The Evolving Champlain Monitoring Program

Ten years and still counting

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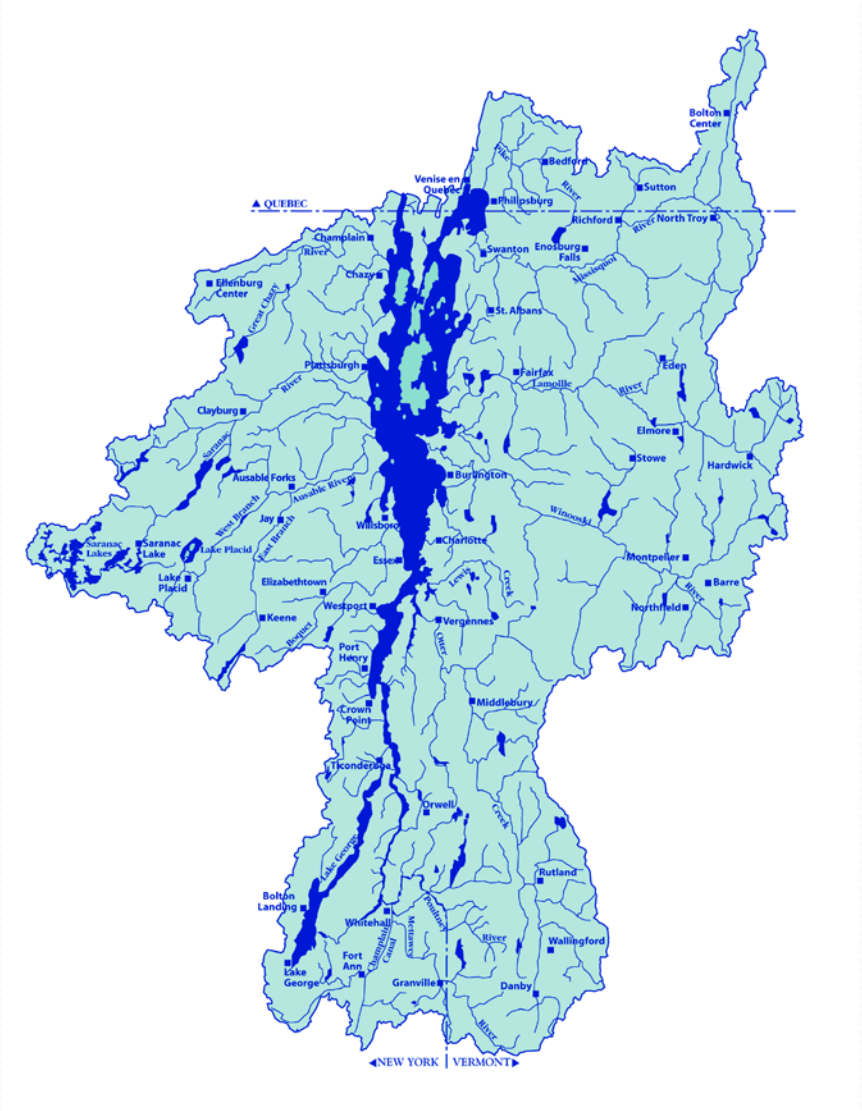
First Known HAB Event - 1999

A dog doing what dogs do when it's hot

The Challenges

- Little data on phytoplankton or cyanotoxins
- Limited resources
- Overlapping jurisdictions
- Large physical area with highly variable water quality
- Varied population demographics



Leveraging our resources

- Lake Champlain Basin Program
- the University of Vermont
- the Long-term WQ monitoring program and VT DEC

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Initial Results - 2000

- Known toxin producers throughout the lake
  - Anabaena, Aphanizomenon, Microcystis
- Microcystin was throughout the lake
  - Source waters
  - Low levels found in raw and finish water on some days
- Anatoxin was present
  - Not in raw or finish waters
- No PSP
- Phytoplankton were toxic to mice

