



AQUATIC CONSULTING & TESTING, INC.

1525 W. University Drive, Suite 106
P.O. Box 1510
Tempe, Arizona 85281
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Lic. No. AZ0003

12 October 2015

Ms. Debbie Tribioli
The Oasis at Anozira
c/o Kinney Management Services
6303 South Rural Road
Tempe, Arizona 85283

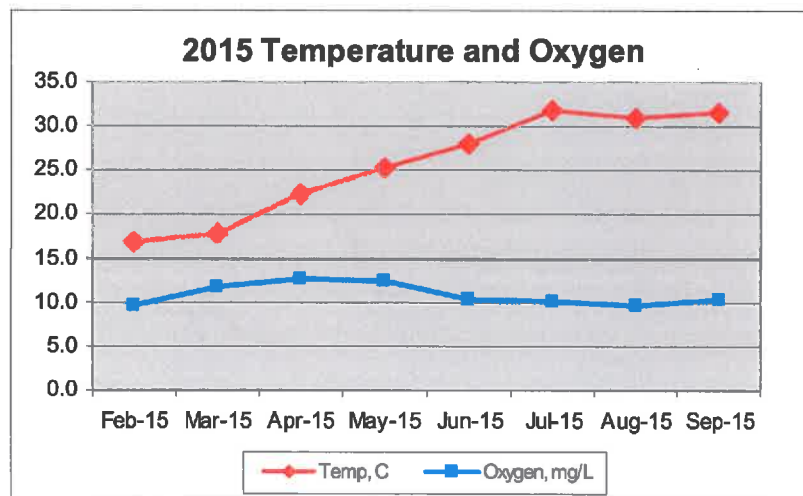
Ref: Oasis Lake, September 2015

Dear Ms. Tribioli:

The following report summarizes initial water quality data collected for Oasis Lake on 03 September 2015. Similar data have been reported each month and are used in this report to generate the initial graphs that will be used for tracking changes in water quality. The report also includes field data sheets reflecting lake and mechanical system conditions for each week during the month.

Chemical and Physical Composition

Temperature, Oxygen, and pH: Water temperature was 31.7 C (89 F) and the dissolved oxygen concentration was 10.5 mg/L. The amount of oxygen that can dissolve in water is temperature dependent; colder water can hold more oxygen than warmer water. At the time of sampling and despite a reduction in oxygen, the oxygen saturation was still over 100 percent, indicating maximum oxygenation and adequate operation of the aeration system.

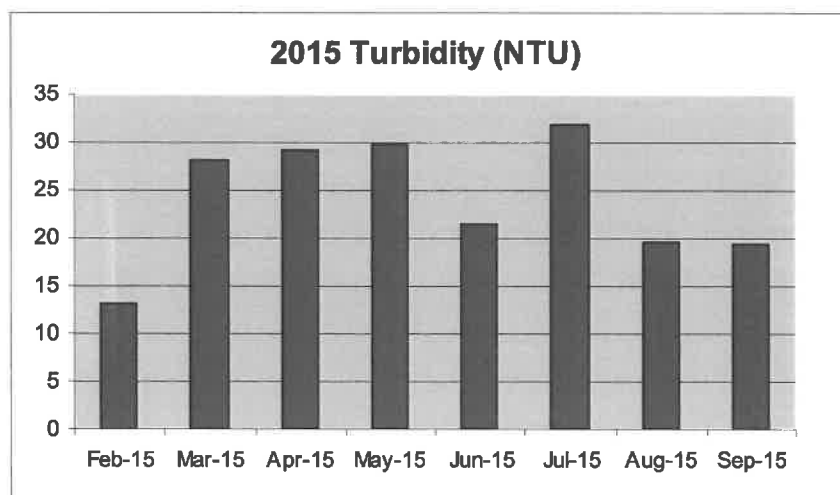


The dissolved oxygen content was also satisfactory for the fishery. The table below shows the USEPA criteria for dissolved oxygen in warm water fisheries.

Criterion	Early life stages	Other life stages
Daily mean	>6.0	>4.0
Daily minimum	>5.0	>3.0

Water temperature tolerance varies among fish species. However, the maximum weekly temperature tolerance of most common urban lake fish species is 32 to 35 C.

