Illinois Harmful Algal Bloom Program

January 16, 2013

Gregg Good, Surface Water Section Manager

Illinois EPA, Bureau of Water, Division of Water Pollution Control

Purpose of Today's Meeting?

- To have an open discussion regarding the need and efficacy of developing and implementing a new, more formalized ***Illinois Harmful Algal Bloom Program*** that at a minimum includes:
  - *Education*
  - *Surveillance Monitoring and Reporting*
  - *Response Planning and Implementation*
- To describe past and present monitoring efforts and findings, and describe local entity and state agency response.
- To describe ongoing activities in other states and around the nation.
- To determine your interest and potential future involvement.
- Next steps? Where do we go from here?

Palmyra-Modesto Lake, July 2011

Purpose Today: To describe Illinois EPA Monitoring Efforts, Findings, and Response

- 2001- Discovery of *Cylindrospermopsin raciborskii* bloom in Ball Lake, Indiana.
- Illinois EPA Surface Water Section staff would hear about this and other blue green algae and algal toxin issues at meetings and conferences primarily from Dr. Ann St. Amand, PhycoTech, Inc.
- And then, Otter Lake (Macoupin Co.), July 2005, during the hot and dry summer……

Taste & Odor Complaints

Dennis Ross,
Otter Lake
Water
Commission

Otter Lake Chronology

- Dennis Ross called Teri Holland, IEPA, and said Otter Lake looked "funky."

- Samples collected on 7/22/05 and 7/27/05; analysis by Larry O'Flaherty and Ann St. Amand, respectively, for algal identification and enumeration.

- Friday, 7/29/05 – Dr. Ann St. Amand confirmed the presence of Cylindrospermopsis raciborskii, a potential toxin-producing algae. Cell count was 305,356 cells/mL (60,433 filaments/mL). Cell count of concern according to the World Health Organization (WHO) is >100,000 cells/mL!!

- Saturday, 7/30/05 – "Proactive" public safety decision was made by Otter Lake officials to cancel the planned Sunday, 7/31/05 Cardboard Boat Regatta.

World Health Organization (WHO) Guidance Values for Recreational Exposure to Cyanobacteria and Microcystin

Relative Probability of Acute Health Effects	Cyanobacteria (cells/mL)	Microcystin-LR (ug/L)	Chlorophyll-*a* (ug/L)
Low	<20,000	<10	<10
Moderate	20,000-100,000	10-20	10-50
High	***100,000*** **– 10,000,000**	***20*****-2,000**	**50-5,000**
Very High	**>10,000,000**	**>2,000**	**>5,000**

August 2, 2005

PUBLIC NOTICE

Otter Lake has recently seen an extensive growth or "bloom" of blue-green algae, the small microscopic aquatic plants found in all lakes in Central Illinois. These blooms are the result of hot days with little fresh water entering the lake.

An algal analysis was performed on a sample of water from Otter Lake. Among several other blue-green algae "Cylindrospermopsis raciborskii" was found. "Cylindro," as with all blue-green algae, are known at times to produce a chemical when they die that may have toxic effects on humans, pets, livestock and wildlife.

While there are currently no set standards for health advisories by any of the regulatory bodies or health agencies, the Otter Lake Water Commission wanted to inform the public of the presence of this algae. Cylindro does not always produce a toxin. Further testing is being done to see if any of these chemicals are being produced.

The treatment process at the water plant removes the algae and these by-products from the water. The Otter Lake Water Treatment Plant continues to meet all state and federal requirements for the quality of its water.

Health effects of contact with this algae include skin irritations, allergic reactions, gastrointestinal symptoms, respiratory problems, and potentially more severe liver or nerve problems. Swimmers, livestock, and small animals should not drink the raw lake water at this time.

Fish caught in waters with Cylindro are safe to eat. As always any fish caught that appears unhealthy should not be consumed.

"Toxic Monster" and Taste & Odor Complaints

Poor Dennis Ross!

Otter Lake Chronology (cont.)

- Monday, 8/1/05 – Meeting held with several state agencies and all the players involved. All were briefed on the potential Drinking Water and Swimming use issues. Phycologists O'Flaherty and St. Amand agreed they were looking at the same algae. *Raphidiopsis curvata = Cylindrospermopsis raciborskii.*

- Group decision that more data was needed before any kind of statewide press release or advisory issuance by IDPH would be considered.

- Tuesday, 8/2/05 - Public Notice formally issued by Otter Lake Water Commission.

- Thursday, 8/11/05 – First results back from 3rd Otter Lake sample (collected 8/2/05). Lots of algae, *Cylindrospermopsis* was the dominate sp. (227,000 cells/mL).

- Friday, 8/19/05 – Toxin results received. No toxins in raw lake water or drinking water.

IEPA First Statewide Effort

- Wednesday, 8/3/05 – In two days (Yes, two days in state government!!), IEPA developed a $9,600 contract for algae identification and enumeration, and toxin analysis with Greenwater Labs in Florida, one of few labs in the country that can do toxin analysis (at least back then).

- 8/8/05 (week of) – IEPA lake experts collected samples and shipped them to Florida. Samples collected at 22 sites. Reports all over the Midwest (IN, IA, NE, WI, etc.) of the same problems. Greenwater Labs was getting a lot of business!!

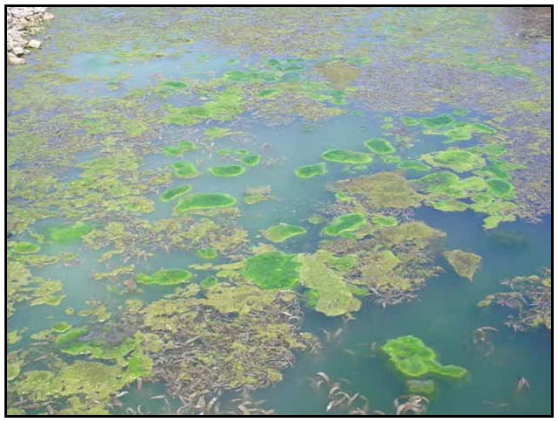
- Post 8/19/05 – Results start filtering back to IEPA.

Site Specific Case:
Marion Reservoir, Marion Illinois

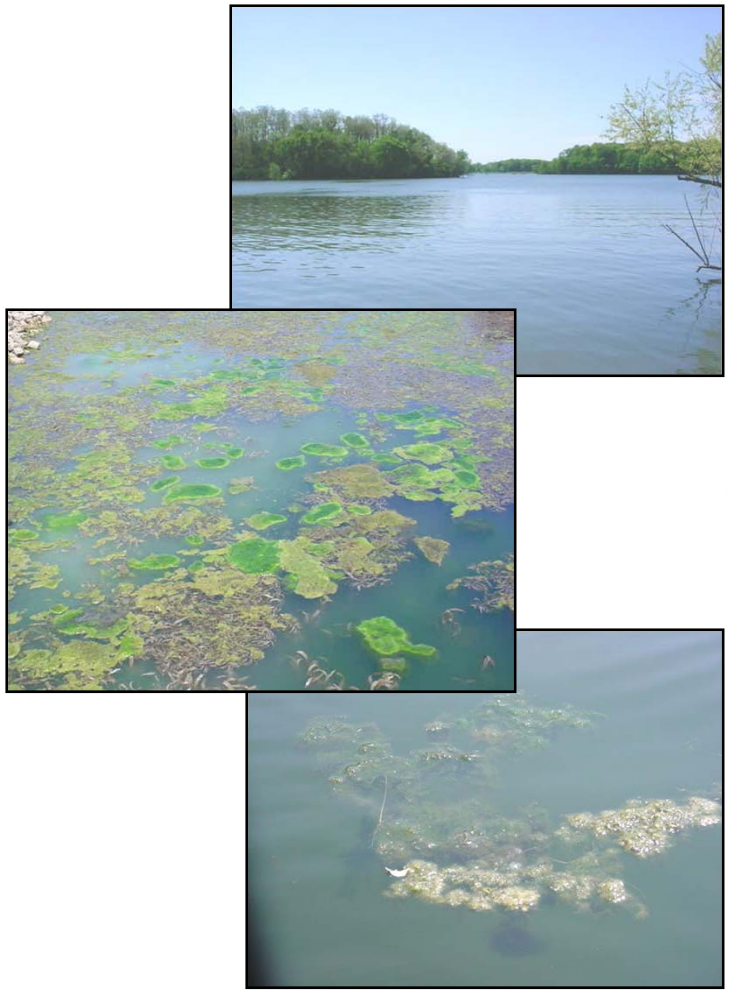
- Tuesday, 7/26/05 – City treated Marion Reservoir w/copper sulfate due to high algae and T&O.
- Tuesday, 7/26/05 – Destratifier turned on at the wrong time and a cold front came through. The lake was completely mixed.
- Thursday, 7/28/05– Total fish kill due to algae die off and subsequent dissolved oxygen depletion.
- Wednesday, 8/3/05 – Q? Did the copper sulfate application lyse enough algae cells where toxins would be found at high levels? Samples collected and shipped to Florida.
- Friday, 8/19/05 – Toxin (Microcystin) found in raw water, but at a very low level (0.10 µg/L). No toxin found in finished drinking water.

