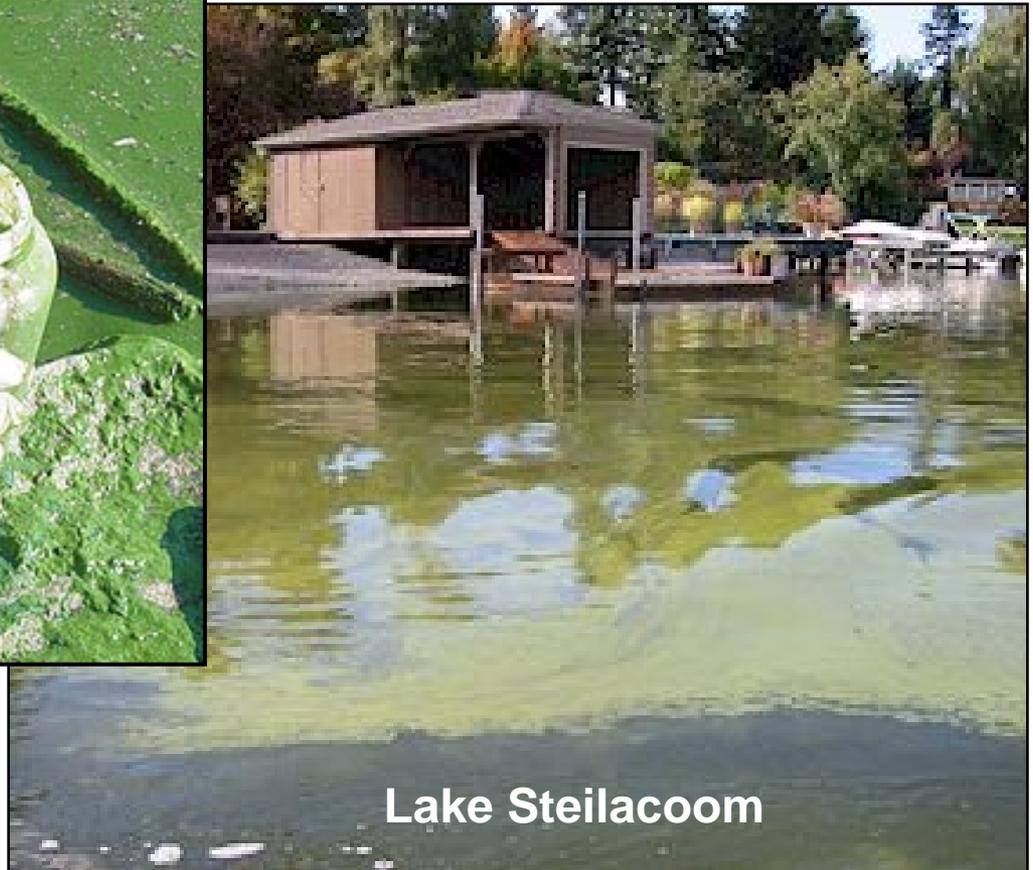


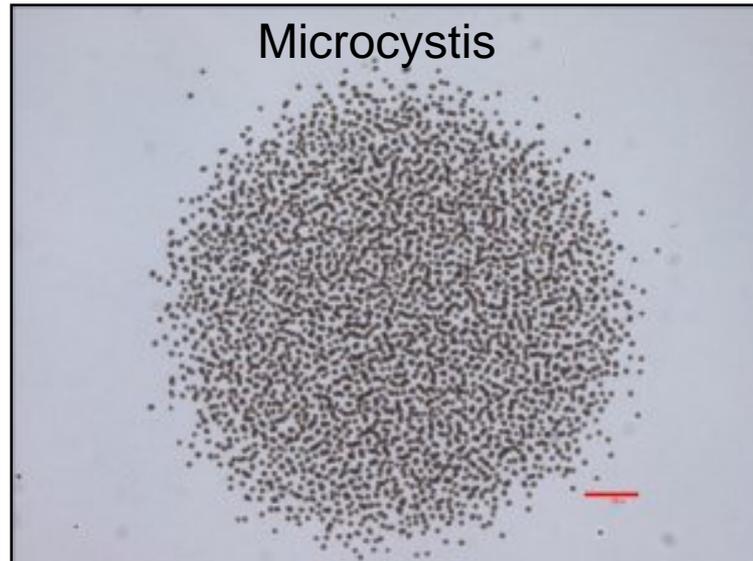
Ecology's Freshwater Algae Program



Lake Steilacoom

Algae Program Overview

- In 2005, the Legislature authorized collection of \$1 from each boat registration for a freshwater algae program and directed Ecology to develop this program.
- Approximately \$250,000 is available each year.