Turbidity: The turbidity of the lake water was relatively unchanged at 19.3 NTU. Water turbidity is impacted by dissolved and particulate matter in the water. As turbidity increases, clarity and aesthetic quality decreases. Turbidity appeared not to change despite measurable precipitation and storm water runoff during September.

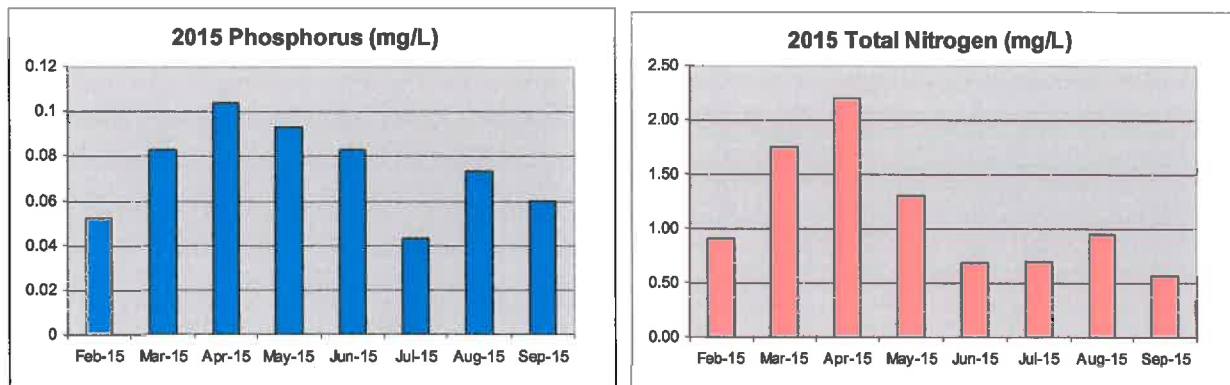


pH: The lake water pH increased to 10.9 SU, above the desired range. Water pH is influenced by the chemical makeup of the water and the amount of algae in the lake. In a very simplified explanation for the role of algae, carbonic acid in the water is formed from dissolution of carbon dioxide. Carbonic acid tends to make the water more acidic and pH decreases. However, algae utilize carbon dioxide during photosynthesis during daylight, making less carbon dioxide available to form carbonic acid, and pH increases. The more algae present, the greater the increase in pH that usually occurs.

High pH can be problematic in terms of toxicity if high concentrations of ammonia are present in the water. Ammonia is in equilibrium between two forms; ammonium ion and ammonia gas. At pH concentrations above 9.0 SU, ammonia converts to the gas which is toxic to many aquatic organisms. At pH 8.0, ammonia would not have a significant adverse impact on the fishery. Despite the measured high pH, no signs of fish stress were observed.

Nutrients: Nitrogen and phosphorus are the primary nutrients that stimulate algae and submerged plant growth. Phosphorus is typically the nutrient that dictates how much plant growth can be sustained in a lake. Usually if the total phosphorus concentration is below 0.030 mg/L, low levels of suspended algae occur. A nitrogen concentration of about 10 times the phosphorus (0.30 mg/L) is typically needed to support algal growth.

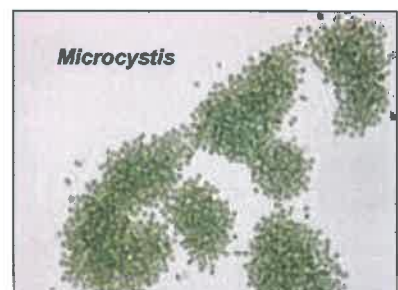
The total nitrogen concentration decreased to 0.57 mg/L as N. The phosphorus concentration also decreased to 0.060 mg/L as P. These data indicate that the lake still has sufficient nutrients to support a high density algae population. However, the phytoplankton data, below, indicate reduced numbers of algae cells.

