Kansas City District Corps Lakes 2014 Special Projects-Algae Blooms

Marvin Boyer

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Kansas City, MO

19 Nov 2014

US Army Corps of Engineers

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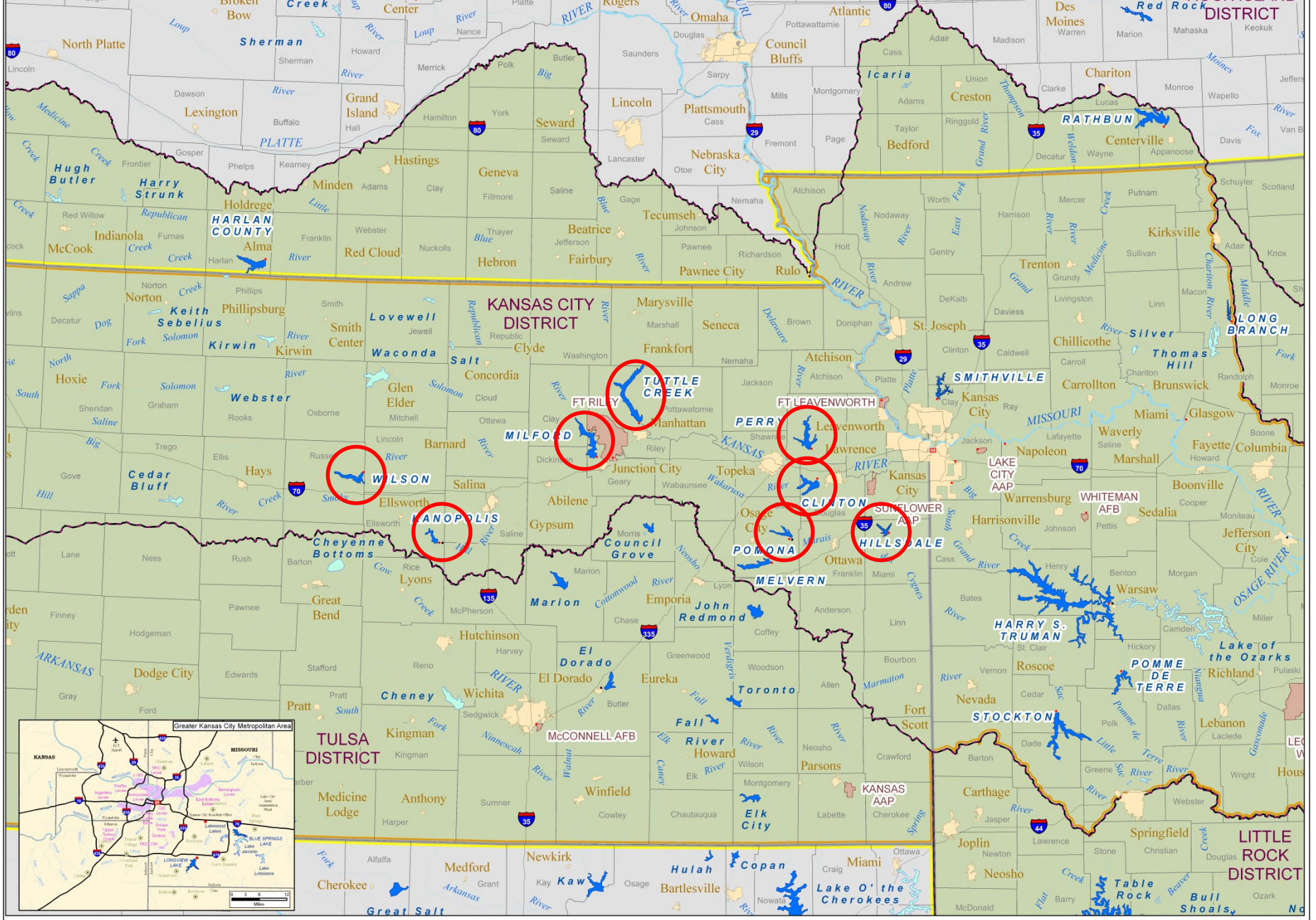
Overview

- Received funding for 2014
  - Directed for District Support to Algae Bloom in 8 Ks Lakes
  - Supporting data for Kansas Lakes to augment WQ data and benefit Project Staff and cooperating stakeholders
- Benefits to Project Staff
  - Describe algae/cyanobacteria composition in 8 Ks Lakes
  - Quantify 3 main algae toxins
  - Research field toxin (microcystin) test for use by Rangers



Mapped and edited by the U.S. Army Corps of Engineers, Kansas City District, GeoSpatial Data Systems Team
Lambert Conformal Conic Projection
1983 North American Datum
False Northing: 0
Central Meridian: -96
Latitude of Origin: 40
http://www.nwk.usace.army.mil
FILE NO. K-1-1054

N

Civil District Boundaries
Military Boundary, Kansas City District
Regulatory Boundary, Kansas City District
District Office, Kansas City
Project Office, Kansas City District
Regulatory Field Office
0 5 10 20 30 40 Miles
Kansas City District
Corps Lake, Kansas City District
Corps Lake, Other Districts
Non-Corps Lake
Military Facilities
Populated Places
Counties