Blue-green Algae Sampling Sites

Total Toxigenic Blue-green Algae Cell Counts



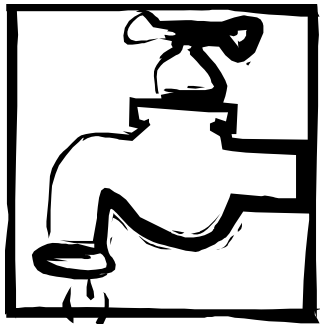
Any Toxins Found? (Raw Water)



Legend

- Toxins Not Detected
- Toxins Detected at Low Levels
- Toxins Detected at Low Levels
- County Boundary

Any Toxins Found? (Drinking Water)



Legend

- Toxins Not Detected
- County Boundary

2005 Lessons Learned

- Hot, dry summers cause lots of algae problems!!
- More blue greens equals more PWS T&O Problems – YUCK!
- Lots of blue greens **does not always** equal lots of algal toxins.
- **"Think twice before you lyse."** Blue green algae management for PWS vs. Swimming uses can be polar opposites!
- Better safe than sorry!! **Dennis Ross/Otter Lake Water Commission did the right "public safety" thing in canceling the regatta.** He and his Commission are to be commended.
- That said, lake use closures/advisories can have local lake "use," "$$$," and "trust" impacts.

Other Questions and Lessons Learned in 2005

- Who is responsible for issuing an advisory? IDPH? IEPA? Local Lake Owner?
- What mechanisms are in place to study, analyze, and issue if necessary?
- Lag Time – The time between collection, algal identification and enumeration, toxin analyses, and issuance of an advisory/closure is lengthy.
- Conservative vs. Proactive Advisory Issuance – depends on the organization and individuals!!

2006 Toxin Monitoring Effort

- ***Round 1 – Late August/Early September 2006***
  - 17 Sites (3 Fox River Sites; 14 Sites at 11 Lakes)
  - Algal Counts Ranged from 5,536 to *966,091* Cells/mL (Sedgewick Lake)
  - Anatoxin-a – 6 of 6 were Non-Detect
  - Cylindro – 5 of 5 were Non-Detect
  - Saxitoxin – 1 of 1 were Non-Detect
  - *Microcystin – 4 of 5 were Detected; 0.7 – 5.1 ug/L*
- ***Round 2 – Late September 2006***
  - 15 Sites (Most were the same, a few dropped and a few added)
  - Algal Counts Ranged from 1,732 to *1,899,211* Cells/mL (Sedgewick Lake)
  - Anatoxin-a – 1 of 1 were Non-Detect
  - Cylindro – 3 of 3 were Non-Detect
  - *Microcystin – 5 of 5 were Detected; 0.2 to 8.2 ug/L*

2006 Toxin Monitoring Effort (cont.)

- Despite a more "normal" weather year in 2006 as compared to the 2005 drought year, there was a similar % of sites where potentially toxin producing species were greater than 100,000 Cells/mL (slightly higher % in 2005).
- Therefore, % of sites that warranted toxin analyses were also similar.
- 2005 and 2006 – Toxin hits were all Microcystin except for one questionable Anatoxin-a hit in 2005; no Cylindrospermopsin or Saxitoxin.
- At PWS sites, raw water samples were low in Microcystin, so couldn't draw conclusions about treatment efficacy.

2005-2006 Microcystin Summary

	2005	2006
N	12	10
Minimum	0.09 ug/L	0.15 ug/L
Maximum	**8.00 ug/L**	**8.20 ug/L**
Median	0.15 ug/L	0.70 ug/L
Average	1.78 ug/L	2.35 ug/L

Lets Keep Looking!!
2007 and 2008 Planned Effort

- Applied for and received a Supplemental Section 106 Monitoring Grant for two more years of monitoring effort.
- Like 2005 and 2006, approximately $8,000-$10,000 of lab work.

2007-2008 Effort

- A different approach was used to collect and analyze algal samples:
  - *Collection at public access and hot spots from lakes in our Ambient Lake Monitoring Program (ALMP).*
  - *No phytoplankton identification/enumeration.*
  - *Just Microcystin analysis.*
- Samples sent to Iowa DNR in Iowa City.
- 2007 - *165* samples collected in July, August, Sept/Oct.
- 2008 - *179* samples collected in July, August, Sept/Oct.

2007-2008 Microcystin Summary

	2007	2008
N	165	179
Minimum	0.12 ug/L	0.15 ug/L
Maximum	**10.77 ug/L**	**17.47 ug/L**
Median	0.20 ug/L	0.15 ug/L
Average	0.75 ug/L	0.64 ug/L
% Non-Detects	44%	57%

Overall Four-Year Microcystin Conclusions 2005-2008

- Out of 366 total samples, 49.5% were non-detects, meaning 50.5% had detects.
- Highest % of *non-detects* in 2008 (57%).
- Highest % of *detects* in 2007 (55%).
- Highest concentration was 17.47 ug/L, 9/18/2008 at West Frankfort Old Reservoir.

Overall Four-Year Microcystin Conclusions 2005-2008 (cont.)

- Of 185 samples with detects:
  - 0 samples (0%) in “high” or “very high” range
  - 3 samples (1.6%) in “moderate” range
  - 182 samples (98.4%) in “low” range
- So the relative probability of acute health effects from 2005-2008 was “Low” – *This was Good News!*
- Yet ~50% of the samples had detects of Microcystin – *This was concerning news!*

Final Conclusionary Statement

"Algal species capable of producing microcystins are present in Illinois waters, and given the right conditions, blooms could produce toxins at much higher concentrations."

Teri Holland, Illinois EPA, 2009

Year 2009

- Despite Teri's conclusion, and since four years of finding almost nothing but low concentrations, in 2009 I did not pursue additional state or federal financial resources to keep microcystin monitoring going.

- And then……

2010 – The Clinton Lake Experience

- Clinton Lake near Clinton, Illinois (46 miles NE of Springfield).
- Power Plant Cooling Water Reservoir, Exelon Corporation. Two major arms – cooler "intake water" arm and warmer "discharge arm."
- Public Beach and Fisheries Managed by IDNR.
- Public Beach located down-lake of discharge arm.
- July 4th Weekend, 2010.

Sunday, July 4, 2010

- Dog owner reported that evening that their 7 year old poodle (<10 lbs.) died after swimming in and drinking the water from Clinton Lake.
- Owner said Veterinarian said that their dog displayed symptoms *consistent with* toxic algae poisoning.
- Incident reported to emergency response folks at IDNR, IEPA, and others very late that evening……

Wednesday, July 7 – Friday, July 9, 2010

- Discussions ensued between IDNR and IEPA leading to sample collection effort at four sites (including beach and cove area) on Friday, July, 9.
- Albeit a fast response, this was still 5 days after the dog death!
- Subsequently contacted Dr. Keith Loftin, USGS-Kansas, national algal toxin expert, to get his take on the situation.
- IEPA Field Operations Section staff reported:
  - Visual observations of "usual" summer algae conditions; nothing unusual
  - No paint-like or algal scums
  - No other dog or human sicknesses reported
  - Very hot summer day and past holiday weekend
  - Water temp was 33 degrees C (~28 degrees C normal at other lakes)!!
- Samples shipped to phycologist O'Flaherty overnight (samples also to be shipped to Iowa DNR for Microcystin analysis on Monday, July 12).

IDNR Advisory – July 9, 2010

IDNR issues advisory for Clinton Lake, urges lake users to be cautious

State agencies testing for potential toxic algae

SPRINGFIELD, IL – The IDNR and IEPA are sampling water at Clinton Lake for potential blue-green algae blooms. Blue-green algae are common in central Illinois waters, but some can produce chemicals that can have a toxic effect on humans, pets and livestock.

The samples have been collected and will be submitted for positive identification. Until testing is complete, boaters, swimmers and other lake users are advised not to ingest lake water and refrain from swimming in areas of the lake where stagnant water or algae blooms are present.

Monday, July 12, 2010

- Monday, July 12, O'Flaherty states that cell counts were low and only *Cylindrospermopsis* algae could have produced enough toxin *(Cylindrospermopsin)* to kill the dog.
- IDNR first becomes aware that a 12-year old girl was reported sick supposedly from swimming in the water on July 4. After hearing of the advisory issued on July 9, they took her to the hospital. Symptoms had been nausea, headache, dehydration. First report of human illness!
- IDNR receives word from a Bloomington Pantagraph reporter saying according to the dog owner, the preliminary autopsy report was that the dog died from heat stroke, not toxic algae!

Tuesday, July 13 – Wednesday July 14, 2010

- IEPA sets up meeting to include IDNR, IDPH, IEPA, USGS, and others. O'Flaherty showed that cell counts for *Cylindrospermopsis* were actually quite low and couldn't have produced that much toxin.
- Autopsy concluded probable cause of dog death was heat stroke, but would not rule out algal toxin poisoning.
- Still only received one report of sickness (12-year old girl) despite the fact that 4,000-5,000 people used the beach over the July 4th weekend.
- After the meeting, received an e-mail regarding results from Iowa DNR, for Microcystin:
  - <0.20 ug/L, <0.20 ug/L, 1.06 ug/L, 0.24 ug/L

  Conclusion: Dog death and girl illness NOT due to microcystin!
- IDNR Amended Algae Advisory – "Water Samples Show Low to No Toxicity."