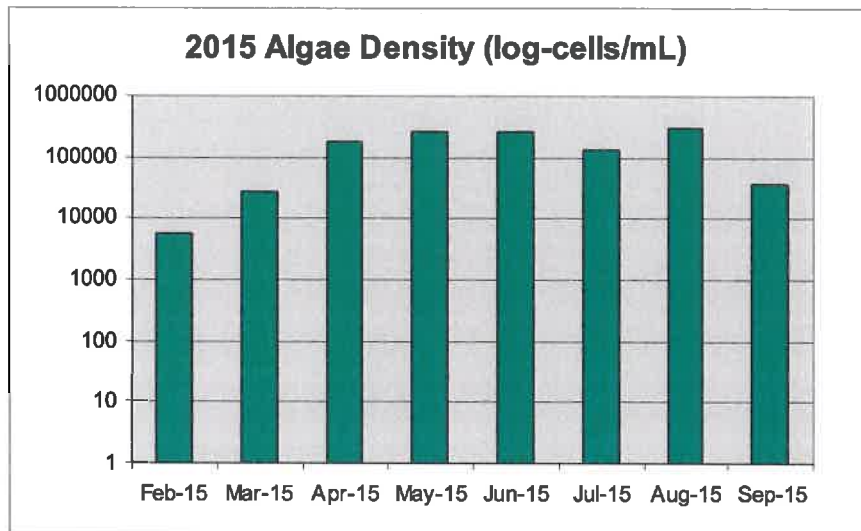


Biological Composition

Phytoplankton (algae): The amount and types of algae in a lake dictate the aesthetic and operational quality of the water. Algae density affects the clarity and color of the water, two very important aesthetic criteria. The species composition dictates the form of growth observed; floating mats, suspended cells, stringy attached filaments, etc. It also impacts the choice, frequency, and dosage of herbicides used for water quality management.

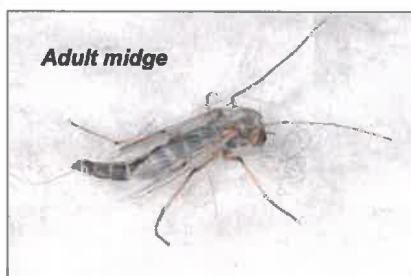
The total algae density in the lake decreased to 3.78×10^4 cells per mL; considered in the moderate category for an urban reservoir in metro-Phoenix. Decreased day length and solar intensity are likely responsible. The dominant alga in Oasis Lake was *Chlorella*, a unicellular green (Chlorophyta) form. This alga is usually not problematic but can turn the water a bright green color if in sufficient density. This was not the case in Oasis Lake. A minor bloom of the blue-green alga, *Microcystis* occurred near the end of the month. The alga forms surface accumulations and swirls. The alga prompted the second aquatic dye application. The potentially toxic (to fish) alga, *Prymnesium parvum*, was not detected in the lake water.





Submerged weeds were not detected in the lake.

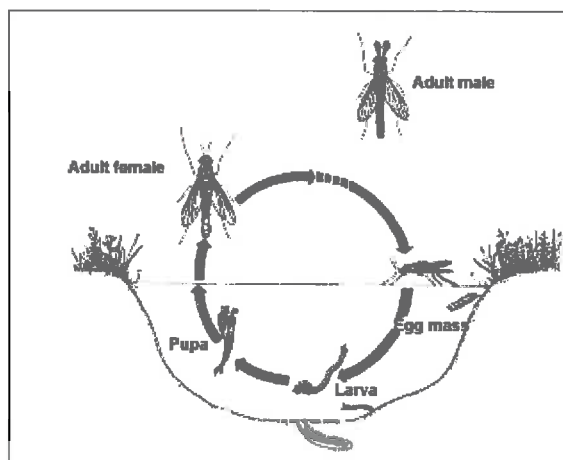
Two maintenance applications of dye were made to the lake to help reduce photosynthesis and pH, while improving lake color and aesthetics.



Midge flies: Midge flies are common inhabitants of most lakes. Adult females lay hundreds of eggs on the water surface. The eggs settle to the lake bottom and hatch in a few days. Larvae develop and grow in the superficial sediments over a three to four week period. In about



30 days the insect larvae become pupae, rise in the water column, and emerge as adult flies. The life cycle is shown diagrammatically below. The Adults tend to swarm at dusk and dawn and become a nuisance. They fly into residents' eyes and mouths, congregate under eaves of houses, and leave a sticky messy residue when they die. Management techniques may include stocking of bottom-feeding fishes to consume the



larvae and/or application of bacterial or chemical larvicides.
Minimal midge fly adults were detected during the month.