We Rely on Strong Partnerships and Diverse Funding

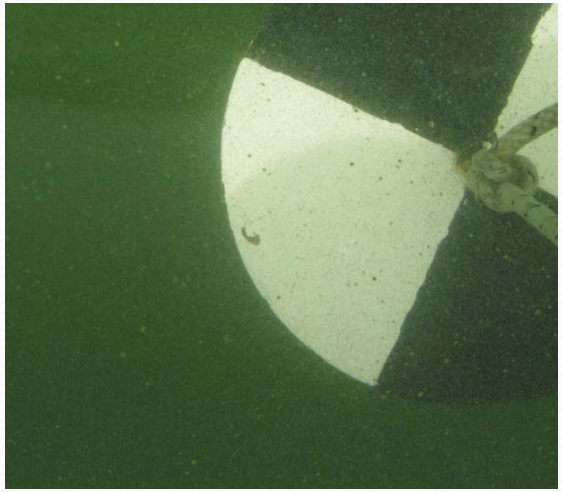
- Partners
  - LCC
  - UVM
  - VTDEC
  - VDH
  - SUNY-CESF
- Funding
  - LCBP
  - NOAA
  - Small grants to UVM
  - State of VT

Long-term Goals for Champlain

- An effective monitoring protocol
- A comprehensive data set
- A communication network for health and environmental professionals
  - A consistent response
- Educate the public

First Steps

- Modification of Chorus and Bartram's drinking water facility monitoring protocols
- Establishment of email list serve to share information and observations
- Development of outreach materials
  - Training water facility operators
  - Websites and brochures



What have we learned?

- TP concentrations indicative of bloom potential
- Chlorophyll not a good indicator of cell density or toxicity
  - UVM found phycocyanin probe to be unsatisfactory
- Cell density is a reasonable estimator of recreational risk
- Conditions vary with location
- Conditions change rapidly

Photo - Mel Effron

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What have we learned?

- Microcystin present lake-wide most years
- Anatoxin seldom found
- Very few human illnesses linked to cyano exposure
- We can't be everywhere

VT's approach to Cyanobacteria

- Towns have primary jurisdiction
- Recreation is primary focus
  - Beach guidance: close if any of these are present
    - Visible cyano or presumed cyano scums
    - Microcystin > 6µg/L
    - Anatoxin >10µg/L
- Drinking Water
  - Voluntary cyanotoxin practice
- Lots of Outreach

Quantitative Monitoring Protocol

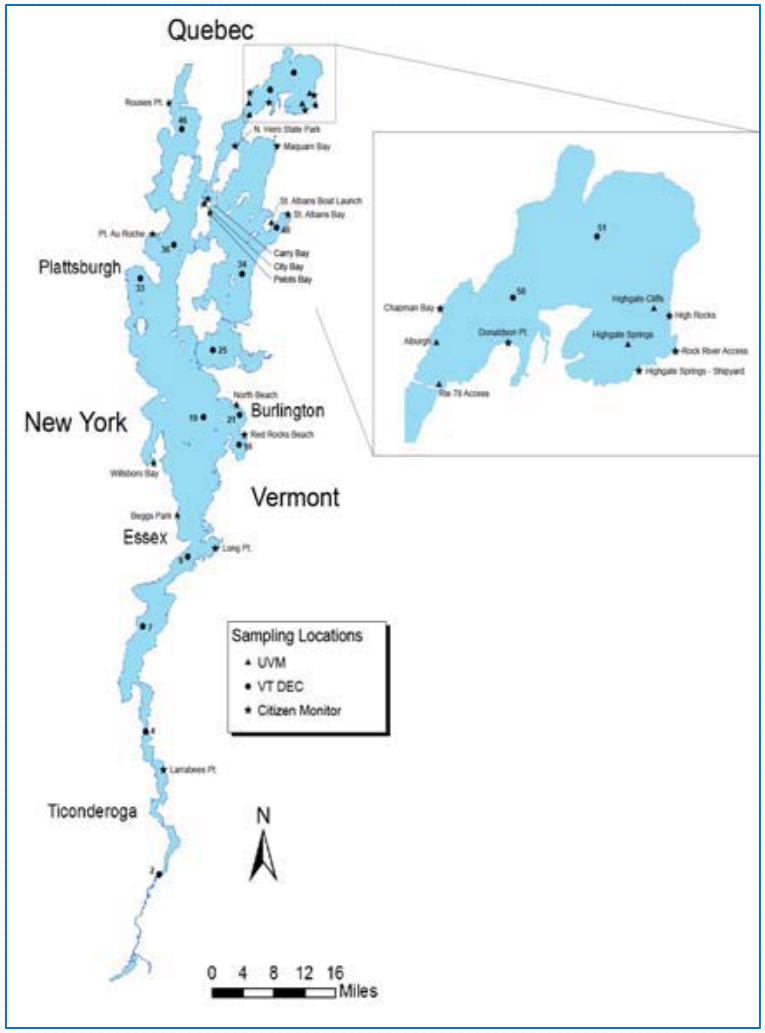
- Monitoring conducted from June to September
  - VT DEC, UVM and LCC citizen volunteers
- 3m net plankton samples
- Toxin analyses run when trigger cell density is reached
- Actions at stations are based on its conditions