Final Statement
Gregg Good to Tim Hickman, IDNR
(E-mail Sept. 16, 2010)

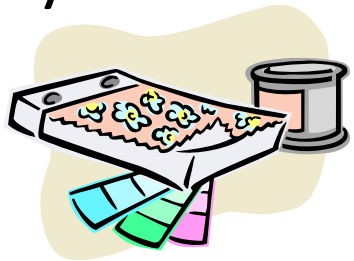
"I just wanted to express my gratitude to you and EVERYONE involved for taking a very proactive approach towards this "dead dog, sick young lady, was it algal toxins or not?" event at Clinton Lake. The cooperation from all was just outstanding. I'm confident in our joint assessment that algal toxins were not the culprit.

Unfortunately, our organizations will probably be working together on similar cases like this at some point down the road, as algae will always be there when you mix nutrients, impounded waters, and warm summer temperatures together! I believe we've learned a lot from this incident, and we'll be even better prepared to respond the next time around.

Outside of IDNR/IEPA, a lot of folks were brought into this picture, from our good friend Dr. O'Flaherty ("Mr. Phytoplankton"), to Mary Skopec at Iowa DNR (free analyses), and Jennifer Graham and Keith Loftin from Kansas-USGS (national expertise and more free analyses). So a special thanks goes out to these folks for helping us out."

Year 2011 - Microcystin Test Kits

- With the Clinton Lake issue fresh in our minds, IEPA purchased and began utilizing *"Abraxis Microcystin Dipstick for Recreational Water"* Test Kits in 2011.
- The Test Kits provide a quick result in ranges of 0, 0-1.0, 1.0-2.5, 2.5-5.0, and 5.0-10.0 ug/L Microcystin.
- One-year shelf life, ~$24/test
- About ~40 total usages in 2011 and 2012



- <u>Summary</u>: A very useful tool! So far whenever we've had laboratory Microcystin analyzed where we've also used a test kit, test kit results were corroborated.

Summer 2012 – The fun begins again!
(and Teri and Gregg were, unfortunately, right!!)

- Based on the 2005-2008 IEPA sampling effort, Teri Holland said:

  "Algal species capable of producing microcystins are present in Illinois waters, and given the right conditions, blooms could produce toxins at much higher concentrations."

- Based on the 2010 Clinton Lake incident, Gregg Good said:

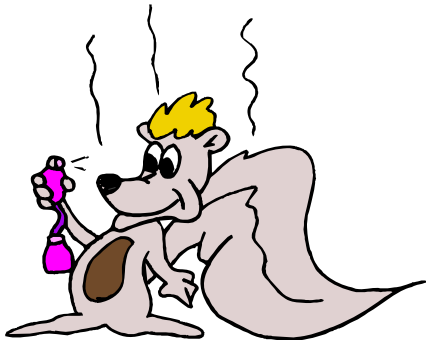
  "Unfortunately, our organizations will probably be working together on similar cases like this at some point down the road, …… I believe we've learned a lot from this incident, and we'll be even better prepared to respond the next time around."

- Welcome to the ***"the Drought of 2012!"***

2012 ALMP and Lake Le-Aqua-Na

- IEPA Ambient Lake Monitoring Program (ALMP) – 5X/Year.
- Lake Le-Aqua-Na, Stephenson County, Illinois (45 miles west of Rockford, Illinois)
  - *43 acre impoundment constructed in 1956*
  - *2,348 acre watershed, 26' max depth*
  - *42" mean Secchi transparency in 2011*
  - *IDNR Owned and Managed*
- Federal Clean Lakes Program Projects
  - *Phase I Diagnostic Feasibility Study (81'-83')*
  - *Phase II Implementation Program (84'-86')*
    - *Lake Aeration/Destratification*
    - *Macrophyte Harvesting*
    - *Shoreline Erosion Control*
    - *Watershed Management*
    - *Post-Restoration Monitoring*

ALMP – Le-Aqua-Na



- July 10, 2012 – Round 2 ALMP monitoring visit by Diane Tancl, IEPA.
- Lake was green as green could be, “sewer smell,” NO dissolved oxygen (but no fish kill – go figure!)
- Test Kit screen result was ***>10 ug/L*** from algal scum taken near boat launch site.
- Called a favor into Keith Loftin, USGS-Kansas, leading algal toxin expert. Agreed to analyze a sample.

Lake Le-Aqua-Na, July 10, 2012

Lake Le-Aqua-Na, July 10, 2012

Lake Le-Aqua-Na
Happenings and Results

- Based on test kit result above 10 ug/L, the terrible smell, and general lake appearance, the following day on July 11, 2012, IDNR closed the beach to recreational usage.
- While waiting for results from Keith Loftin, IEPA revisited the lake on August 8, 2012. Beach and boat launch samples collected.
- 0-1 ug/L at both sites (Really? Go figure).
- Keith Loftin results for July 10 sample came in August 22, 2012 - 48 ug/L!
- New Illinois Record (previous high was 17.47 ug/L in 2008)
- Keith Loftin – "One of the higher values I have analyzed this year."

Enter Candlewick Lake

- Candlewick Lake, Boone County, Illinois (Mmm….also located in Northern Illinois, 12 miles east of Rockford).
  - *184 acre impoundment constructed in 1975*
  - *2,100 acre watershed, 30' max depth*
  - *42" mean Secchi transparency in 2011*
  - *Candlewick Lake Association Owned and Managed*
- Private lake manager reported to IEPA on Monday, August 20 that privately collected samples were sent to Greenwater Lab in Florida for toxin analysis and to PhycoTech, Inc. in Michigan for phytoplankton identification and enumeration.
- *History – WWTP discharge directly to the lake through late 80's early 90's.*
- Result provided to IEPA on Thursday, August 23 that Candlewick had a Microcystin level of ***14,800 ug/L*** (remember that >20 ug/L is "High")
- Candlewick Lake closure to all uses issued by Candlewick Lake Association.
- ***HOLY MOLY -*** Alerted Agency management late that afternoon.

Enter USGS Illinois Water Science Center, Champaign, Illinois

- The following day on Friday, August 24, 2012, USGS heard at a Governor's Drought Task Force meeting from IEPA's Rick Cobb that a drought-related finding of high algal toxins was being reported in several northern Illinois lakes.
- USGS contacted IEPA on Monday, August 27, offering to conduct a joint project of algal identification, enumeration, and toxin analysis at lakes of concern, and streams where taste and odor problems had recently been reported (Fox R., Vermilion R.).
- In addition to the results at Le-Aqua-Na and Candlewick, on Tuesday, August 28, we received the Westlake results.
- By August 28 p.m., laid out a plan of action.
- Sample collection on Wednesday August 29 and Thursday August 30, 2012.

USGS
science for a changing world

So what's this about Westlake?

- Westlake, Winnebago County, Illinois (Mmm….mmm…..also located in Northern Illinois, 15 miles west of Rockford).
  - *83 acre impoundment constructed in ~1997*
  - *??? acre watershed, ??? max depth*
  - *44" mean Secchi transparency in 2009*
  - *Westlake Village Owned and Managed*
- Of Interest….
  - *Winnebago Sewage Treatment Plant, Population ~3,100*
  - *Discharge to Coolidge Creek, ~3 miles from Westlake*
  - *Minor NPDES permit holder, no TP removal requirement*
  - *Westlake Golf Course located immediately west of and adjacent to Westlake*

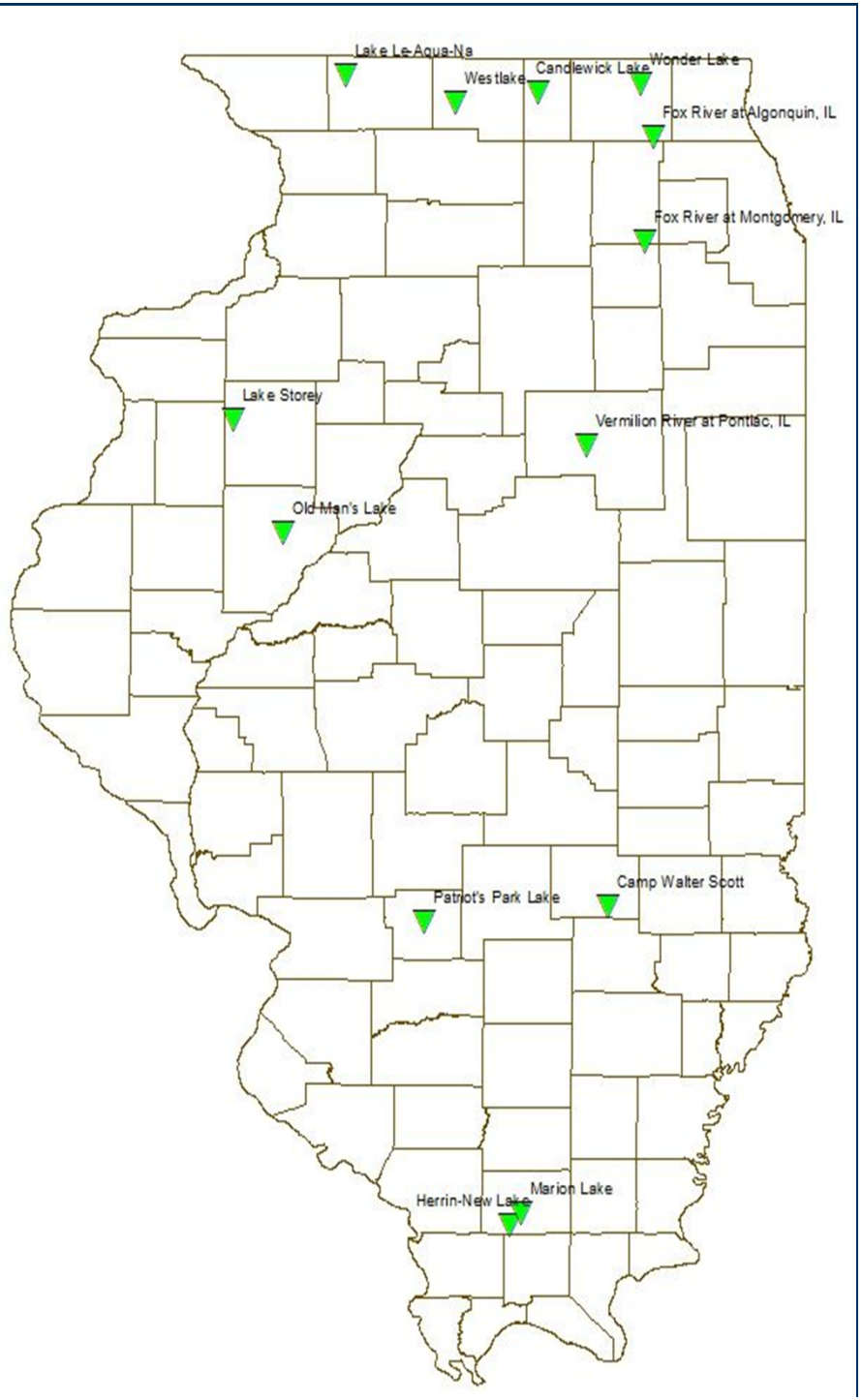
Westlake (cont.)