Fishery: Fish activity appeared normal. No dead fish were observed or reported during the month.

Waterfowl: Ducks and geese can be a beautiful sight on a small urban pond or lake. They seem to make the lake look more like a natural lake than an artificial reservoir. They are fascinating creatures. However, when ducks and geese become too numerous, several lake management and aesthetic problems can develop.

Bird droppings can be a nuisance and aesthetic detraction along the shoreline. The droppings create slippery conditions along the shoreline and certainly are not attractive in appearance. Because the droppings must be physically washed from the lake edge, they create an additional maintenance task. Some waterfowl, as geese can become aggressive to humans, especially after they have become accustomed to being fed human food. They can do significant damage to turf areas, ripping up and consuming grass. Water fowl are also a source of nitrogen and phosphorus; nutrients that stimulate algae growth in a lake and cause the water to turn green. Ducks like to forage vegetation from the land. They convert it to water-soluble forms of nitrogen and phosphorus during digestion. The wastes are then deposited in the lake while they swim. Bird wastes contain fecal bacteria. Because we sometimes fish and our children often play along the water's edge, hands or feet somehow find their way into the water. Thus, the waste material can pose a health risk. Finally, some diving birds as cormorants are excellent fishermen. These birds have reduced the fish populations in some nearby lakes, consuming game fish and reducing recreational benefits. They have also removed fish that had been added for weed and insect control. Frequent fish restocking increases operational costs for the lake owner.

Arizona Game and Fish Department has developed the following criteria for waterfowl on small urban lakes.

Excellent	<3/acre
Good	3-4/acre
Fair	5-6/acre
Poor	>6/acre

Based on the Arizona Game & Fish Department scale, the lake condition in terms of waterfowl was good during the month. A minor change in variety and number of ducks was observed and a few geese (Canada geese, shown at right) were observed during routine inspections. Canada geese consume grass and deposit fecal matter on land and water. Cormorants were not observed.



In terms of public health protection, the *E. coli* bacteria concentration was 194 per 100 mL. The State swimming

standard (full body contact) for *E. coli* is 235 and the secondary (partial body contact) standard is 575 per 100 mL. The lake water met both standards.

Mechanical Systems and Field Observations

Weekly field inspection forms are attached to this report. The lake was cleaned of surface debris weekly.

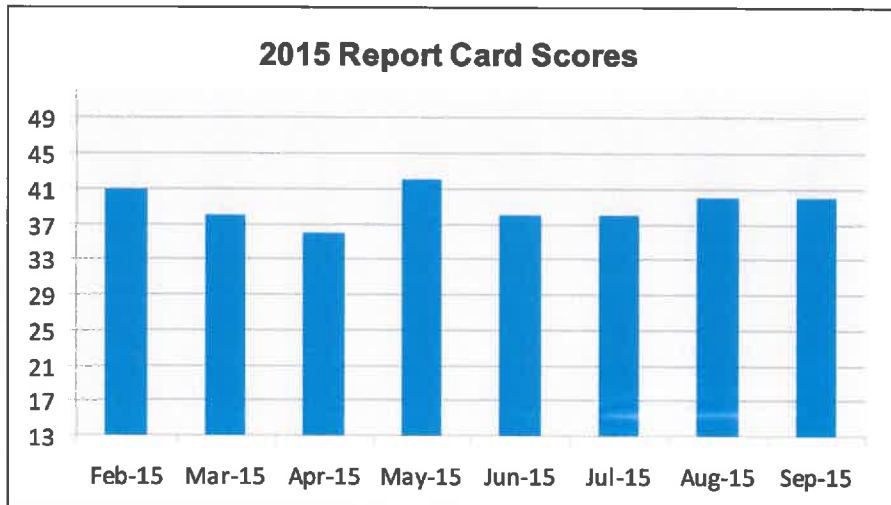
- The Los Feliz entry fountain operation was interrupted for maintenance, but returned to services during the month.
- Two (2) aerator diffuser stations continued to work poorly, but were functional.
- A light *Microcystis* surface algae bloom occurred during the month.

