

# **SAMPLE REPORT**

Produced from actual lake data and imagery.  
Some identities and dates presented are fictitious.

## **Report to Acme Hydrology LLC**

**Green Lake**

**Ace County Water Authority**



**BLUE WATER**  
S A T E L L I T E , I N C

**September 5, 2010**

Blue Water Satellite, Inc.  
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Suite 201  
Bowling Green, Ohio 43402  
(419) 728-0060  
[www.BlueWaterSatellite.com](http://www.BlueWaterSatellite.com)



## History of Project

The Ace County Water Authority, Anytown, USA, is under a consent decree from the U.S. Environmental Protection Agency to reduce nutrient loads into Green Lake and to demonstrate a reversal of eutrophication of Green Lake by 2013.

Acme Hydrology LLC has been retained by the Ace County Water Authority to determine levels of pollution and nutrient loads in Green Lake. Further, Acme has contracted with Ace County Water Authority to report recommendations on means of reducing nutrient loads into and resulting eutrophication of Green Lake.

Acme Hydrology LLC has contracted Blue Water Satellite, Inc. (BWSI) to perform satellite detection/testing of Green Lake to establish the current condition of Green Lake and to aid in identification of sources of nutrient loads

## Scope of Project

Contract number 10-457 was signed on August 8, 2010 between Acme Hydrology and BWSI to perform the following work:

- Produce one (1) scan for Phycocyanin (Cyanobacteria) of the entirety of Green Lake (5037 surface acres)
- Produce one (1) scan for Total Phosphorus of the entirety of Green Lake (5037 surface acres)
- Produce one (1) scan for Chlorophyll-a of the entirety of Green Lake (5037 surface acres)
  - All scans will be produced for a single date in late August, 2010.
  - BWSI will produce the scan only with raw data from satellite overpass with 20% cloud obfuscation, or less as requested by Acme Hydrology.

## Methodology

Blue Water Satellite will acquire raw data from satellites Landsat 5 and Landsat 7, operated by the United States Geological Service. The raw data will be processed using BWSI's patented & proprietary algorithms. Separate algorithms will be used for the detection and measurement of Cyanobacteria, Total Phosphorus and Chlorophyll-a.