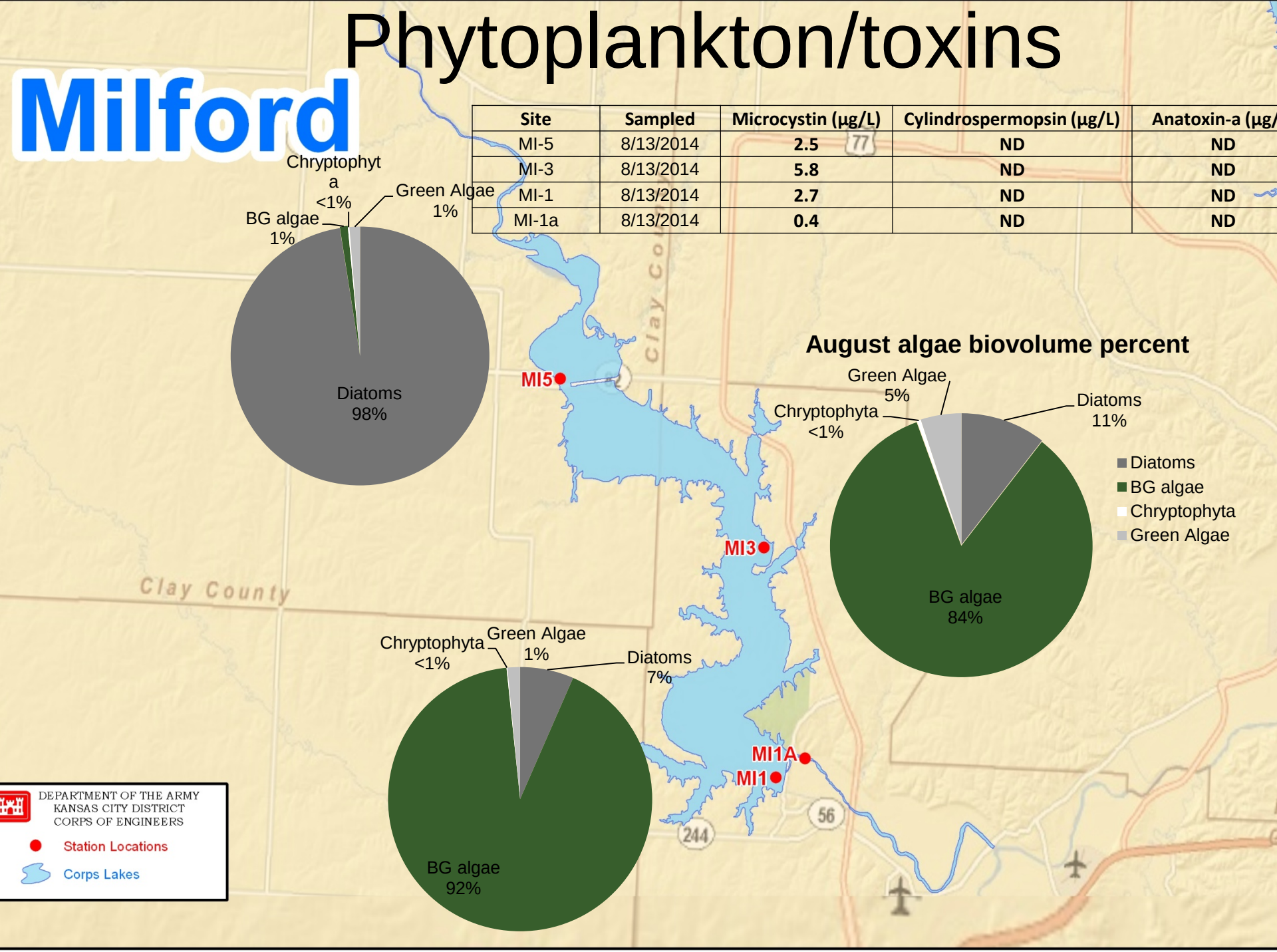
DEPARTMENT OF THE ARMY
KANSAS CITY DISTRICT
CORPS OF ENGINEERS

November 2002

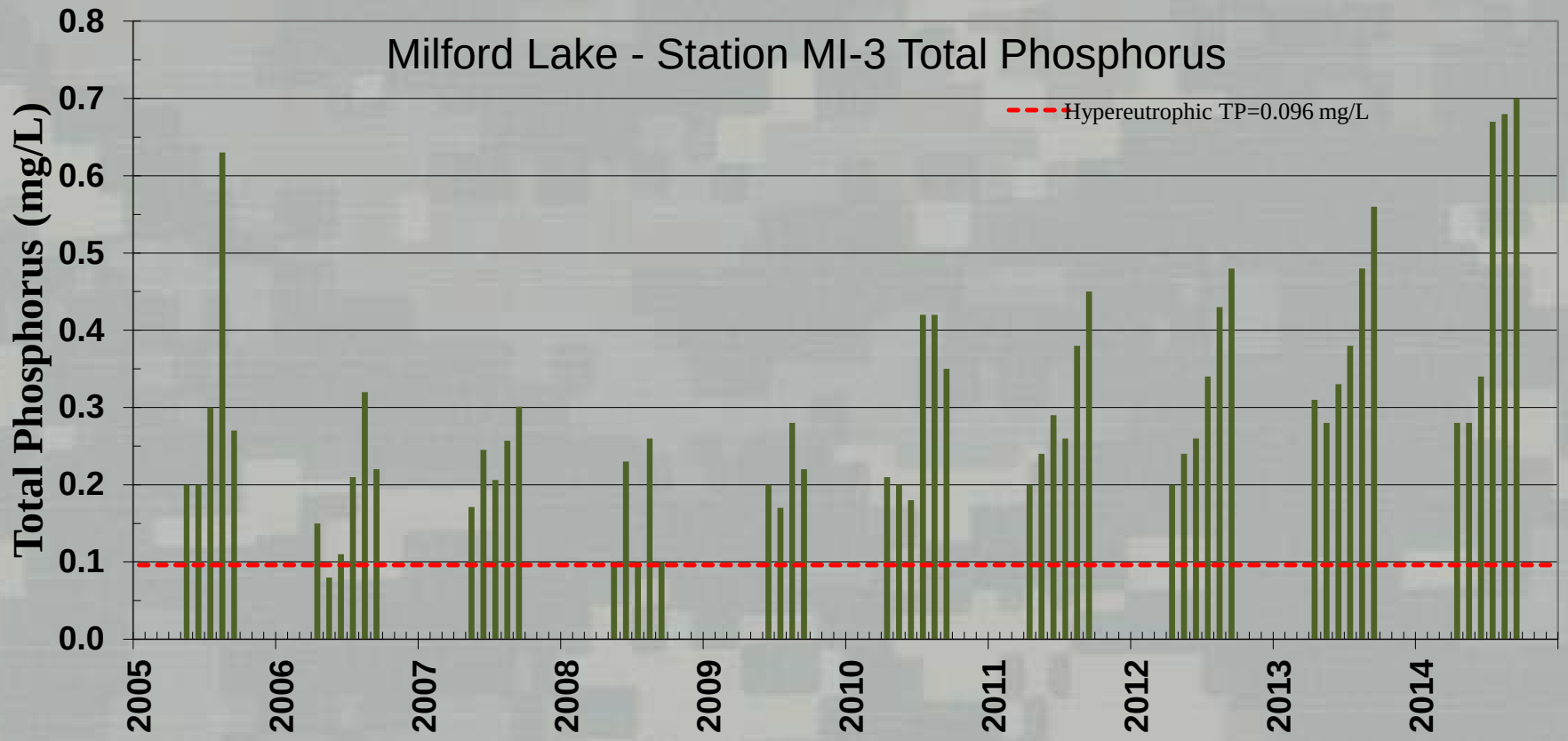
Phytoplankton/toxins

Milford

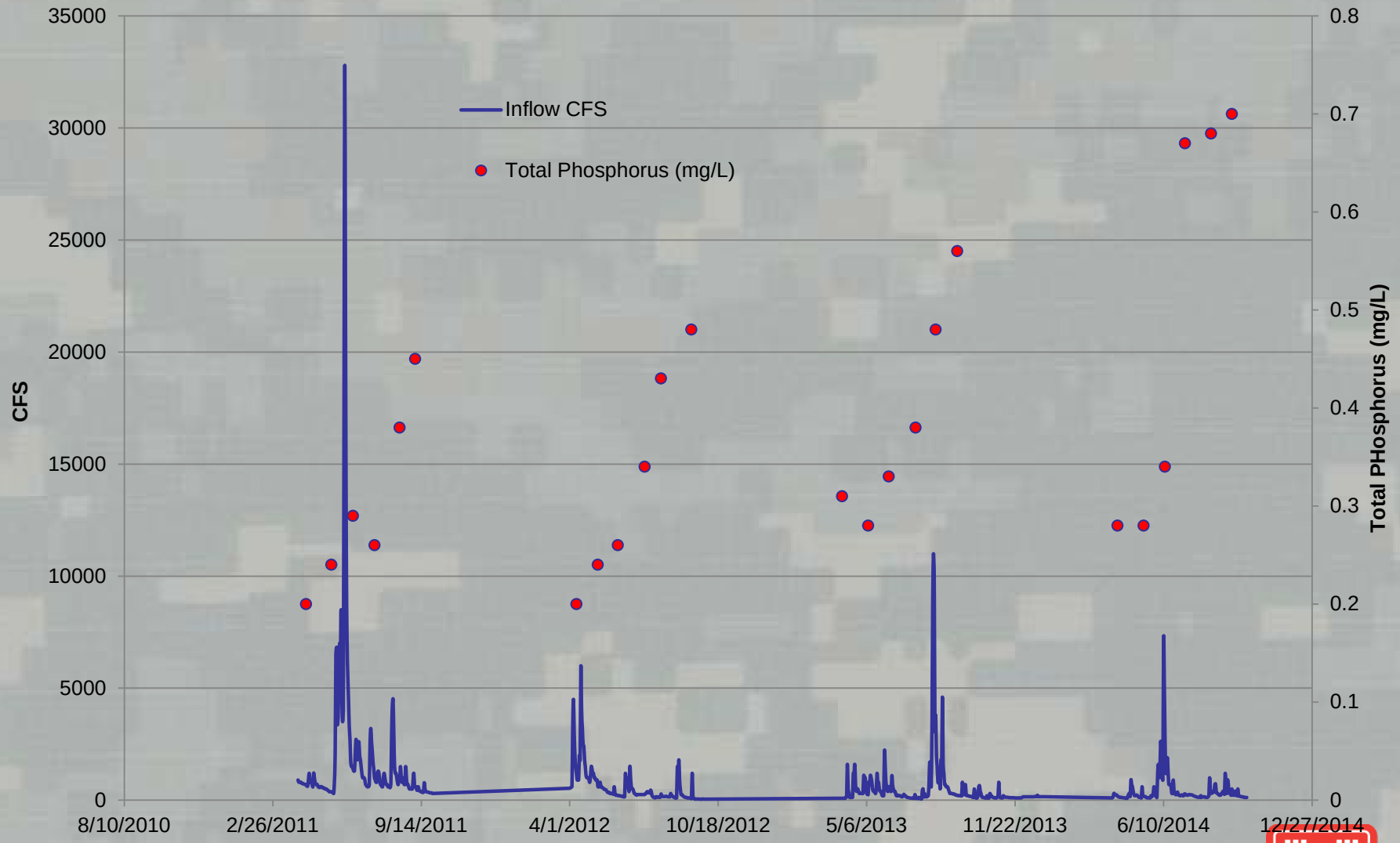
Site	Sampled	Microcystin (µg/L)	Cylindrospermopsin (µg/L)	Anatoxin-a (µg/
MI-5	8/13/2014	**2.5**	**ND**	**ND**
MI-3	8/13/2014	**5.8**	**ND**	**ND**
MI-1	8/13/2014	**2.7**	**ND**	**ND**
MI-1a	8/13/2014	**0.4**	**ND**	**ND**