Chemical/Biological Product Applications

Two applications of aquatic dye were made during the month.

Lake Report Card

The water quality data are summarized on the attached Oasis Lake Report Card. Each salient parameter has been qualitatively evaluated and then assigned a numeric value for comparison and tracking purposes. The overall rating was unchanged at 40. Report card scores for the year are summarized below.



Respectfully,

AQUATIC CONSULTING & TESTING, INC.

Frederick A. Amalfi, Ph.D., C.L.M.
Laboratory Director



LABORATORY REPORTS



FIELD INSPECTION FORMS



PESTICIDE APPLICATION DOCUMENTS



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LABORATORY REPORT

Client: Oasis at Anozira
c/o Kinney Management Services
6303 S. Rural Road
Tempe, Arizona 85283

Date Submitted: 09/03/15
Date Reported: 10/01/15

Attn: Debbie Tribioli

Project: Monthly Lake Monitoring

RESULTS

Client ID: Lake
ACT Lab No.: BX08507

Sample Type: Surface Water
Sample Time: 09/03/15 12:40

<u>Parameter</u>	<u>Analysis Date</u>		<u>Method No.</u>	<u>Result</u>	<u>Unit</u>
	<u>Start</u>	<u>End</u>			
Algae Count	09/10/15	09/10/15	SM 10200 F	See Attached	cells/mL
Algae Identification	09/10/15	09/10/15		See Attached	
Oxygen, Dissolved Field	09/03/15	09/03/15	SM4500 O G	10.9	mg/L as O ₂
pH, Field	09/03/15	09/03/15	SM4500H+ B	10.9	SU
Temperature, Field	09/03/15	09/03/15	SM2550 B	31.7	C
Nitrate + Nitrite - N	09/12/15	09/12/15	SM4500NO3 E	0.07	mg/L as N
Phosphorus, Total	09/08/15	09/08/15	365.3	0.060	mg/L as P
Total Kjeldahl Nitrogen	09/08/15	09/08/15	SMNorg C,NH3 C/D	0.5	mg/L as N
E. coli, Colilert	09/03/15	09/04/15	SM 9223 B	194	MPN/100 mL
Turbidity	09/03/15	09/03/15	180.1	19.3	NTU

Reviewed by:


Frederick A. Amalfi, Ph.D.
Laboratory Director

ALGAE IDENTIFICATION

AC&T Lab No.
Client I.D.BX08507
OasisDate Collected
Collected ByAC&T
09/03/15Divisions: bac=Bacillariophyta; chl=Chlorophyta; cry=Chrysophyta; cyn=Cyanophyta; eug=Euglenophyta;
hap=Haptophyta; pyr=Pyrrhophyta Forms: u=unicell; c=colony; f=filament; g= flagellate