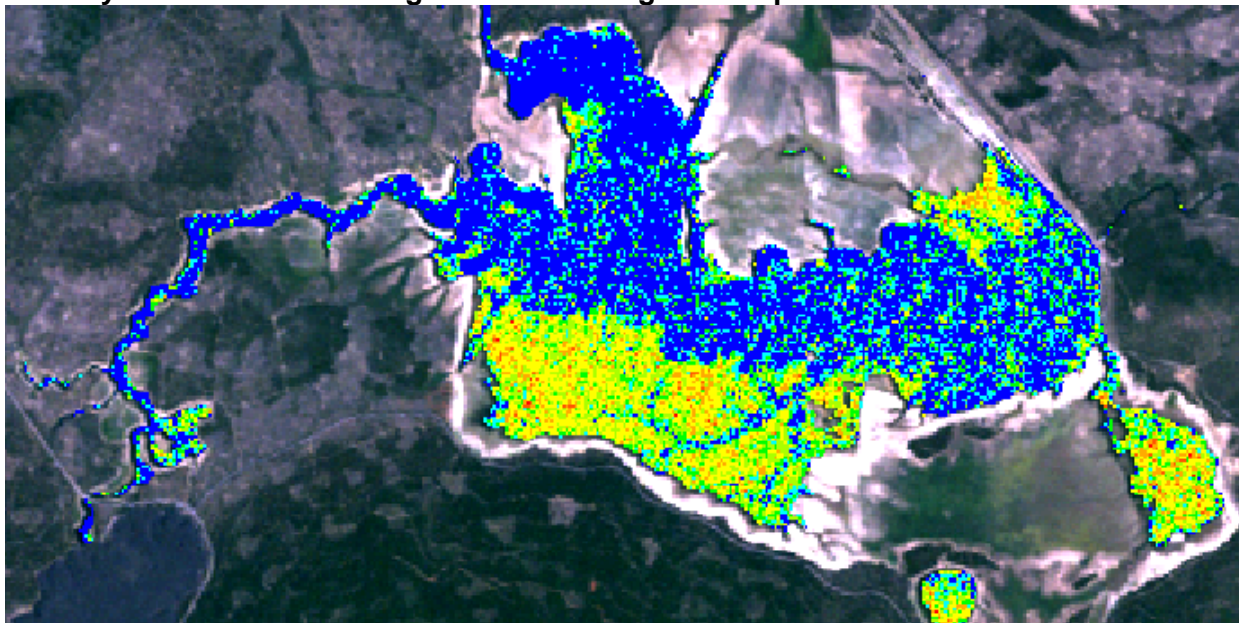
## Blue Water Satellite Results

Blue Water Satellite chose data imaged by Landsat 5 on August 22, 2010, 4:52 p.m. GMT (12:52 p.m. EDT) due to clarity of view at satellite overpass (0% cloud obfuscation).

### Phycocyanin Scan

Green Lake

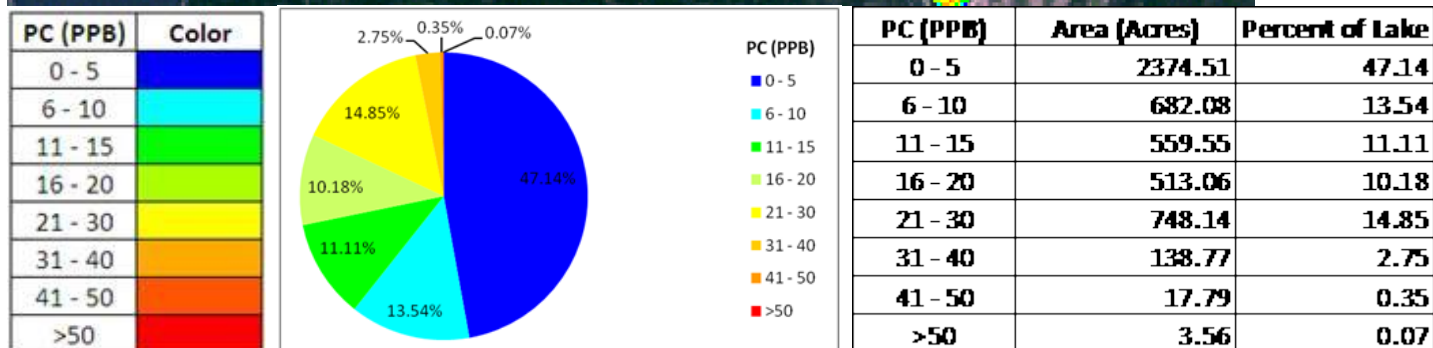
Overlay on natural color image of surrounding landscape



Color scale (lower left) indicates ranges of concentration of phycocyanin in parts per billion as represented in scan image (left).

Pie chart histogram (lower center) indicates percentage of water within view delineated by concentration ranges.

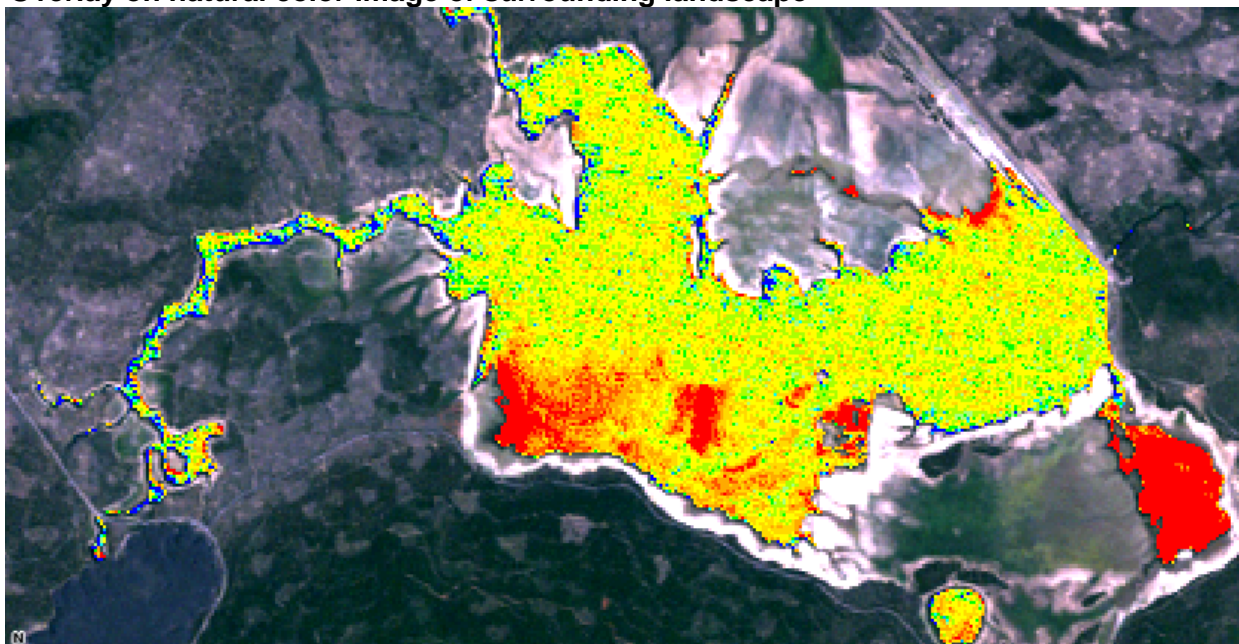
Table (lower right) indicates actual acreage falling within each range of concentration of phycocyanin.