- Private lake manager reported to IEPA on Tuesday, August 28 that privately collected samples were sent to Greenwater Lab in Florida for toxin analysis and to PhycoTech, Inc. in Michigan for phytoplankton identification and enumeration.
- Result provided was that Westlake had a Microcystin level of ***31,500 ug/L – HOLY HOLY MOLY MOLY***

  (remember that >20 ug/L is "High")
- Also alerted by Ann St. Amand that high concentrations of Aeromonas species (420,000 cells/mL of Aeromonas species, 60% identified as *Aeromonas hydrophila).* Suggestion that densities are typical of sewage, not recreational lakes!
- Closures to all uses issued by Westlake Association.

Map of Locations Sampled

- Small survey of lakes and rivers, Aug. 29-30
- Sampling by the IEPA and the USGS
- Algal samples will be analyzed stepwise by the USGS Kansas Organic Lab
- Initial results expected by end of September



Lake Le-Aqua-Na, Wednesday, August 29, 2012

Lake Le-Aqua-Na, Wednesday, August 29, 2012

Candlewick Lake, Wednesday, August 29, 2012

Candlewick Lake, Wednesday, August 29, 2012

Candlewick Lake, Wednesday, August 29, 2012

Westlake, Wednesday, August 29, 2012

Westlake, Wednesday, August 29, 2012

Westlake, Wednesday, August 29, 2012

"Hey, what about us here at Wonder Lake?"

- Heard about Le-Aqua-Na, Candlewick, and Westlake on Thursday, August 30.
- *"Our lake water could easily pass for the contents of a can of green paint." (Richard Hilton, Executive Director)*
  - Mmm…mmm…mmm…45 miles east of Rockford in McHenry County
  - 830 acre impoundment
- Yet another Northern Illinois impoundment with algal problems.
- Right before Labor Day Weekend (Friday, August 31-Monday, Sept 3), 2012.
- Wonder Lake Master Property Owners Association (WLMPOA) "wondered"(pun intended) what to do?
- Lake closed to ALL uses Friday, August 31th.
- BIG CONFLICT – Lake Use prohibited before a holiday weekend including a scheduled National Ski Team performance!!

IEPA/IDPH Public Response…

- Three lakes in Northern Illinois with confirmed concentrations > than WHO guidelines, some three orders of magnitude greater than!
- All three voluntarily closed their lakes.
- By Friday morning, August 31, IEPA had developed a ***"Blue Green Algae and Algal Toxin Fact Sheet,"*** largely patterned after Iowa Department of Public Health's.
- IEPA PIO sent to IDPH requesting that it be sent to local Public Health Departments. Follow-up e-mail to IDPH by G. Good providing Le-Aqua-Na, Westlake, and Candlewick specific results and WHO guidelines of concern.
- **IEPA sent the fact sheet BEFORE the Labor Day Weekend** on August 31, 2012, to Illinois Lake Management Association, IDPH-Lake County, Lakes Management Unit, CMAP, Illinois Association of Lake Communities, and individual lake managers we'd been working with asking them to spread the word and ***inform (not "scare")*** their constituents.

IEPA Fact Sheet

USGS

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

State of Illinois
Pat Quinn, Governor

Illinois Environmental Protection Agency
John Kim, Interim Director

BLUE-GREEN ALGAE and ALGAL TOXINS

Background

Blue-green algae are microscopic organisms that are naturally present in lakes and streams. Some blue-green algae can produce algal toxins that could pose a health risk to people and animals when they are exposed to them in large enough quantities. This fact sheet answers questions about blue-green algae and algal toxins.

What are blue-green algae?

Blue-green algae, also known as cyanobacteria, are microscopic organisms that are naturally present in lakes and streams. They are usually present in low numbers. However, blue-green algae can grow quickly and become very abundant in warm, shallow, undisturbed surface water that receive a lot of sunlight. When this occurs, they can form blooms that discolor the water or produce floating rafts or scums on the surface of the water. These blooms are primarily a concern during the summer months in Illinois.

Are blue-green algae or algal toxins harmful to my health?

Some blue-green algae produce algal toxins (e.g., microcystin, cylindrospermopsin, anatoxin, saxatoxin; the most common is microcystin) that could pose a health risk to people and animals when exposed to them in large enough quantities. Health effects could occur when surface scums or waters containing high levels of blue-green algae toxins are swallowed, come in contact with skin, or when airborne droplets containing toxins are inhaled while swimming, boating, waterskiing, tubing, bathing or showering.

Recreational contact such as swimming and household contact such as bathing or showering with water not visibly affected by a blue - green algae bloom is not expected to cause health effects.

How do I know if I am being exposed to blue-green algae?

People should suspect that blue-green algae are present in water that is visibly discolored or that has surface scums. Colors can include shades of green, blue-green, yellow, brown, or red. Water affected by blue-green algae blooms often is so strongly colored that it can develop a paint-like appearance (see photos below).

The presence of toxins from algae can only be verified through laboratory analysis. Unpleasant tastes or odors are not reliable indicators of blue-green algae toxins or other toxic substances, because the algae may or may not also produce chemicals that affect the taste or odor of drinking water. Similarly, the absence of unpleasant tastes and odors does not guarantee the absence of blue-green algal toxins.

Can you get sick from blue-green algal toxins?

People can get sick from blue-green algal toxins if they have direct contact with a blue green algae bloom, by either intentionally or accidentally swallowing water, by having direct skin contact (as when swimming, wading, or showering), or by breathing airborne droplets containing the toxins, such as during boating or waterskiing.

People should avoid contact with water that is discolored or has scum on the surface and restrict the access of their pets and livestock to this water. Pets can get sick if they have been swimming in water where algal blooms have been and ingest significant amounts of toxins by licking themselves after leaving the water.

Are children more vulnerable than adults to blue-green algal toxins?

Yes. Because of their comparatively low body weight, it takes fewer toxins to make children sick from exposure to blue green algae. In addition, children tend to have more sensitive skin than adults, so a skin rash or reaction is more likely. Children should always be supervised when swimming in any body of water.

Illinois
Environmental
Protection Agency

Office of Community Relations
1021 N. Grand Avenue East
Springfield, Illinois 62702

August 2012

Wonder Lake Happenings (cont.)

- Saturday, September 1. WLMPOA board meeting in the a.m.
- After reconsideration, they opened up Wonder Lake to "non-contact" uses.
- Monday, September 3, WLMPOA sent me newspaper electronic blogs - Incredible!
  - "What the Hell does IEPA know?"
  - *"IEPA is just offering advice and WLMPOA did the right thing?"*
  - "Who's business is it of IEPA or WLMPOA anyway to tell us what we can do on our lake?"
  - *"If you don't like the advice offered, why don't you go take a jump in the lake?"*
- IEPA sampled the lake on Tuesday, September 4, after the Labor Day weekend. Samples collected at three lake sites.
- Unbelievably, all three samples analyzed using the Test Kits showed 0-1 ug/L Microcystin.