Assessment Levels

- Generally Safe
  - Density of potentially toxic taxa are <4000 cells/mL
- Low Alert
  - Density of potentially toxic taxa >4000 cells/mL
  - Microcystin <6 ug/L
- High Alert
  - Density of potentially toxic taxa >4000 cells/mL
  - Microcystin >6ug/L

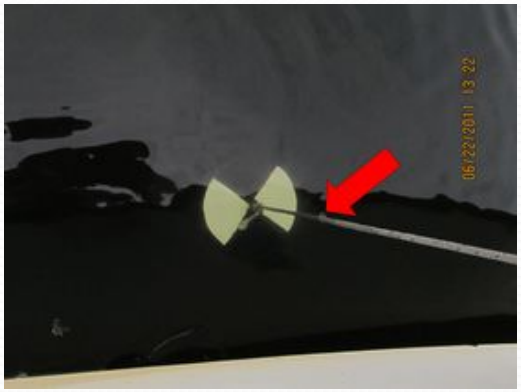
Overcoming Limitations

- Monitoring limited to high risk areas
- Most of Champlain doesn't experience HABs
- The public needs to be able to assess cyano risk on their own
  - Presence/absence of scum is visual cue that most would recognize



The New Visual Assessment

Generally safe = no or few cyanobacteria

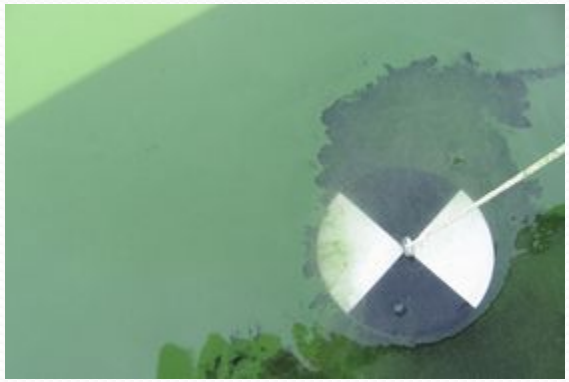


The New Visual Assessment

Low Alert = cyanobacteria present at less than bloom levels

The New Visual Assessment

- High Alert = bloom in progress
- No routine toxin testing
  - VDH works with municipalities to test as needed