Milford Lake Water Quality



Milford Lake Water Quality



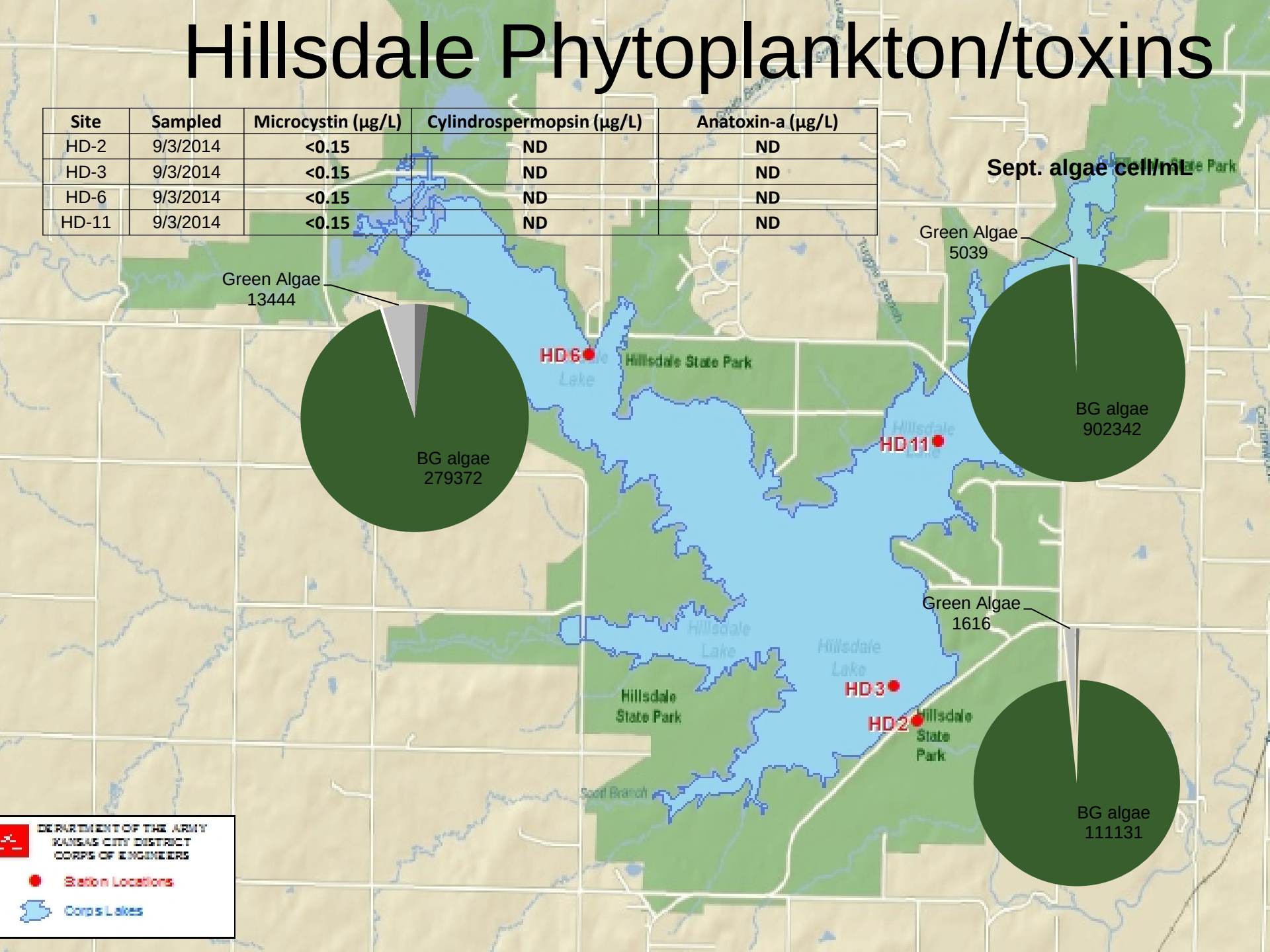
Milford Lake Water Quality

- 2014 record transparency-Secchi 2.8m -2.6m for 3 months (inflows, zebras and ice).
- Hypereutrophic-Higher TP and TOP at all site than previous years
- TOP-available for algae 87% of TP in 2014
- Very low TN:TP ratio as nitrates were used up and nearly non detect
- Perfect conditions for HAB