Genus	Div.- Form	Rel. Count	Total per mL	Comp.	Genus	Div.- Form	Rel. Count	Total per mL.	Comp
<i>Achnanthes</i>	bac-u				<i>Microcystis</i>	cyn-c			
<i>Anabaena</i>	cyn-f				<i>Microspora</i>	chl-f			
<i>Ankistrodesmus</i>	chl-u				<i>Mougeotia</i>	chl-f			
<i>Aphanocapsa</i>	cyn-c				<i>Navicula</i>	bac-u			
<i>Asterionella</i>	bac-c				<i>Nitzschia</i>	bac-u			
<i>Botryococcus</i>	chl-c				<i>Oocystis</i>	chl-c			
<i>Carteria</i>	chl-ug				<i>Oscillatoria</i>	cyn-f	25	4704	12.44%
<i>Cephalomonas</i>	chl-ug				<i>Pandorina</i>	chl-cg			
<i>Ceratium</i>	pyr-ug				<i>Pediastrum</i>	chl-c			
<i>Chlamydomonas</i>	chl-ug				<i>Peridinium</i>	pyr-ug	3	565	1.49%
Chlorella	chl-u	88	16560	43.78%	<i>Phacotus</i>	chl-ug			
<i>Chlorococcum</i>	chl-c				<i>Phacus</i>	chl-ug			
Chroococcus	cyn-c	28	5269	13.93%	<i>Pinnularia</i>	bac-u			
<i>Chroomonas</i>	crp-ug				<i>Pithophora</i>	chl-f			
<i>Closterium</i>	chl-u				<i>Prymnesium</i>	hap-ug			
<i>Cocconeis</i>	bac-u				<i>Rhizoclonium</i>	chl-f			
<i>Coelastrum</i>	chl-c				<i>Rhoicosphenia</i>	bac-u			
<i>Cosmarium</i>	chl-u				<i>Rhopalodia</i>	bac-u			
<i>Cosmocladium</i>	chl-c				Scenedesmus	chl-c	14	2635	6.97%
<i>Crucigenia</i>	chl-c				<i>Scytonema</i>	chl-f			
Cryptomonas	crp-ug	13	2446	6.47%	<i>Selanastrum</i>	chl-u			
<i>Cyclotella</i>	bac-u				<i>Sphaerocystis</i>	chl-c			
<i>Cymbella</i>	bac-u				<i>Spondylumorum</i>	chl-c			
<i>Diatoma</i>	bac-u				Spirulina	cyn-f	30	5645	14.93%
<i>Dinobryon</i>	bac-c				<i>Stauroneis</i>	bac-u			
<i>Dunaliella</i>	chl-u				<i>Stephanodiscus</i>	bac-u			
<i>Epithemia</i>	bac-u				<i>Stigeoclonium</i>	chl-f			
<i>Euglena</i>	eug-ug				<i>Surirella</i>	bac-u			
<i>Fragilaria</i>	bac-u				<i>Synechococcus</i>	cyn-u			
<i>Frustulia</i>	bac-u				<i>Synechocystis</i>	cyn-c			
<i>Glenodinium</i>	pyr-ug				<i>Synedra</i>	bac-u			
<i>Golenkinia</i>	chl-c				<i>Synura</i>	cry-cg			
<i>Gomphonema</i>	bac-u				<i>Tetraedron</i>	chl-u			
<i>Gonium</i>	chl-cg				<i>Tetrastrum</i>	chl-c			
<i>Gonyaulax</i>	pyr-ug				<i>Trachelomonas</i>	eug-ug			
<i>Gyrosigma</i>	bac-u				<i>Vaucheria</i>	chl-f			
<i>Hydrodictyon</i>	chl-c				<i>Volvox</i>	chl-cg			
<i>Lyngbya</i>	cyn-f				<i>Zygnema</i>	chl-f			
<i>Melosira</i>	bac-f								
<i>Meridion</i>	bac-u								
<i>Merismopedia</i>	cyn-c								

Aquatic Consulting & Testing, Inc.
1525 W. University Dr., Suite 106
Tempe, Arizona 85281Count (cells/mL) 3.78E+04

check 100.00%

Aquatic Consulting & Testing, Inc.

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 Tempe, Arizona 85281
 (480) 921-8044 Fax (480) 921-0049

Chain of Custody

Client Project Info:

Monthly Lake Monitoring
 Oasis at Anozira

AC&T Client Reporting Information:

Oasis at Anozira
 c/o Kinney Management Services
 Attn: Debbie Tribioli
 6303 South Rural Road
 Tempe, AZ 85283
 P: 480-820-3451
 E: debbie@kinneymanagement.com

AC&T Sampler: *Andrew Marrett*

Sample Location ID: **Lake** Date: **9/3/15** Time: **1740** Micro: **SW**

Sample Containers & Preservation:		Page 1 of 1	
Non Preserved	1	1	AC&T Laboratory Sample Identification <i>BX-08507</i>
Na2S2O3 (Sterile)	2	1	
HNO3 (Nitric)	1	1	
H2SO4 (Sulfuric)	1	1	
Other:			

Field Measurements:	Algae Count & ID	Golden Algae	pH, Temp, O2
Total Phosphorous (P-T)	X		X
Total Kjeldahl Nitrogen (TKN)	X		X
Total E.Coli -MPN	X		X
Turbidity	X		X
Algae Count & ID	X		X
Golden Algae			X
Field Measurements:			X

Project Location: Oasis at Anozira

AC&T Sample Receipt: *Andrew Marrett*

PO#: 5

Notes: 1 pres @ P.W.