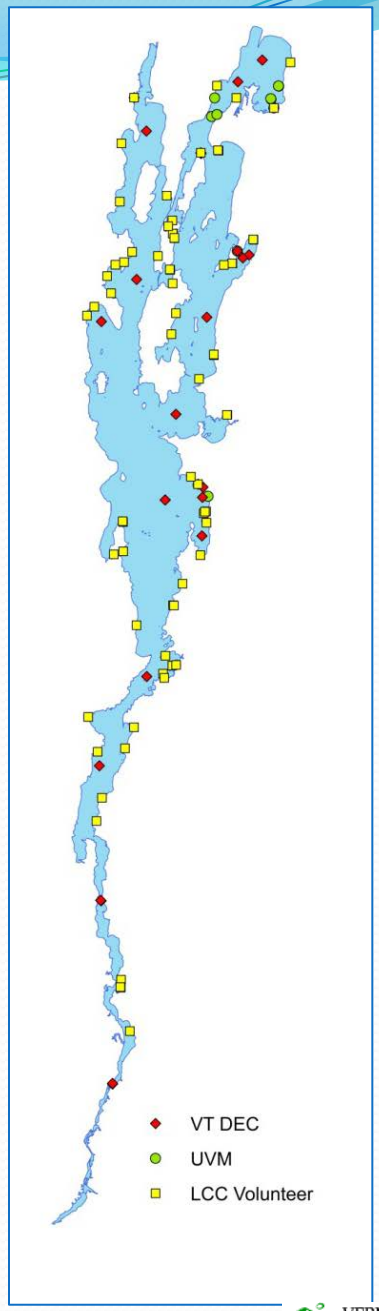
People are passionate about their lake!

Lake Champlain committee staff trained over 100 volunteers to monitor shorelines

More than 50 reported all summer long

All lake segments had quantitative and qualitative data

Total Number of Stations = 88



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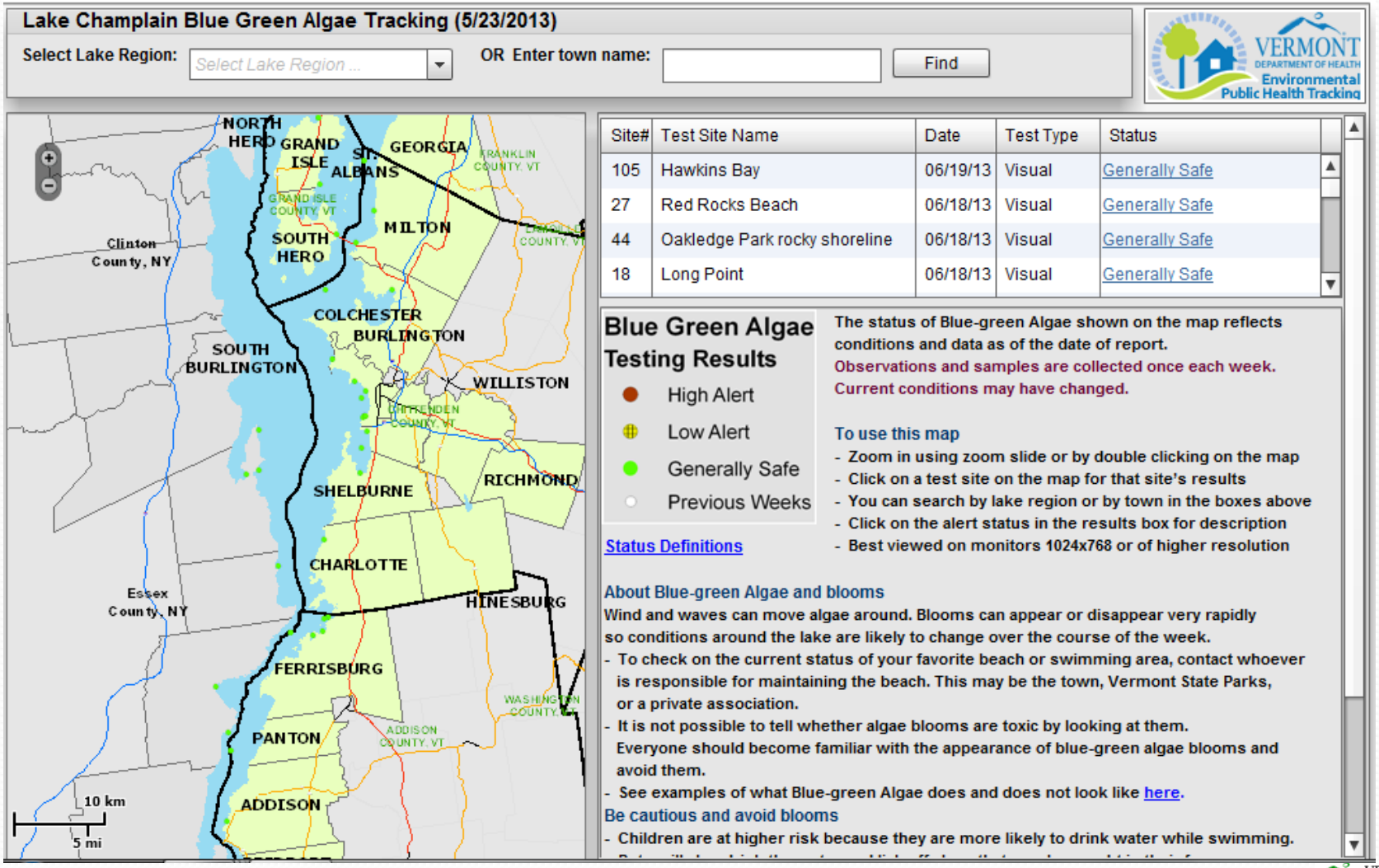
2012 Weekly Process