Wonder Lake, Tuesday, September 4, 2012

Wonder Lake, Tuesday, September 4, 2012

Wonder Lake, Tuesday, September 4, 2012

Camp Walter Scott Lake

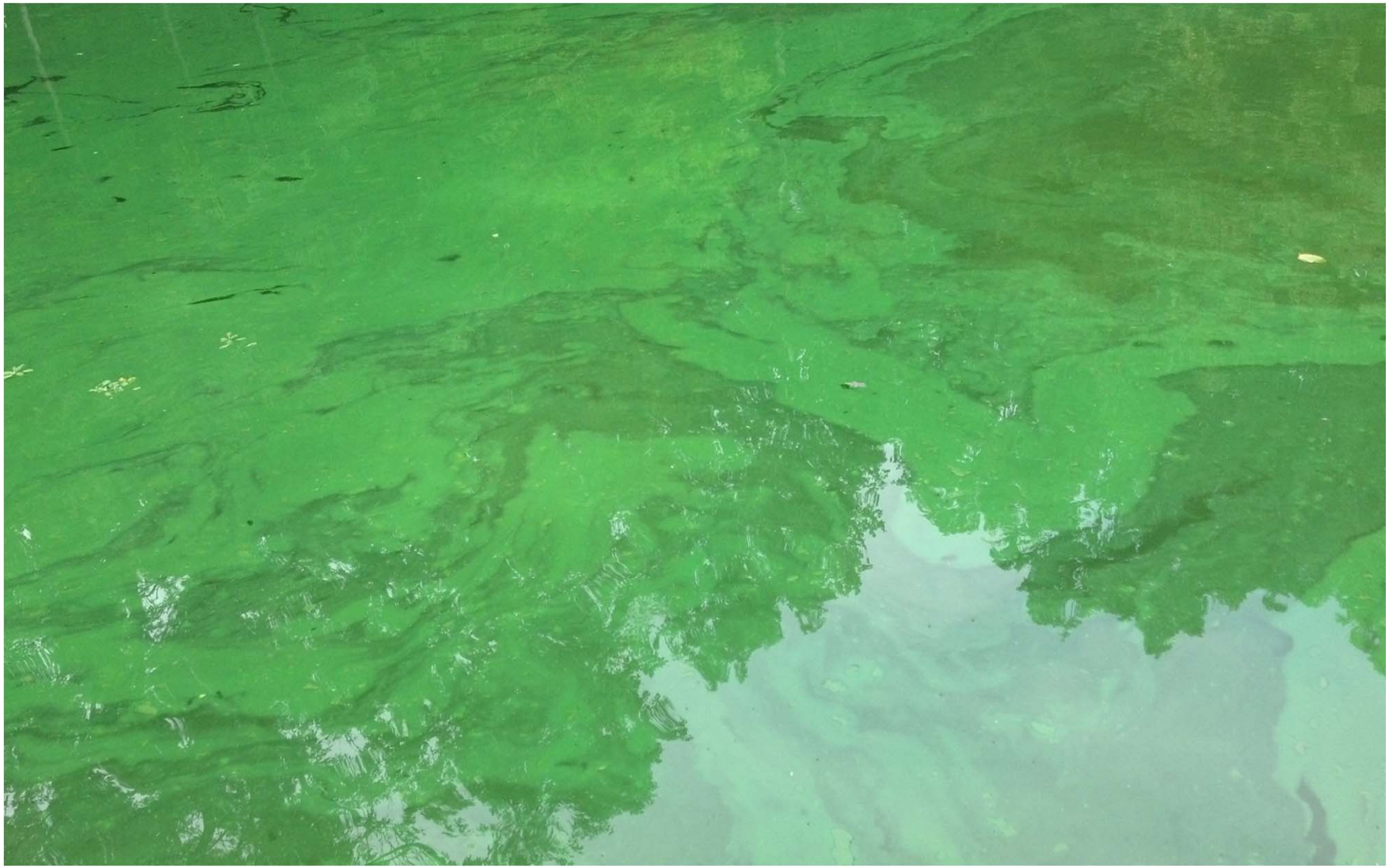
- Small Church Camp lake located 100 miles SW of Springfield, and South of Effingham, IL.
- Mike Bundren, IEPA Marion, was contacted by the Illinois Department of Public Health (IDPH) about the lake. A lake sample was sent to Mike Bundren for microcystin screening.
- Result of the screening test? ***>10 ug/L.***
- At that time, IEPA-HQ had already "called in a favor" to get the Le-Aqua-Na sample analyzed, so we had no place to get a sample analyzed in detail. Direction to keep an eye on the lake. Mike advised IDPH of the screening results. They contacted the lake owner and as a result, the lake was closed to swimming.
- IEPA staff revisited the lake on September 4, 2012.

Camp Walter Scott Lake
Friday, July 18, 2012

With Knowledge of USGS/IEPA Sampling Effort……

- IEPA staff traveling to drop off other collected algal samples on Tuesday, September 4, 2012. After drop off, they swung by Camp Walter Scott Lake.
- Bloom was still clearly evident.
- Test kit that day still showed ***>10 ug/L.***
- Like other lakes, the lake surface looked like a paint spill! See……
- This sample was sent to USGS-Kansas for detailed analysis.

Camp Walter Scott Lake
Tuesday, September 4, 2012



Camp Walter Scott Lake
Tuesday, September 4, 2012

USGS/IEPA Overall Microcystin Results

Analysis	Collection Date	Lake/Location	Result (Microcystin ug/L)	WHO Recreational Advisory Level
USGS-Kansas	**8/29/12**	**Candlewick (RPV-99)**	**4,800**	**Very High**
USGS-Kansas	**8/29/12**	**Westlake (RPZK-99)**	**62**	**High**
USGS-Kansas	**8/29/12**	**Westlake (RPZK-98)**	**1,700**	**High**
USGS-Kansas	8/29/12	Le-Aqua-Na (RPA-99)	6.7	Low
USGS-Kansas	8/29/12	Herrin (RNCZ-99)	0.23	Low
USGS-Kansas	8/29/12	Vermilion R. @ Pontiac (DS-19)	<0.10	Low
USGS-Kansas	8/29/12	Vermilion R. @ Pontiac (DS-19)	<0.10	Low
USGS-Kansas	8/29/12	Marion Reservoir (RNL-99)	<0.10	Low
USGS-Kansas	8/30/12	Patriot's Park Lake (ROY-99)	9.8	Low
USGS-Kansas	8/30/12	Fox R. @ Algonquin (DT-06)	1.4	Low
USGS-Kansas	8/30/12	Fox R. @ Algonquin (DT-06)	1.1	Low
USGS-Kansas	8/30/12	Fox R. @ Montgomery (DT-38)	0.95	Low
USGS-Kansas	8/30/12	Fox R. @ Montgomery (DT-38)	0.62	Low
USGS-Kansas	8/30/12	Fox R. @ Montgomery (DT-38)	0.17	Low
USGS-Kansas	9/4/12	Wonder Lake (RTZC-97)	0.93	Low
USGS-Kansas	9/4/12	Wonder Lake (RTZC-98)	0.56	Low
USGS-Kansas	9/4/12	Wonder Lake (RTZC-99)	0.88	Low
USGS-Kansas	**9/4/12**	**Camp Walter Scott Beach (RCS-99)**	**1,500**	**High**

Did Cell Count and Microcystin Expected Relationships Exist in 2012 ?

(Results as of 10/23/12) Kinda Sorta Not Really!

Collection Date	Lake/ Location	Result (Microcystin ug/L)	WHO Rec. Advisory Level	*Result (Total Cyano-bacteria cells/mL)*	*WHO Rec. Advisory Level*
8/29/12	**Candlewick (RPV-99)**	**4,800**	**Very High**	***84,573,082***	***Very High***
8/29/12	**Westlake (RPZK-98)**	**1,700**	**High**	***302,526***	***High***
9/4/12	**Camp Walter Scott Beach (RCS-99)**	**1,500**	**High**	***3,528,833***	***High***
8/30/12	Patriot's Park Lake (ROY-99)	9.8	Low	***572,012***	***High***
8/29/12	Le-Aqua-Na (RPA-99)	6.7	Low	***1,178,963***	***High***
9/4/12	Wonder Lake (RTZC-99)	0.88	Low	***467,627***	***High***

Candlewick Chronological Results

Analysis	Collection Date	Location	Result (Microcystin ug/L)
Greenwater	8/15/12	Beach	2.8
Greenwater	8/15/12	Fisherman's Cove	14,800
USGS-Kansas	8/29/12	Marina Boat Ramp	4,800
Greenwater	9/11/12	Beach	17
Greenwater	9/11/12	Fisherman's Cove	9,650
Greenwater	9/19/12	Beach	15
Greenwater	9/19/12	Fisherman's Cove	28
Greenwater	9/19/12	Inlet Cove	73
Greenwater	9/19/12	Marina	21
Greenwater	9/19/12	The Dip	23

Westlake Chronological Results

Analysis	Collection Date	Location	Result (Microcystin ug/L)
Greenwater	8/20/12	Main Lake	7,400
Greenwater	8/20/12	Beach	31,500
Greenwater	8/27/12	Dam	4.9
Greenwater	8/27/12	Cove	10,050
USGS-Kansas	8/29/12	Beach	62
USGS-Kansas	8/29/12	Cove	1,700
Greenwater	9/10/12	Dam	245
Greenwater	9/10/12	Main Lake	21

So in Summary…..

