygen throughout the water column. As aquatic life consumes oxygen from the water, the reserve of nanobubbles transfers oxygen throughout the water body to maintain DO levels. Maintaining dissolved oxygen (DO) levels at the muck layer reduces nutrient cycling from the sediment. The nanobubbles also produce a mild and effective oxidant to improve clarity and overall water quality.

The Clear is available in 50 and 150 gpm flow rates and includes a pump and air compressor or the option to transfer twice as much oxygen to the water body using an oxygen enrichment package. The Clear nanobubble generator was specifically designed for aquatic management and is easy to install, operate, and maintain.

FEATURES & BENEFITS

- 90% standard oxygen transfer efficiency
- <65 dB
- Improved water quality and clarity
- 100 nm-sized bubbles
- >1 billion nanobubbles / mL
- Oxygenates entire water column
- Easy to install
- Compact & lightweight
- Reduced nutrient recycling rate
- Enriched oxygen option available

www.moleaer.com

MODELS	Clear 50	Clear 50 (230V)	Clear 150	Clear 150 Enriched
LIQUID FLOW CAPACITY				
Flow Rate, GPM (m ³ /hr)	50 (11)	50 (11)	150 (34)	150 (34)
Indicated Gas Flow Range Maximum, CFH (m ³ /hr)			20 (0.6)	
Indicated Gas Flow Range Recommended, CFH (m ³ /hr)	5 (0.1)	5 (0.1)	15 (0.4)	15 (0.4)
OPERATING PARAMETERS				
Temperature Tolerance, PVC, °F (°C)			41 - 140 (5 - 60)	
Standard Oxygen Transfer Efficiency			> 90%	
Solids, inches (mm)			Up to 3/8 (10)	
GAS FEED¹				
Feed Gas Pressure Range Minimum, PSIG (bar)			60 (4.1)	
Feed Gas Pressure Range Maximum, PSIG (bar)			100 (6.9)	
PUMP				
Pump Model			Pentair Sparus 160	
Wetted Parts Materials			Polypropylene/316 SS/Buna	
Voltage	115	230	230	230
Phase			1	
Hz			60	
HP	3/4	3/4	3	3
COMPRESSOR				
Compressor Model			Gast 86R Single Cylinder	
Voltage	115	230	230	230
RPM	1725	1735	1725	1725
HZ			50/60	
Total Draw, Amperage (Including Pump/Comp)	12	6.8	15	18.2
Total Draw, Horsepower (kW)		0.875 (0.652)	3.125 (2.32)	3.37 (2.51)
CONTROLS				
Pressure Gauges (bar)			Wika 2.5" (60/160) (4-11)	
Rotameter, CFH (KNOBLESS)	0 - 20	0 - 20	0 - 20	0 - 20
MOTOR STARTER SWITCH				
Model			Enclosed Motor Starter with OL reset button	
Resistance Rating			9-45A rating with 24 VDC input	
			Watertight / NEMA 4 X	
UNIT CONNECTIONS - FEMALE SOCKET CONNECT				
Inlet, inches	2 (50)	2 (50)	3 (75)	3 (75)
Discharge, inches	2 (50)	2 (50)	3 (75)	3 (75)
DIMENSIONS & WEIGHT				
Height, inches (cm)			26 (66)	
Width, Inches (cm)			34 (86)	
Length, inches (cm)			38 (96.5)	
Weight, lb (kg)	164 (74)		198 (90)	202 (92)

General Note

3" inlet and outlet Customer piping is recommended for the Clear 150 and Clear 150 Enriched

Nitrogen Separator Details (Enriched Option Only)

Nitrogen Separator Model Prism PA3010

Max Pressure PSIG(BAR) 385 (26.5)

Max Temp °F (°C) 150 (65.6)

EPA Establishment Number 94231-CA-1

MUCKBIOTICS

Powerful Muck and Nutrient Removal

MuckBiotics™ are a next generation probiotic tablet for restoration and maintenance of impaired water resources. This advanced probiotic combines scientific research with novel bioengineering, resulting in a product that treats the entire water body by starting at the bottom.

MuckBiotics are applied by broadcasting the tablets evenly over the surface of the targeted area. The tablets sink to the bottom and rapidly populate the aquatic environment in which they are applied. MuckBiotics should be applied across the entire surface of a water body for best results. They also excel at targeting shorelines, coves, or similar specific areas prone rapid accumulation of organic matter. MuckBiotics DO NOT kill aquatic plants or algae.

PRODUCT HIGHLIGHTS

- Great for both targeted treatments and full water bodies
- Non-toxic, non-hazardous, pet-safe water treatment tablet
- Proven results backed by years of scientific research



MuckBiotics are available in 30 pound biodegradable and resealable bags.



Diagram shows MuckBiotics sinking into the muck layer for optimal degradation.