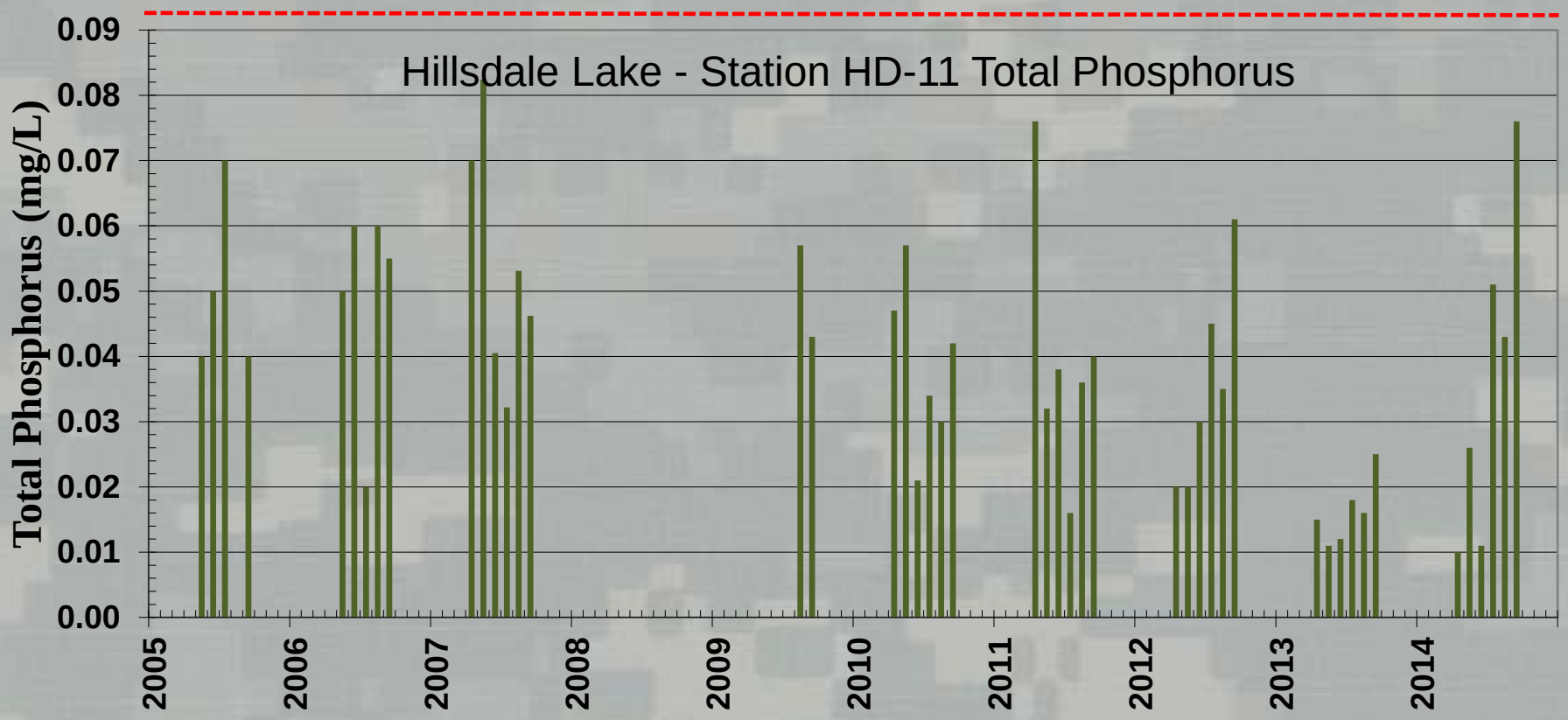
Hillsdale Phytoplankton/toxins

Site	Sampled	Microcystin (µg/L)	Cylindrospermopsin (µg/L)	Anatoxin-a (µg/L)
HD-2	9/3/2014	**<0.15**	**ND**	**ND**
HD-3	9/3/2014	**<0.15**	**ND**	**ND**
HD-6	9/3/2014	**<0.15**	**ND**	**ND**
HD-11	9/3/2014	**<0.15**	**ND**	**ND**