Total # Containers: YES NO

Custody Seals: YES NO

Samples Intact: YES NO

Samples On Ice: YES NO

Ice Type: WET BLUE

Sample Receipt Temperature: 31°C

2. RECEIVED BY:

Signature: *J. Johnson*

Print Name: **J. Johnson**

Date: **9-3-15** Time: **14:14**

3. RELINQUISHED BY:

Signature: *Andrew Marrett*

Print Name: **Andrew Marrett**

Date: **9/3/15** Time: **1414**

4. RECEIVED BY:

Signature: _____

Print Name: _____

Date: _____ Time: _____

OASIS LAKE REPORT CARD

DATE OF EVALUATION:

Sep-15

CONDITION

GOOD

SCORE

41

PREVIOUS EVALUATION:

Aug-15

CONDITION

GOOD

SCORE

40

CONDITION	RESULT	RATIONALE	4 pts			3 pts			2 pts			1 pt					
			EXCELLENT	GOOD	FAIR	POOR	SCORE	EXCELLENT	GOOD	FAIR	POOR	SCORE	EXCELLENT	GOOD	FAIR	POOR	SCORE
Turbidity (NTU)	19.3	aesthetics	<5	5-10	11-20	>20											
Dissolved oxygen (mg/L)	10.5	aquatic life, sediment nutrient release, odors	>7.0	5.6-6.9	4.0-5.5	<4.0											
Nitrogen, total (mg/L)	0.57	algae and macrophyte growth	<0.5	0.5-1.0	1.0-2.0	>2.0											
Phosphorus, total (mg/L)	0.060	algae and macrophyte growth	<0.03	0.03-0.05	0.06-0.10	>0.10											
Algae density (no./mL)	3.8 x 10 ⁴	aesthetics	<5 x 10 ⁴	5x10 ⁴ - 9x10 ⁴	1 x 10 ⁵ - 5x 10 ⁶	>5 x 10 ⁵											
Algae form (dominant)	green unicells	aesthetics, treatability	greens; no floating mats	diatoms; no floating mats	blue-greens; no floating mats	blue-greens; floating mats common											
Macrophytes (% cover)	<1	aesthetics, boating	none	<10%	11-20%	>20%											
pH (SU) avg.	10.9	swimming, fishery, ammonia toxicity	6.5-8.0	8.0-8.5	8.5-9.0	>9.0											
E. coli bacteria (#/100 mL) avg.	194	public health protection	<20	21-80	81-125	>125											
Midge flies	no nuisances	quality of life	no nuisances	minor nuisances	moderate nuisances	significant nuisances											
Waterfowl (no. per acre)	1	nutrient and bacteria loading	<2	2-5	6-10	>10											
Fishery	normal	recreation, aesthetics	no fish piping; no fish kills	some fish piping; gulping; no fish kills	fish piping before dawn; occasional fish kills	fish piping common; fish kills common											
Shoreline/banks	no edge growths	aesthetics	no evidence of salt crusts or algal scums	some white deposits and scums	numerous patches of salt deposits and algae scums	most of lake shore covered with crusts or scums											

SCORING KEY:

Excellent
42-48

Good
36-41

Fair
30-35

Poor
<30

Definitions: Ratings

Excellent: Lake aesthetic and operational conditions above level of expectation.

Good: Lake aesthetic and operational conditions at level of expectation.

Fair: Lake aesthetic and operational conditions slightly below level of expectation.

Poor: Lake aesthetic and operational conditions considerably below level of expectation.

Definitions: Terms

Macrophyte: Large plant, observable without the aid of a microscope, that may be floating, submerged or emergent.

Midge: Small, flying, non-biting "gnat-like" insect whose larval stage exists in the lake sediments (bloodworm).