APPLICATIONS

- Lakes and ponds
- Aquaculture
- Shorelines
- And more!
- Golf courses
- Retention ponds
- Decorative ponds

BENEFITS

- Removes buildup of organic matter
- Improves water quality and clarity
- Restores balance to water bodies
- Reduces internal nutrient load

MuckBiotics™ Dosage - Once per month or as needed

Surface Acres	Targeted Muck Reduction	Muck Maintenance & Prevention	Degradation of Floating Debris
1/4	5 - 12.5 pounds	2.5 - 6.25 pounds	1.25 - 3.75 pounds
1/2	10 - 25 pounds	5 - 12.5 pounds	2.5 - 7.5 pounds
1	20 - 50 pounds	10 - 25 pounds	5 - 15 pounds
5	100 - 250 pounds	50 - 125 pounds	25 - 75 pounds
10	200 - 500 pounds	100 - 250 pounds	50 - 150 pounds
100	2000 - 5000 pounds	1000 - 2500 pounds	500 - 1500 pounds

- Do not mix directly with algaecides or herbicides
- If used in conjunction with algaecide or herbicide, apply MuckBiotics after chemical treatments for best results

INCLUDE IN TREATMENT PROGRAMS FOR:

FILAMENTOUS ALGAE

CYANOBACTERIA

WATER CLARITY

AQUATIC PLANTS

PLANKTONIC ALGAE

MUCK & SLUDGE

NUTRIENT REDUCTION

SUBMERGED PLANTS

THE SCIENCE BEHIND IT

The nontoxic, organic technology saturates the surface of the sediment layer with rare earth stimulants and a broad spectrum of natural bacterial cultures. This establishes a healthy microbiota at the water-to-sediment interface that accelerates the digestion of organic matter. The microbiota functions as a biofilter, reducing harmful nutrient loading from both internal and external sources.

For more information on the science behind MuckBiotics, and the full details of our research into it's creation and effectiveness, visit us online at www.naturalake.com/muckbiotics.

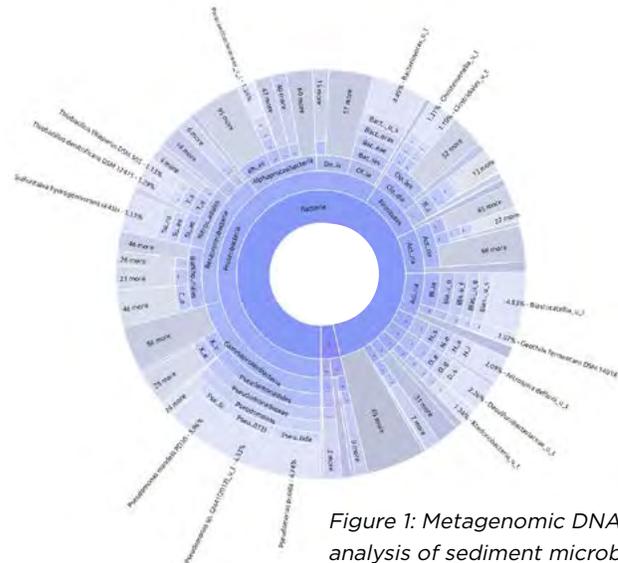


Figure 1: Metagenomic DNA analysis of sediment microbiota.



888.757.9577 | www.naturalake.com | orders@naturalake.com

Important: Always read and follow label instructions. This product DOES NOT kill aquatic plants or algae. Call us, 888.757.9575 for more information.

Appendix B
Monthly Water Quality Data Sheets

Peacock Gap Lagoon Water Quality Assessment

Collection Date: 5/13/2020

Samples collected by: AC, EK

Sample Time: 1000

Sample Location: S-1, 2, 3, 4

Air Temperature: 62

Green - Good Yellow - Acceptable Red - Poor

Sample location - S-1

	SURFACE	SEAFLOOR
Temp:	66	66.1
pH:	8.7	8.1
NTU:	3	3.9
DO mg/l:	9.1	1.9
Sal:	8.9	9
Depth:	1.3	4.6