Sept. algae cell/mL



Hillsdale Lake Water Quality

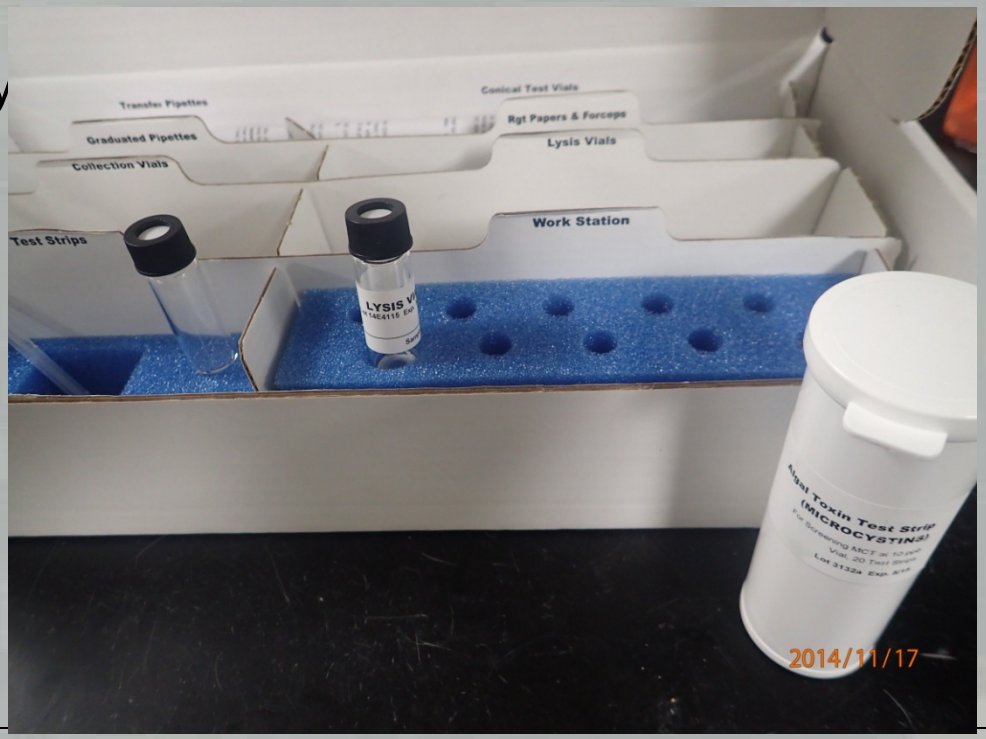


Hillsdale Lake Water Quality

- 2014 record transparency at dam-Secchi highest avg. in 10 years
- Eutrophic conditions.TP and TOP not at record levels and ND for TOP at many samples
- Low TN:TP ratio. Less than 20 at all sites after July
- Favorable for cyanobacteria species cylindrospermopsis (900k cells/mL), but not toxin producing Annie, Fannie, and Mike.
- No toxins detected during blooms

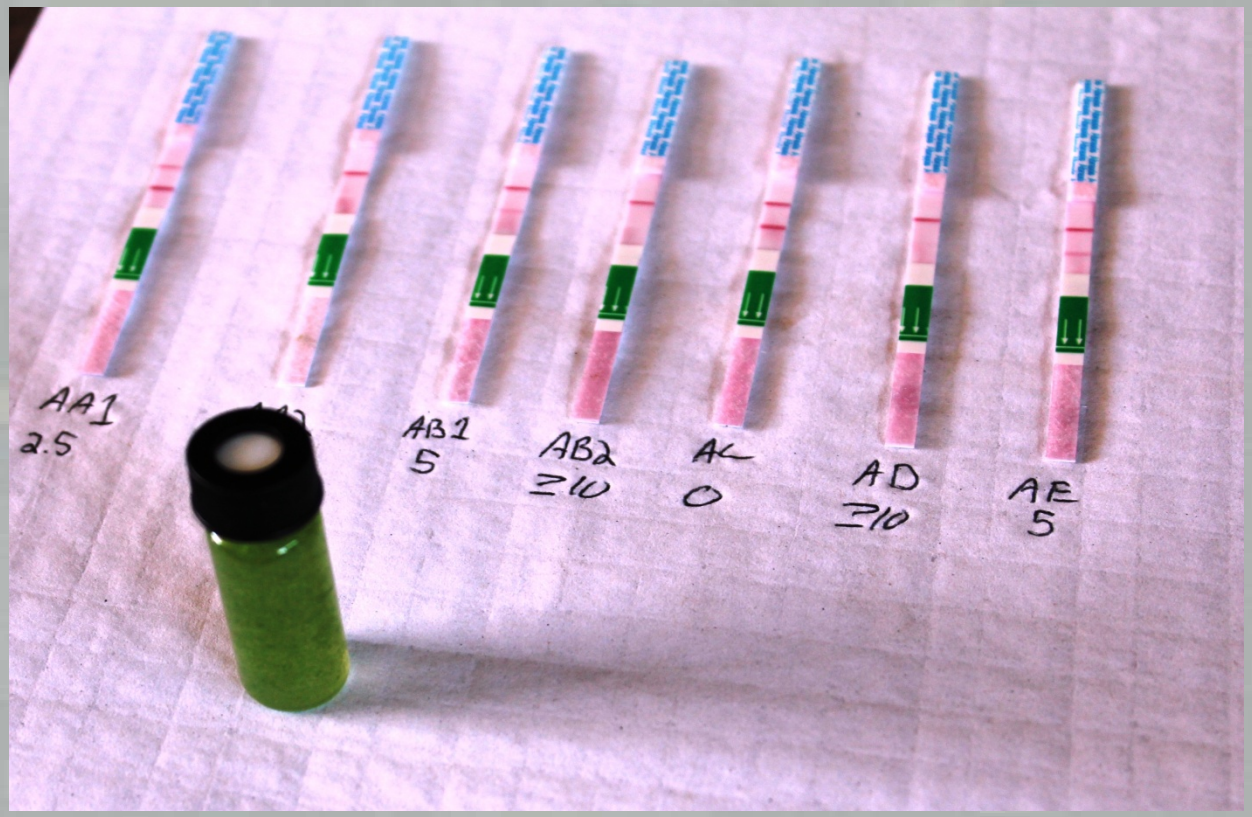
Microcystin StripTest Kits for Rec. Water

- Commercial product for quick (2hr) results by field staff
  - All reagents and quick-lyse are included separate vials
  - Detailed instructions with diagrams and all necessary equipment included (e.g. forceps, reagents, droppers, vials, vial holder, test strips)
  - Cookbook chemistry



Microcystin StripTest Kits for Rec. Water

- Commercial product for quick (2hr) results by field staff
  - semi-quantitative results in the range of 0 to 10 ppb



Microcystin StripTest Kits for Rec. Water

- Commercial product for quick (2hr) results by field staff
  - Detected MC>5ppb 14/16 times (88%)
  - Did not get to test dilutions to evaluate 20 ug/L