N/A: not applicable; insufficient data or too early in development of lake (an arbitrary 3 rating is provided for these items).

pH: -log hydrogen ion conc.; amount of acid in the water identified on scale 1-14; 1 being most acid, 7 neutral, and 14 being most caustic.

Phytoplankton (algae): Microscopic plant fraction of the plankton community.

Piping: Act of fish coming to surface of water and capturing a bubble of air in their mouth; a sign of low oxygen concentrations.

Plankton: Organisms of relatively small size that have relatively small powers of locomotion or that drift in the water.

Turbidity: Degree to which particles and color in the water scatter light; the "cloudiness" of the water.

OASIS AT ANOZIRA FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 9/3/15
By: Am

Aeration System Operation

Operational Problem

Details: All working, 2 weak

Lake Surface

Lake surface cleaning

Floating Fountains West East South

Operational Problem Details: _____

Pump house housekeeping leaks ventilation lighting Notes _____

Compressors Operational Problem Details: good

Pumps Operational Problem Details: _____

Entry Fountains

Elliot North: Operational Screens cleared Problem Details: _____

Elliot South: Operational Screens cleared Problem Details: _____

Los Feliz: Operational Screens cleared Problem Details: Turned off

Monthly Chemistry & Biology

- Dissolved oxygen 10.9
- Temperature 31.7
- pH 7.0
- Algae ID and count
- Ammonia-N
- Organic N (TKN)
- Phosphorus
- Turbidity
- E. coli
- Golden algae (seasonal)



OASIS AT ANOZIRA FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 9/10/15
By: Mr

Aeration System Operation

operational Problem

Details: 2 weak aerators

Lake Surface

Lake surface cleaning

Floating Fountains West East South

operational Problem Details: _____

Pump house

housekeeping leaks ventilation lighting Notes) _____

Compressors

operational Problem Details: Good

Pumps

operational Problem Details: _____

Entry Fountains

Elliot North: operational Screens cleared Problem Details: _____

Elliot South: operational Screens cleared Problem Details: _____

Los Feliz: operational Screens cleared Problem Details: _____

Monthly Chemistry & Biology

- Dissolved oxygen 10.7
- Temperature 31.2
- pH 10.7
- Algae ID and count
- Ammonia-N
- Organic N (TKN)
- Phosphorus
- Turbidity
- E. coli
- Golden algae (seasonal)



OASIS AT ANOZIRA FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 9/17/15
By: Am

Aeration System Operation

operational Problem

Details: 2 poorly

Lake Surface

Lake surface cleaning

Floating Fountains West East South

operational Problem Details: _____

Pump house housekeeping leaks ventilation lighting Notes good

Compressors operational Problem Details: good

Pumps operational Problem Details: good

Entry Fountains

Elliot North: operational Screens cleared Problem Details: _____

Elliot South: operational Screens cleared Problem Details: _____

Los Feliz: operational Screens cleared Problem Details: _____

Monthly Chemistry & Biology

- Dissolved oxygen 10.4
- Temperature 31.1
- pH 10.6
- Algae ID and count
- Ammonia-N
- Organic N (TKN)
- Phosphorus
- Turbidity
- E. coli
- Golden algae (seasonal)



OASIS AT ANOZIRA
FIELD INSPECTION FORM (wpdoc/lists&forms)

Date: 9/24/15
By: [Signature]

Aeration System Operation

operational Problem

Details: Minor Microcystis
3 gallons Pond dye

Lake Surface

Lake surface cleaning

Floating Fountains West East South

operational Problem Details: _____

Pump house housekeeping leaks ventilation lighting Notes _____

Compressors operational Problem Details: _____

Pumps operational Problem Details: _____

Entry Fountains

Elliot North: operational Screens cleared Problem Details: _____

Elliot South: operational Screens cleared Problem Details: _____

Los Feliz: operational Screens cleared Problem Details: _____

Monthly Chemistry & Biology

- Dissolved oxygen 11.7
- Temperature 31.5
- pH 8.8
- Algae ID and count
- Ammonia-N
- Organic N (TKN)
- Phosphorus
- Turbidity
- E. coli
- Golden algae (seasonal)