## Chlorophyll-a Scan

Green Lake

Overlay on natural color image of surrounding landscape

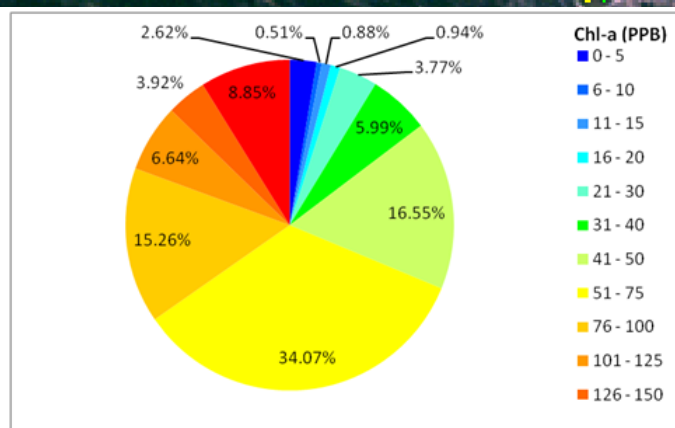


Color scale (lower left) indicates ranges of concentration of chlorophyll-a in parts per billion as represented in scan image (left).

Pie chart histogram (lower center) indicates percentage of water within view delineated by concentration ranges.

Table (lower right) indicates actual acreage falling within each range of concentration of chlorophyll-a.

Chl-a (PPB)	Color
0 - 5	Blue
6 - 10	Light Blue
11 - 15	Medium Blue
16 - 20	Cyan
21 - 30	Light Green
31 - 40	Green
41 - 50	Yellow-Green
51 - 75	Yellow
76 - 100	Orange-Yellow
101 - 125	Orange
126 - 150	Red-Orange
>150	Red