Microcystin StripTest Kits for Rec. Water

KDHE Site-Milford	Date Collected	Date Analysed-USACE	KDHE ELISA RESULTS	Abraxis Test Results (ppb)
AA	6/30/2014	7/1/2014	<0.5	2.5
AB	6/30/2014	7/1/2014	5	5
AC	6/30/2014	7/1/2014	7	≥10
AD	6/30/2014	7/1/2014	1	2.5
AE	6/30/2014	7/1/2014	<0.5	1
AA	7/7/2014	7/9/2014	<0.5	2.5
AB	7/7/2014	7/9/2014	3	5
AC	7/7/2014	7/9/2014	2	0
AD	7/7/2014	7/9/2014	17	≥10
AE	7/7/2014	7/9/2014	5	5
AB	7/7/2014	7/15/2014	3	0
AB	7/7/2014	7/15/2014	3	0
AE	7/7/2014	7/15/2014	5	1
AE	7/7/2014	7/15/2014	5	2.5
AA	7/9/2014	7/9/2014		≥10
AB	7/9/2014	7/9/2014		≥10
AB	7/9/2014	7/15/2014		≥10
AB	7/9/2014	7/15/2014		≥10
AA	9/4/2014	9/12/2014	10	5
AB	9/4/2014	9/12/2014	5	5
AC	9/4/2014	9/12/2014	130	≥10
AD	9/4/2014	9/12/2014	250	≥10
AH	9/4/2014	9/12/2014	20	5
AA	9/4/2014	9/22/2014	10	0
AB	9/4/2014	9/22/2014	5	2.5
AC	9/4/2014	9/22/2014	130	≥10
AD	9/4/2014	9/22/2014	250	≥10
AH	9/4/2014	9/22/2014	20	5

No training or discussion

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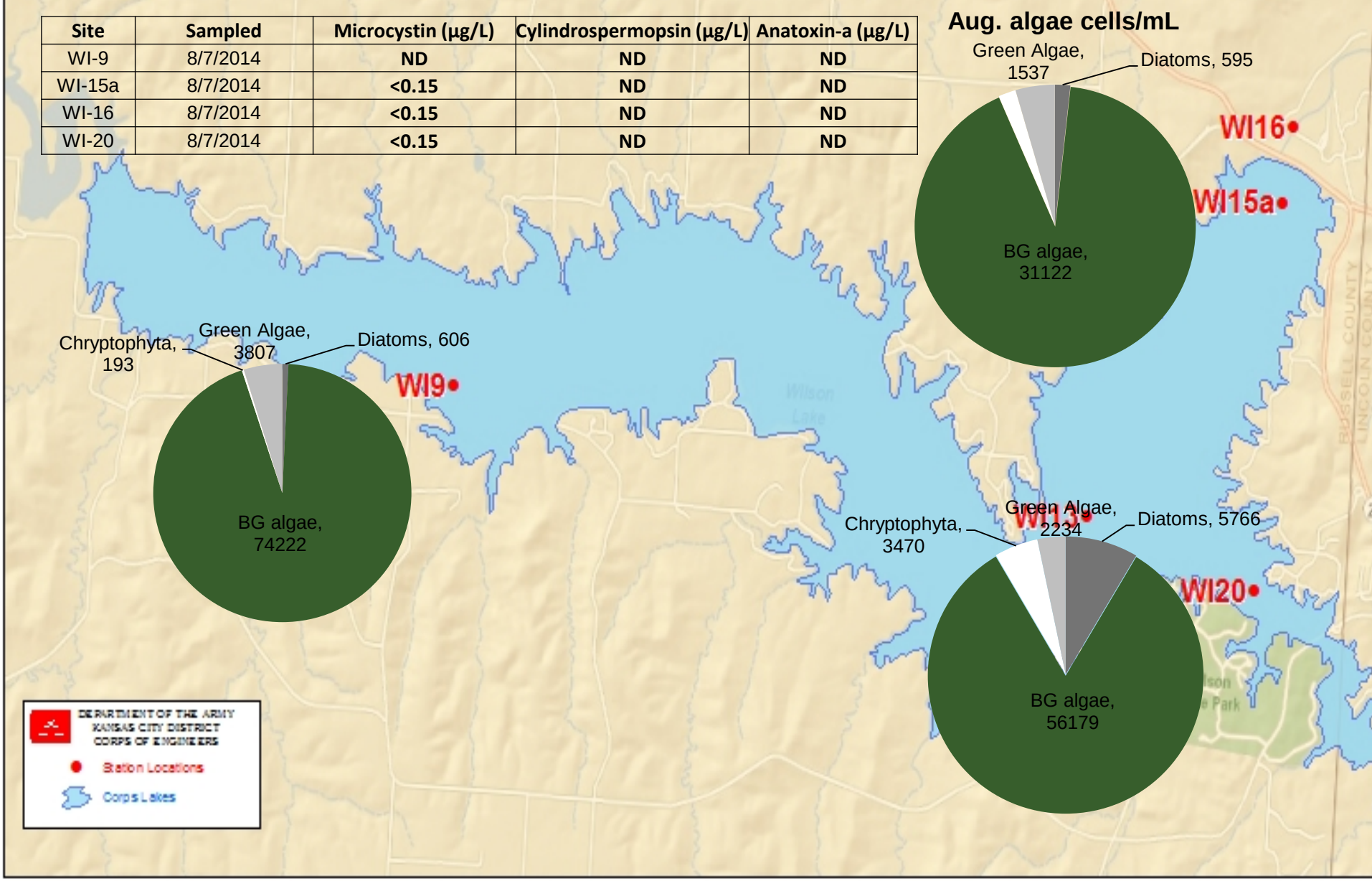
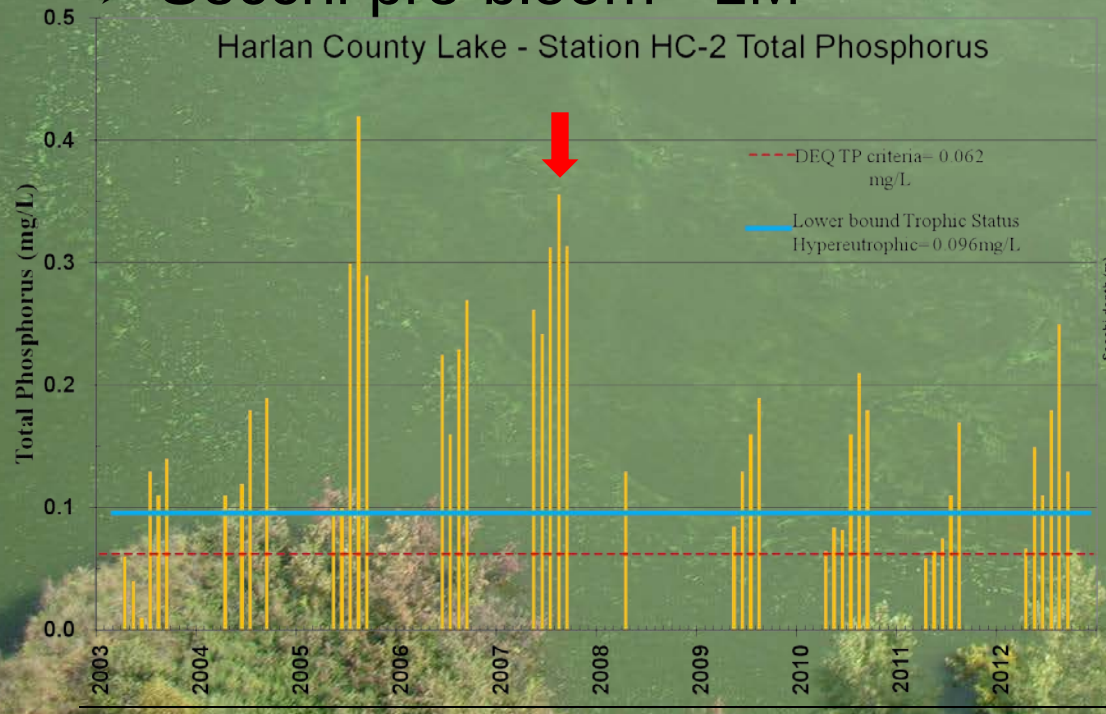
Wilson Lk Phytoplankton/toxins