Sample location - S-2

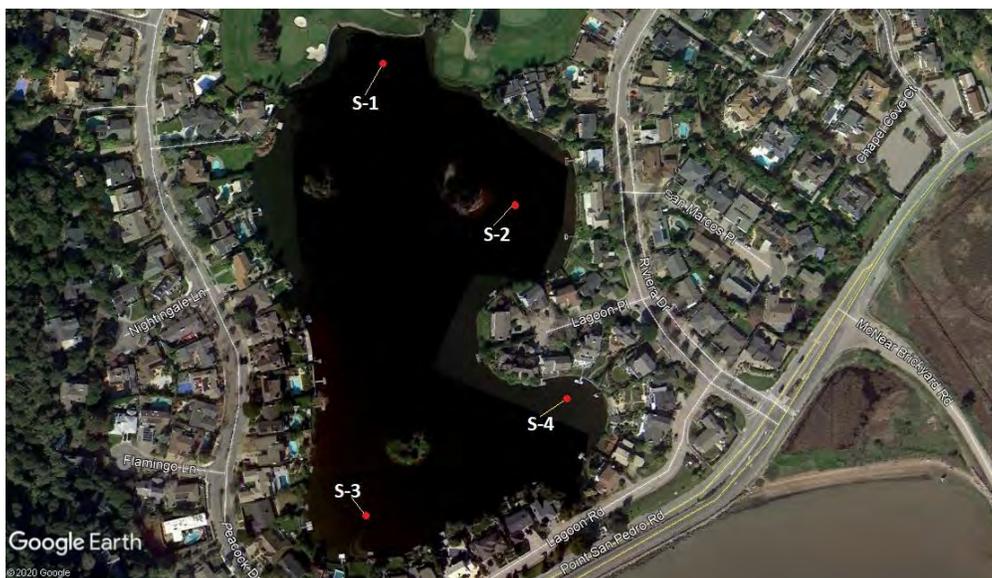
	SURFACE	SEAFLOOR
Temp:	66.2	66
pH:	8.5	8.4
NTU:	3.44	3.8
DO mg/l:	9.8	1.3
Sal:	9	19
Depth:	1.22	4.8

Sample location - S-3

	SURFACE	SEAFLOOR
Temp:	66.1	66.3
pH:	8.3	8.21
NTU:	3.12	3.55
DO mg/l:	9.1	0.81
Sal:	9	21
Depth:	0.8	5.7

Sample location - S-4

	SURFACE	SEAFLOOR
Temp:	66	66.1
pH:	8.29	8.39
NTU:	3.2	3.99
DO mg/l:	9.22	2.9
Sal:	9	14
Depth:	1.3	5.4



Summary: Please refer to the PGL Assessment dated 7/9/20
 Note significant difference in Salinity and DO from surface to seafloor

Peacock Gap Lagoon Monthly Water Quality Summary

Collection Date: 7/29/2020

Samples collected by: AC, EK

Sample Time: 1100

Sample Location: S-1, 2, 3, 4

Air Temperature: 77

Green - Good Yellow - Acceptable Red - Poor

Sample location - S-1

	SURFACE	SEAFLOOR
Temp:	76	73.6
pH:	8.3	8.3
NTU:	4	4
DO mg/l:	3.2	2.8
Sal:	24	24
Depth:	1.3	4.6

Sample location - S-2

	SURFACE	SEAFLOOR
Temp:	75	73.2
pH:	8.33	8.34
NTU:	3.5	3.2
DO mg/l:	2.7	2.4
Sal:	24.6	24.56
Depth:	1.22	4.8

Sample location - S-3

	SURFACE	SEAFLOOR
Temp:	76.6	75.2
pH:	8.3	8.22
NTU:	4.2	4.33
DO mg/l:	3.5	3.1
Sal:	24	24.2
Depth:	0.8	5.7

Sample location - S-4

	SURFACE	SEAFLOOR
Temp:	75.4	75.2
pH:	8.3	8.39
NTU:	4.4	4.7
DO mg/l:	2.7	2.77
Sal:	24.1	24.2
Depth:	1.3	5.4



Summary: Dissolved oxygen levels are lower than our initial readings in May as a result of vegetation growth. Salinity has risen to comparable levels with the Bay, Blue Green algae levels are 6-10mg/l (low) and Chlorophyll level is 9-10 mg/l (mid). Lab samples indicate both Total Nitrogen and Phosphorus are 2-3 times higher than minimal level for algae to populate. Nitrogen levels should drop with the enzyme applications, Phosphorus levels should drop once the Nano bubbler system is up and running. July 2020 score 3.5/10

Peacock Gap Lagoon Monthly Water Quality Summary

Collection Date: 8/27/2020

Samples collected by: AC, EK

Sample Time: 1000

Sample Location: S-1, 2, 3, 4

Air Temperature: 76

Green - Good Yellow - Acceptable Red - Poor

Sample location - S-1

SURFACE		SEAFLOOR	
Temp:	73.5	Temp:	73.6
pH:	8.1	pH:	8.15
NTU:	16	NTU:	17
DO mg/l:	4.4	DO mg/l:	2.9
Sal:	25	Sal:	25
Depth:	1.4	Depth:	4.2

Sample location - S-2

SURFACE		SEAFLOOR	
Temp:	73.7	Temp:	73.8
pH:	8.2	pH:	8.11
NTU:	15	NTU:	19
DO mg/l:	4.4	DO mg/l:	2.9
Sal:	25.2	Sal:	25
Depth:	1.22	Depth:	4.8