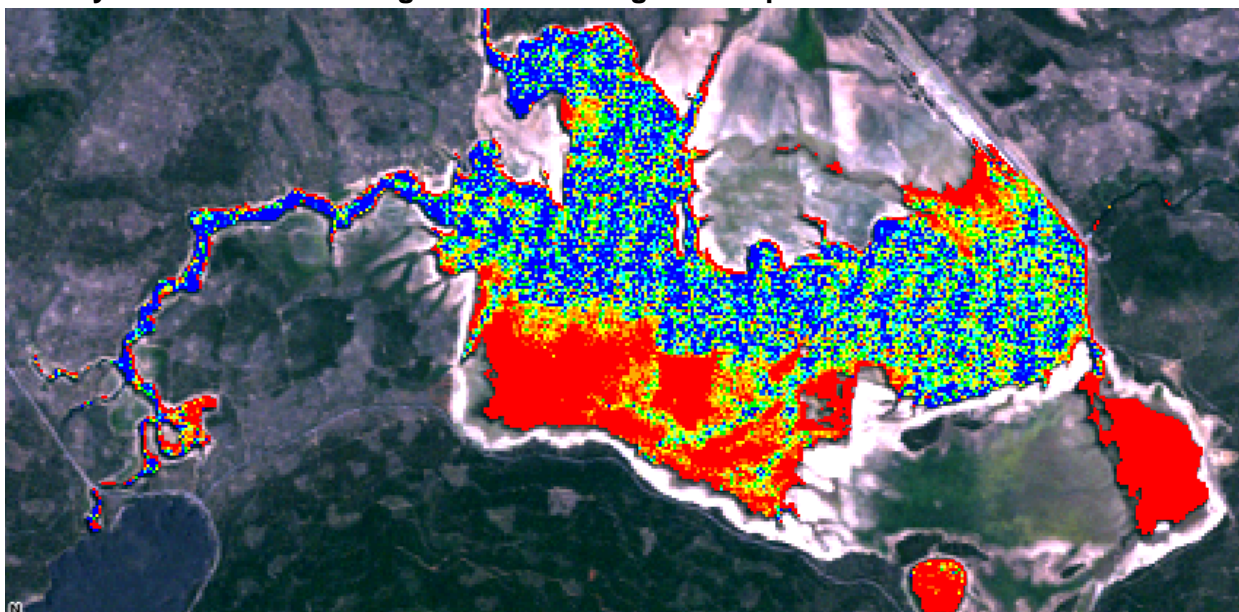


Chl-a (PPB)	Area (Acres)	Percent of Lake
0 - 5	128.10	2.62
6 - 10	24.91	0.51
11 - 15	43.14	0.88
16 - 20	45.81	0.94
21 - 30	183.92	3.77
31 - 40	292.23	5.99
41 - 50	807.74	16.55
51 - 75	1662.62	34.07
76 - 100	744.58	15.26
101 - 125	324.25	6.64
126 - 150	191.26	3.92
>150	432.11	8.85

## Total Phosphorus in Water Scan

Green Lake

Overlay on natural color image of surrounding landscape

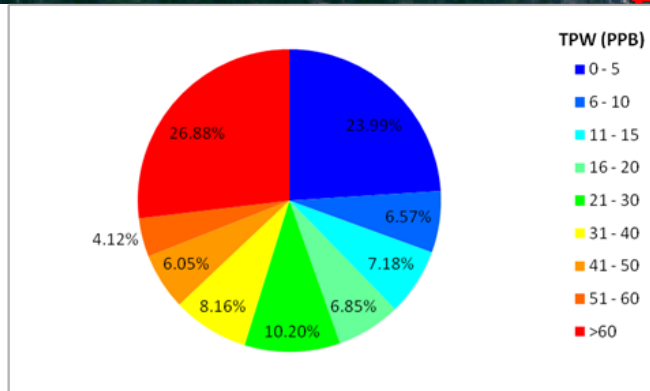


Color scale (lower left) indicates ranges of concentration of phosphorus in parts per billion as represented in scan image (left).

Pie chart histogram (lower center) indicates percentage of water within view delineated by concentration ranges.

Table (lower right) indicates actual acreage falling within each range of concentration of phosphorus.

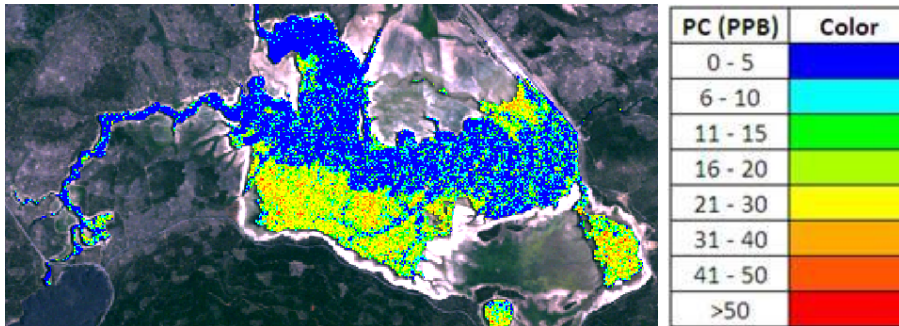
TPW (PPB)	Color
0 - 5	Blue
6 - 10	Light Blue
11 - 15	Cyan
16 - 20	Light Green
21 - 30	Green
31 - 40	Yellow-Green
41 - 50	Yellow
51 - 60	Orange
>60	Red