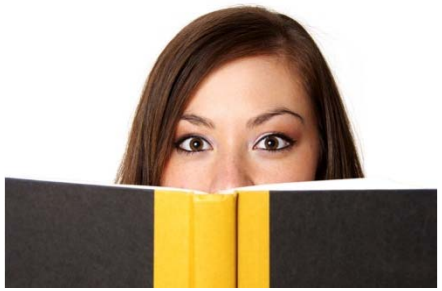
- 8-year “on and off” IEPA, IDNR, and USGS involvement since 2004.
- Nothing substantial found from 2005-2008.
- No activity in 2009.
- Then the 2010 Clinton Lake *“dead dog, sick girl, toxic algae, Loch Ness Monster, the press, flying by the seat of our pants”* incident!
- 2011 IEPA became more proactive with the purchase and utilization of test kits. Also noticing the fully functioning and proactive programs all around us in WI, IA, and IN.
- Then the 2012 drought, Northern lakes with voluntary lake use closures, ***31,500 ug/L*** at Westlake, Algal Toxin Fact Sheet development and distribution, and with the WHO guidelines available to us, *a definite public health concern!!*

So why are we here today on January 16, 2013?

- Realization that we as responsible Environmental Protection, Natural Resources, and Public Health agencies in Illinois probably need to do more than simply "fly by the seat of our pants!!"
- Interest shown at an October 24, 2012, meeting with IDNR, IEPA, and IDPH; November 19, 2012, meeting with UIUC Veterinary Medicine, INHS, ISWS, and others in pursuing additional discussions.
- This problem will NOT go away, and it will come and go from year to year and within season!
- Many states adjacent to Illinois and around the country have functioning, proactive programs. Why don't we?
- We have education, monitoring, and response planning/advisory issuance in the state's Fish Contaminant Monitoring Program to answer the question, *"Can I eat the fish?"* Why can't we do the same for Algal Toxins to answer the questions, *"Can my kids swim in the water, and do I need to be concerned about drinking my tap water?"*

Regarding the Question of Public Water Supply……

- Have to date only really addressed swimming and recreation concerns.
- Have only done a little in 2005-2006 to look at both raw and finished drinking water simultaneously.
- September 2012 Minnesota Department of Health, Environmental Health Division Microcystin-LR in Drinking Water guidance value of 0.04 ug/L.
- *Recreation vs. PWS Lake Management*
  - If Taste and Odor problems, do you kill algae?
  - Copper Sulfate lyses the algae cells. Will toxin release result in concentrations above values of concern?
  - Think twice before you lyse!
  - Marion Reservoir, 2005 incident.



Things We've Learned Along the Way

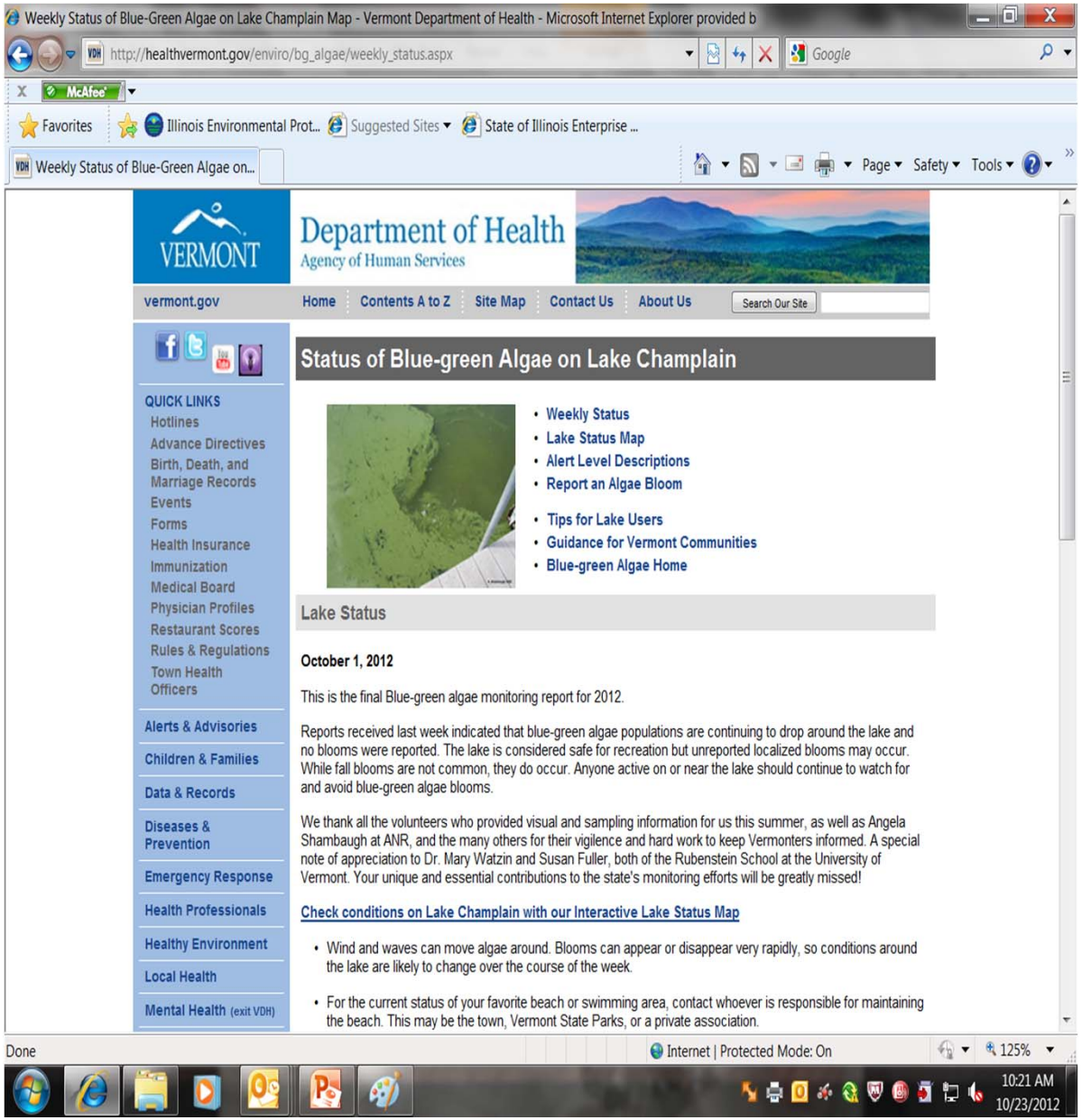
- Don't NPDES permit WWTP discharge to lakes (this is no longer even a viable option like it was in the 70's and 80's).
- Unless properly managed, Golf Course runoff to residential ponds/lakes can be a significant nutrient source and contribute to use impairments.
- Lake destratifier operational knowledge is critical (Le-Aqua-Na, Marion).
- Slow moving, dammed up, and open sunlight streams can turn green just like inland lakes/impoundments (Fox River).
- When a dog dies, its sad, and people rightfully look for reasons as to "why."
- The press loves "Dead Dog" and "Toxic Algae" headlines!
- Public questioning will be abundant!
  - *"Can I eat the fish?" (Tom Hornshaw, IEPA Toxicologist says "no consumption" >20 ug/L, August 31, 2012)*
  - *"Can I eat the vegetables out of my lake-watered garden?"*
  - *"Can I ski, or will toxin filled water aerosols get up my nose?"*
  - *"Can this occasional, uncontrollable twitch in my neck be caused by algal toxins?"*

Purpose Today: To Describe Ongoing Activities in Other States and Around the Nation

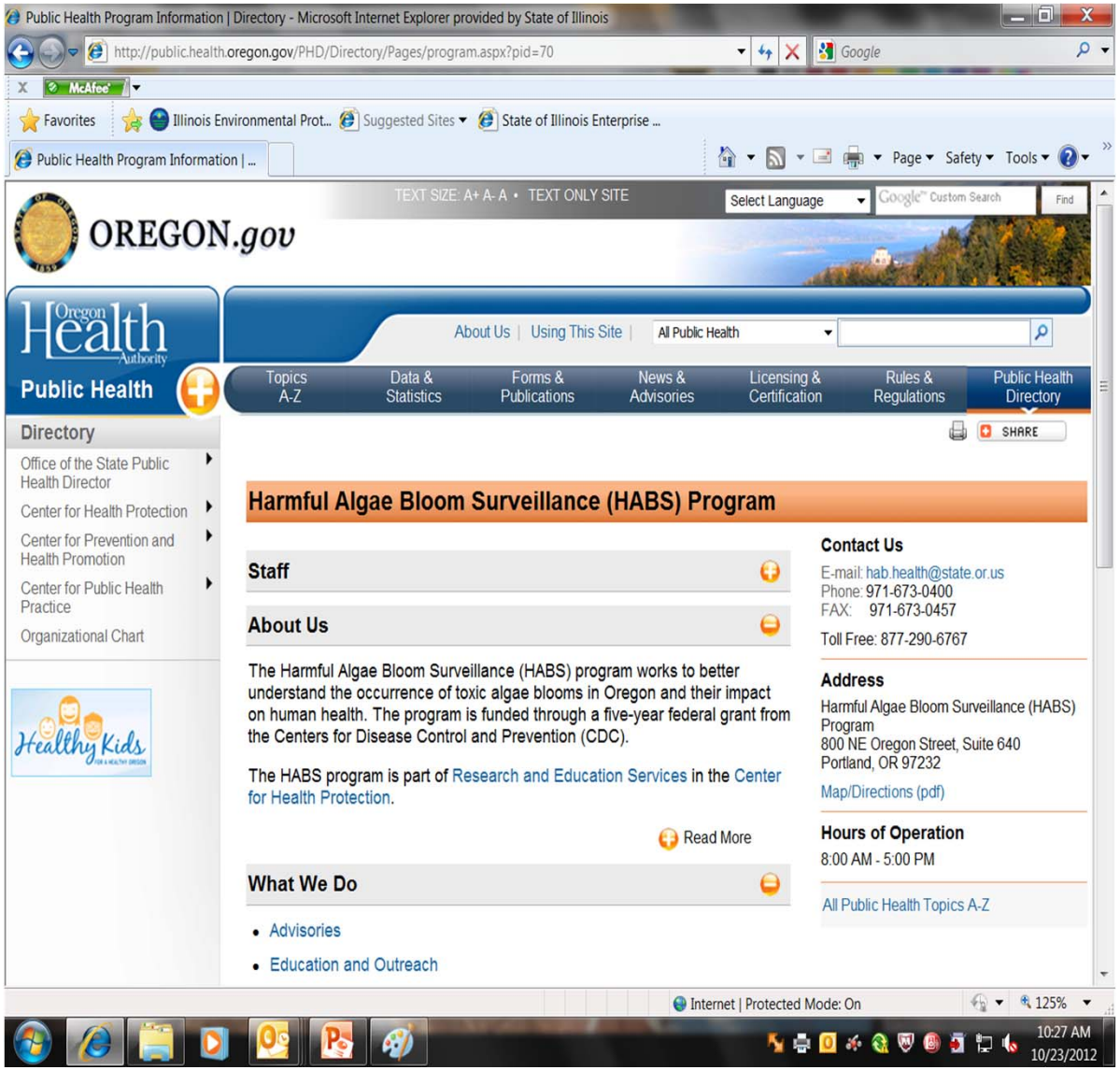
- Inland CyanoHab National dialogue lead by Lorraine Backer, Center for Disease Control, National Center for Environmental Health. Webinars every month or two.
- ABC News Story on Toxic Algae, Lake Petenwell, Wisconsin (dammed up portion of the Wisconsin River), September 30, 2012, Sunday Evening News. Go to http://www.youtube.com/watch?v=2GP7gzy-llA
- Cooperative interagency programming exists around the country, and are primarily lead by State and County Health Departments.
- Those states that issue advisories base them on WHO guidelines (Microcystin >20 ug/L **AND** or **OR** Total Cyanobacteria >100,000 cells/mL; High or Very High Relative Probability of Acute Health Effects)