Sample location - S-3

SURFACE		SEAFLOOR	
Temp:	74.3	Temp:	74.4
pH:	8.1	pH:	8.1
NTU:	15.6	NTU:	20.2
DO mg/l:	5.4	DO mg/l:	3
Sal:	25.6	Sal:	25.4
Depth:	0.8	Depth:	5.7

Sample location - S-4

SURFACE		SEAFLOOR	
Temp:	74.4	Temp:	74.8
pH:	8.2	pH:	8.1
NTU:	17.7	NTU:	20.9
DO mg/l:	7.8	DO mg/l:	4.3
Sal:	25	Sal:	24.9
Depth:	1.4	Depth:	4.5



Summary: Molear Nano bubbler installed near S-4 on August 15th and started to show positive signs on the adjacent algae mats almost instantly. The August monitoring took place approximately 10 days after installation. Improvements to the DO levels near the unit are evident. Turbidity level are higher this month indicating the Muck Biotocs are working to consume biomass at the seafloor. August 2020 lagoon score: 4.50

Peacock Gap Lagoon Monthly Water Quality Summary

Collection Date: 9/23/2020

Samples collected by: AC, EK

Sample Time: 0900

Sample Location: S-1, 2, 3, 4

Air Temperature: 68

Green - Good Yellow - Acceptable Red - Poor

Sample location - S-1

SURFACE		SEAFLOOR	
Temp:	73.5	Temp:	73.6
pH:	7.8	pH:	7.82
NTU:	16	NTU:	12
DO mg/l:	5.8	DO mg/l:	4.5
Sal:	27.2	Sal:	27.1
Depth:	0.6	Depth:	6.4

Sample location - S-2

SURFACE		SEAFLOOR	
Temp:	70.3	Temp:	71.4
pH:	7.8	pH:	7.8
NTU:	14	NTU:	11.1
DO mg/l:	7.1	DO mg/l:	4.9
Sal:	27.2	Sal:	27.1
Depth:	0.98	Depth:	5.1

Sample location - S-3

SURFACE		SEAFLOOR	
Temp:	70.2	Temp:	71.4
pH:	7.7	pH:	7.7
NTU:	21.2	NTU:	27.5
DO mg/l:	5.6	DO mg/l:	3.9
Sal:	25.6	Sal:	25.4
Depth:	0.8	Depth:	5.7

Sample location - S-4

SURFACE		SEAFLOOR	
Temp:	70.1	Temp:	71.9
pH:	7.5	pH:	7.6
NTU:	22.3	NTU:	28.9
DO mg/l:	7.7	DO mg/l:	5.5
Sal:	23	Sal:	27.1
Depth:	0.6	Depth:	5.1



Summary: Molear Nano bubbler installed near S-4 on August 15th, 90% of existing visible Algae mats have diminished without signs of repopulation. DO levels have increased significantly throughout the lagoon, Visible marine life (Fish) appear to be reacting to the increase in oxygen. Turbidity level are higher this month indicating the Muck Biotocs are working to consume biomass at the seafloor Lagoon is currently going through it's annular turn indicated by the temp inversion. pH levels have returned to neutral September 2020 Lagoon WQ Score: 7.0

Peacock Gap Lagoon Monthly Water Quality Summary

Collection Date: 10/22/2020

Samples collected by: AC, EK

Sample Time: 0930

Sample Location: S-1, 2, 3, 4

Air Temperature: 62

Green - Good Yellow - Acceptable Red - Poor

Sample location - S-1

	SURFACE	SEAFLOOR
Temp:	68.2	68
pH:	8.2	8.2
NTU:	14.1	17.6
DO mg/l:	5.4	5.2
Sal:	27	27
Depth:	1.3	5.4

Sample location - S-2

	SURFACE	SEAFLOOR
Temp:	68.2	68.1
pH:	8	8.19
NTU:	14.5	13.2
DO mg/l:	6.8	6.5
Sal:	27	27.3
Depth:	0.8	5.7

Sample location - S-3

	SURFACE	SEAFLOOR
Temp:	68	68
pH:	8	8.24
NTU:	11	13
DO mg/l:	8.2	5.2
Sal:	27	27.1
Depth:	1.22	4.8

Sample location - S-4

	SURFACE	SEAFLOOR
Temp:	68	67.2
pH:	8	8
NTU:	14	12
DO mg/l:	7.2	5.5
Sal:	27	27.2
Depth:	1.3	4.6



Summary: Dissolved oxygen levels continue to rise with the introduction of the nano bubbler Salinity has risen to comparable levels with the Bay, Nitrogen (TKN) level is high, Recommend Nitrogen source sampling No visible sign of Algae along shoreline, Clarity has increased due to Muckbiotics. Monthly Lagoon Score 8.5/10