TPW (PPB)	Area (Acres)	Percent of Lake
0 - 5	1174.24	23.99
6 - 10	321.81	6.57
11 - 15	351.38	7.18
16 - 20	335.15	6.85
21 - 30	499.28	10.20
31 - 40	399.64	8.16
41 - 50	296.23	6.05
51 - 60	201.93	4.12
>60	1315.91	26.88

## Comparison & Conclusions

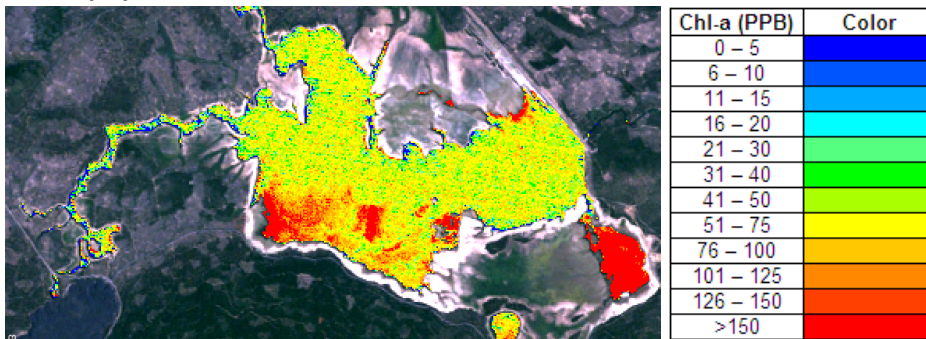
### Cyanobacteria Scan



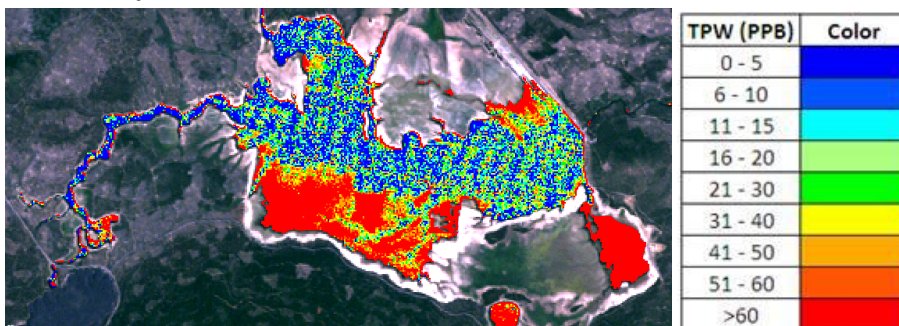
As evidenced by the images on the left, there is a clear correlation between concentrations of total phosphorus in the water of Green Lake and the higher concentrations of both cyanobacteria and chlorophyll-a.

As client has ordered no archived (historical) data, no assessment on improvement nor degradation of Green Lake can be made. Upon request of client, BWSI will access archived data from as early as June, 1982 for comparison purposes.

### Chlorophyll-a Scan



### Total Phosphorus in Water Scan





## Review and Approval

The contents of this document have been reviewed and approved for conveyance to client.

**Dr. Robert K. Vincent, PhD**  
**Chief Technical Officer**  
**Blue Water Satellite, Inc.**

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Date

**Louis Sanderson, MS**  
**Senior Project Scientist**  
**Blue Water Satellite, Inc.**

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Date

**Milt Baker**  
**Chief Executive Officer**  
**Blue Water Satellite, Inc.**

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Date

**James Harpen**  
**Manager of Business Development & Collaborations**  
**Blue Water Satellite, Inc.**

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Date



## Use of BWSI TIF files in your GIS software

As a client of Blue Water Satellite, Inc., you are also being provided with TIF files for each individual constituent scanned, QML files for each constituent, and a natural color image of the surrounding landscape. Once properly installed in your GIS software (i.e. ArcGIS) you will be able to

- Isolate small areas for closer inspection,
- Identify specific concentrations (vs. ranges) of each constituent in each 30m x 30m sample area, and
- Overlay the scan on other digital maps/charts used in your profession.

### Questions or need help?

#### Email

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