Kansas Department of Health and Environment

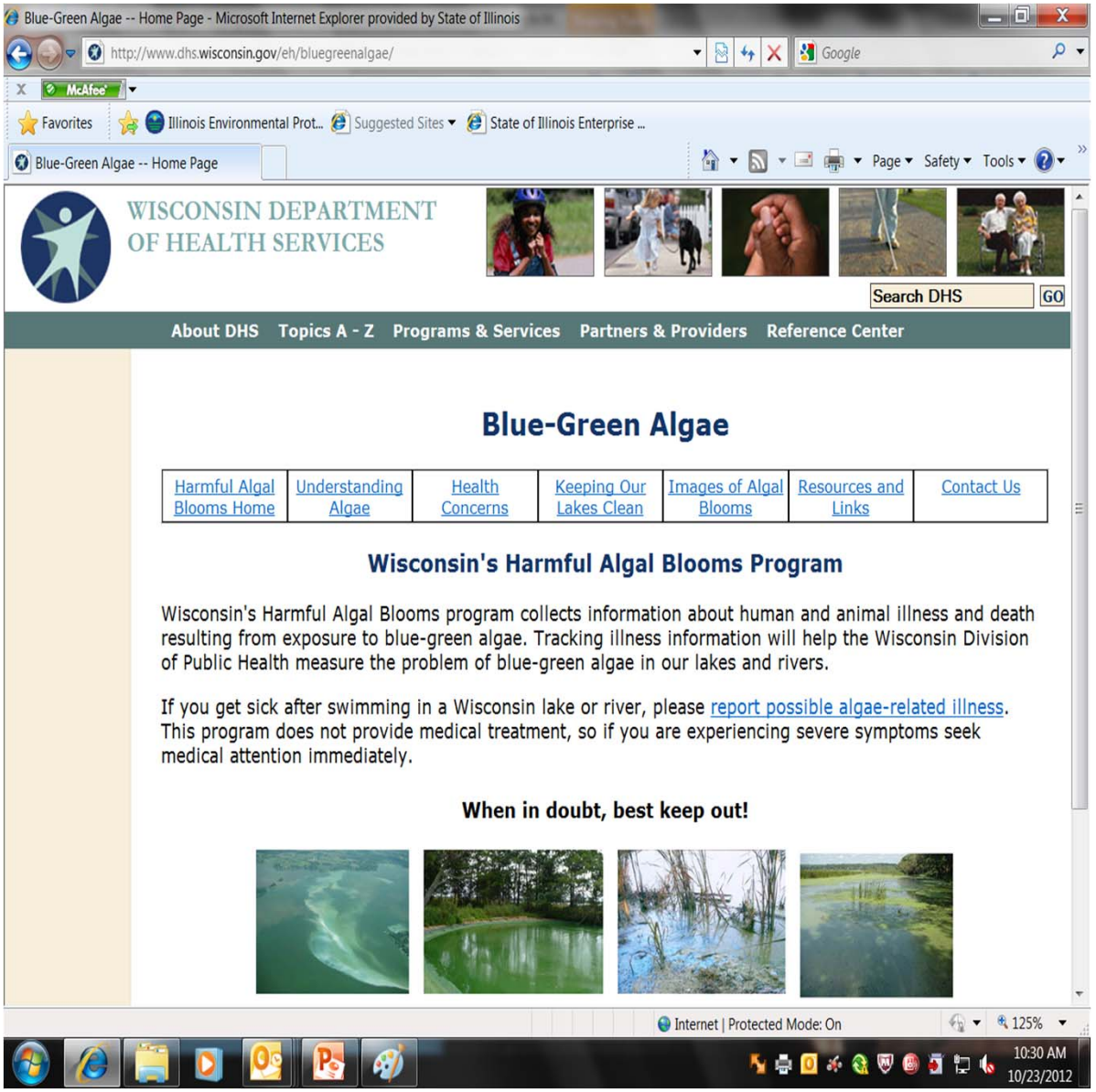
Vermont Department of Health



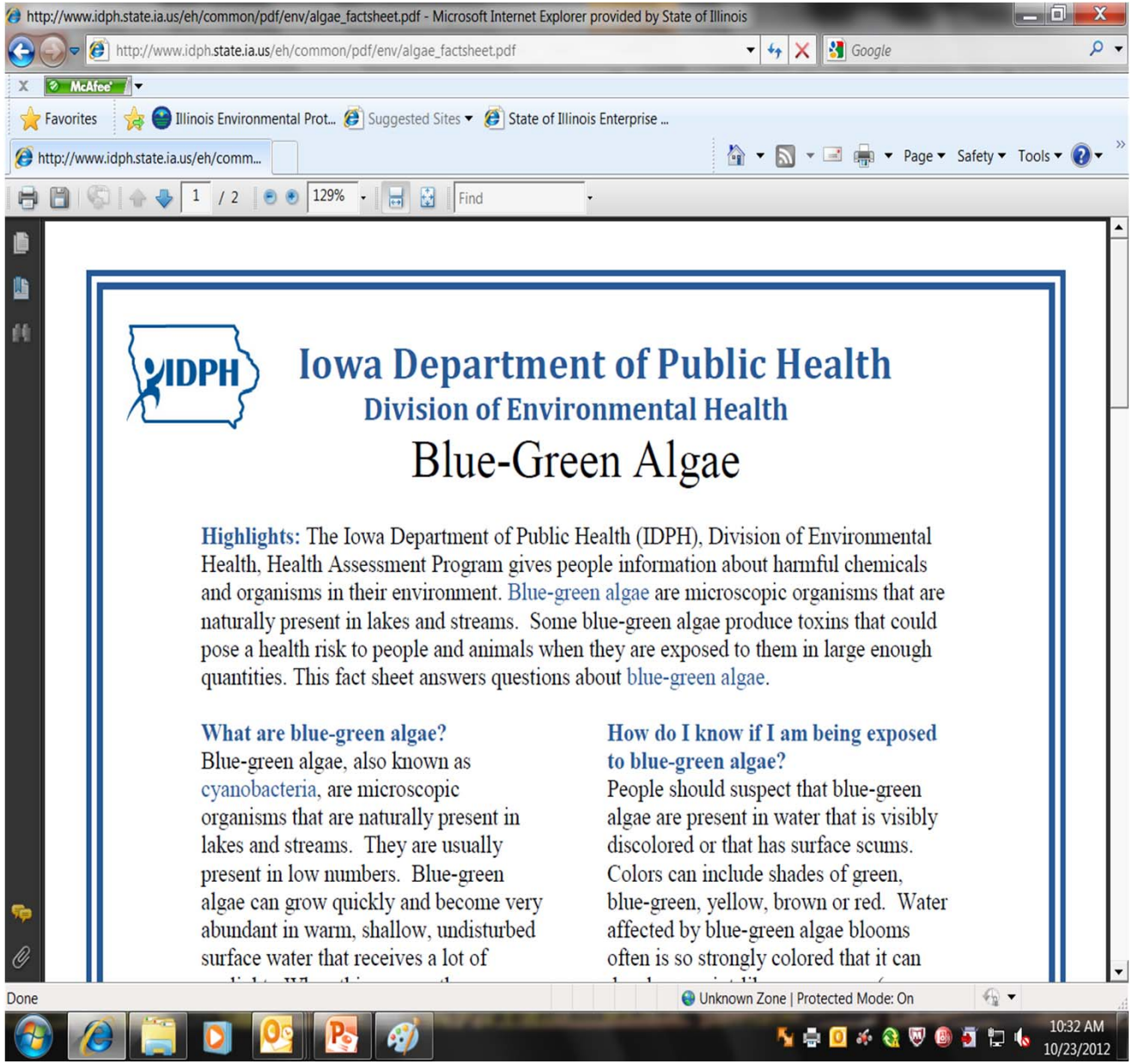
Oregon Health Authority
Surveillance Sampling and Advisory Guidelines