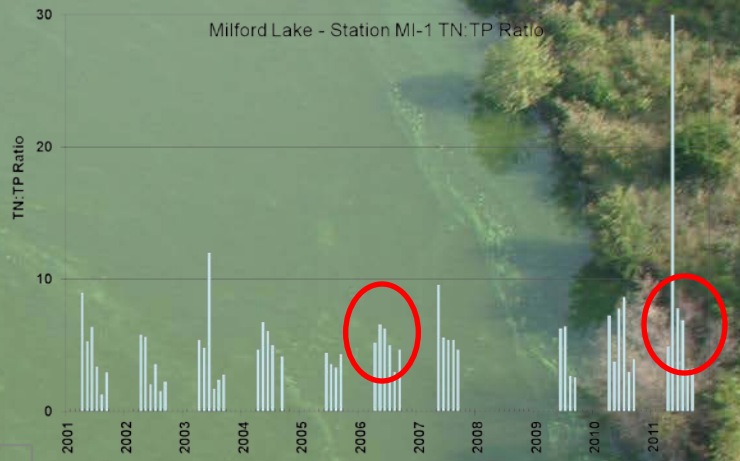
Site	Sampled	Microcystin (µg/L)	Cylindrospermopsin (µg/L)	Anatoxin-a (µg/L)
WI-9	8/7/2014	**ND**	**ND**	**ND**
WI-15a	8/7/2014	**<0.15**	**ND**	**ND**
WI-16	8/7/2014	**<0.15**	**ND**	**ND**
WI-20	8/7/2014	**<0.15**	**ND**	**ND**

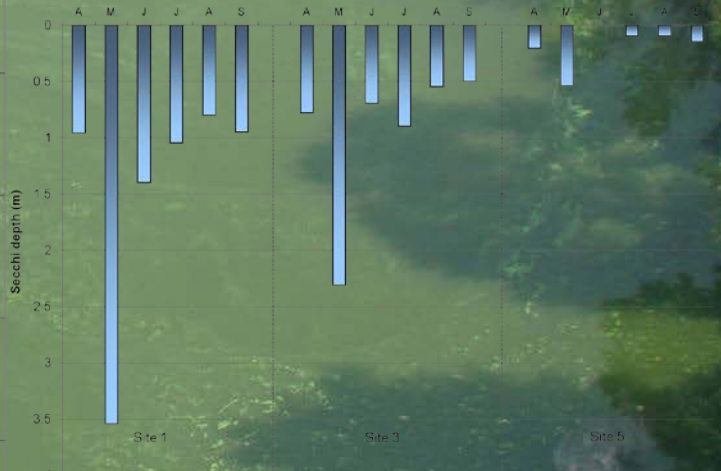


Conditions leading to KCD HABs

- Other KCD WQ Conditions
  - Eutrophic to Hypereutrophic
  - High TP (>0.3 mg/L)
  - Low TN:TP (<12)
  - Secchi pre-bloom >1M







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