- VT DEC and UVM collect quantitative samples
- Volunteers make observations at designated site
  - LCC reviews and approves each report
    - Photos provided by volunteers when conditions reach alert levels
- UVM and VDH conduct toxin analyses as needed
- VT DEC collates
  - Email to state and public health officials each Thursday
- VT DOH posts to their website each Friday

New in 2012 - The Interactive Map



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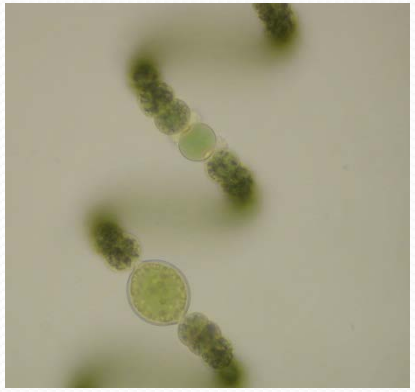
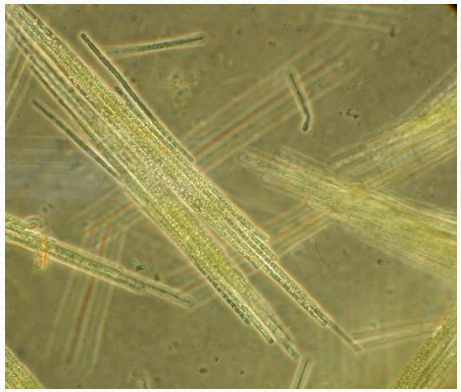
2012 by the numbers



- >600 site-specific reports posted
  - 73% were utilized the visual assessment
- >250 plankton samples analyzed
- >300 filters collected for toxin analysis
  - Approx. 100 analyzed
- 81 people received email updates
- >3300 visits to the new interactive map



2012 Cyanobacteria Status

- 90% of reports indicated generally safe conditions
- 2% reported high alert conditions
- No human or animal illnesses reported

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We continue to evolve

- State of VT will have primary responsibility for Champlain program in 2013
- Interactive map will have crowd-sourcing programming
  - volunteers input data directly in database
  - Reduced data management time
  - Rapidly updated map
  - Mobile-device friendly

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Looking Ahead

- Interactive map is not real-time
  - Education about proper use of the map
- Adapt to Changing conditions
  - Recognizing new species and/or new toxins
  - Adapting to a warming climate

Looking Ahead

- Drinking Water Facilities
  - Responding to affected facility in major urban area
- Reduce P in our lakes
  - Increasing P means increasing HAB events

oto – Experimental Lakes Area, Canada

Champlain Websites

- http://www.lakechamplaincommittee.org/get-involved/volunteers/bga-monitors/bga-report/
- http://healthvermont.gov/enviro/bg_algae/bgalgae.aspx
  - https://webmail.vdh.state.vt.us/vttracking/bluegreenalgaefp/
  - http://healthvermont.gov/enviro/bg_algae/documents/BGA_guide.pdf