Wisconsin Department of Health Services

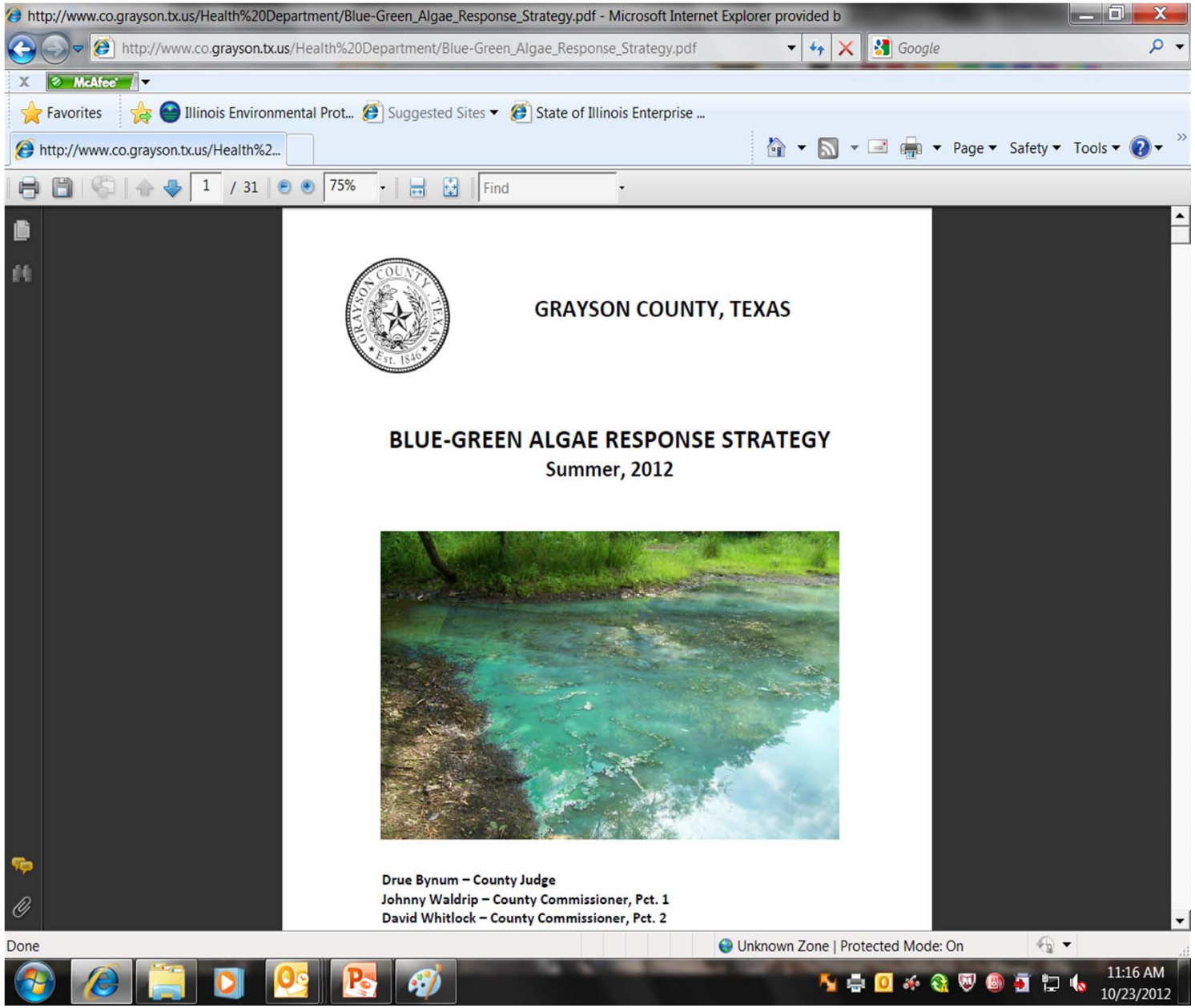


Iowa Department of Public Health

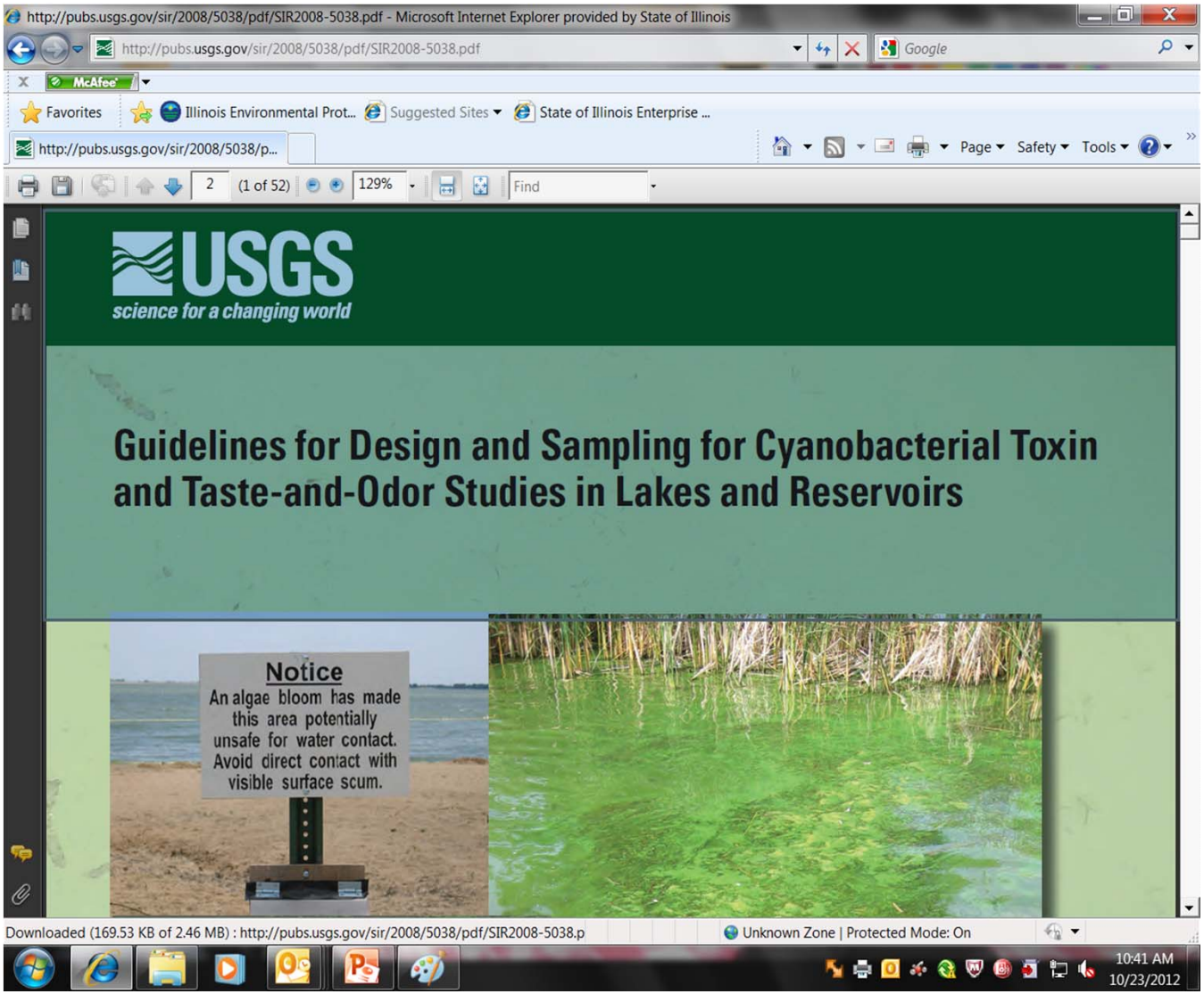


Indiana State Department of Health

Grayson County, Texas Response Strategy



USGS Guidelines for Design and Sampling for Cyanobacterial Toxin and Taste-and-Odor Studies in Lakes and Reservoirs



USEPA HAB Website

Purpose Today: To Determine Agency and Partner Interest and Future Involvement

- So what do you think? Is this really a problem worth doing something about?
- ***Do we want or need (or both) a formalized Illinois Harmful Algal Bloom Program, or do we continue to respond on an "as needed," "seat of the pants" basis?***
- Do you have the time, energy, and resources to get involved?
- Assuming we go forward, what do we work on first?
  - *Education*
  - *Surveillance Monitoring and Reporting*
  - *Response Planning and Implementation*
- If needed, where might the money come from?
- Does your organization have technical expertise?
- Other than those at the table today, who else can we pull into this process?

Next steps?
Where do we go from here?

Dave McMillan, IEPA Division of Public Water Supply