Photograph by Robin Matthews

Algae Program Overview

- The Legislature directed Ecology to provide:
 - ❖ Technical assistance about freshwater algae control.
 - ❖ Grants to manage excessive freshwater algae with an emphasis on lakes with **harmful algae blooms**.

Algae Program Development

- Based on stakeholder feedback Ecology proposed:
 - ❖ Focusing on cyanobacteria (toxin producers and considered to be **Harmful Algae Blooms**)
 - ❖ An algal identification and toxicity testing service
 - ❖ Development of statewide recreational guidelines for algal toxins with DOH
 - ❖ A grants program
 - ❖ Information sharing

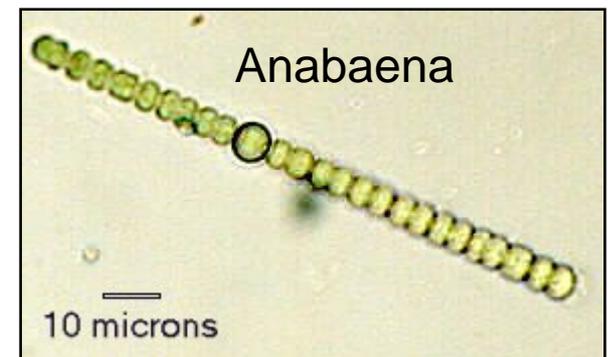


Photo from Cyanosite

Why Cyanobacteria?

- Many cyanobacteria (blue-green algae) produce toxins:
 - ❖ Human health concerns.
 - ❖ Concerns for pets, livestock, wildlife.
- Blooms increasing in Washington and world-wide.



Cyanobacterial Toxins of Most Concern to Washington

- **Microcystins** (Liver toxins, tumor promoter, most common toxins, widespread poisonings)
- **Anatoxin-a** (Nerve toxins, common toxins, animal deaths)
- **Saxitoxins** (Nerve toxins, sporadic, some animal deaths)

(Many genera make the same toxin)

(Many genera make multiple toxins)

Cyanotoxins are Highly Toxic

Compounds and their LD₅₀ (μg/kg)

Saxitoxin	9	Ricin	0.02
Anatoxin-a(s)	20	Cobra toxin	20
Mircrocystin LR	50	Curare	500
Anatoxin-a	50	Strychnine	2000

Information from Dr. Carmichael

Statewide Cyanobacterial Guidelines

➤ The Department of Health, with funding from Ecology, has developed statewide recreational guidelines for cyanobacterial toxins. These guidelines will help to answer questions such as:

- ❖ When is it appropriate for a local health district to:
 - Post an advisory on a water body?
 - Close a lake to recreation?



Recreational Guidance Levels

- Washington's recreational guidance level is **6 µg/L** for microcystin
- DOH still developing a recreational guidance level for anatoxin-a
- Only two other states have established recreational guidance levels
 - ❖ Oregon **8 µg/L** microcystin
 - ❖ Vermont **6 µg/L** microcystin



Algae Identification & Toxicity Testing

- In 2007, Ecology established a mail-in algal identification and toxicity testing service for lake residents and others.



Photos courtesy of King County

Laboratory

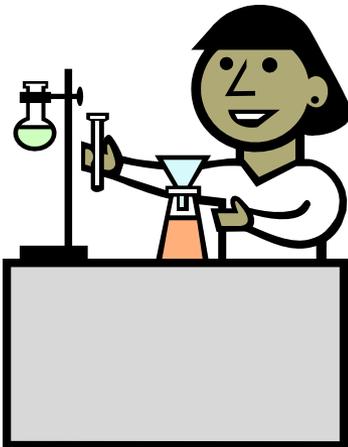
➤ Ecology contracted with King County Environmental Laboratories for

- ❖ Algal identification (to genera)

- ❖ Toxicity testing

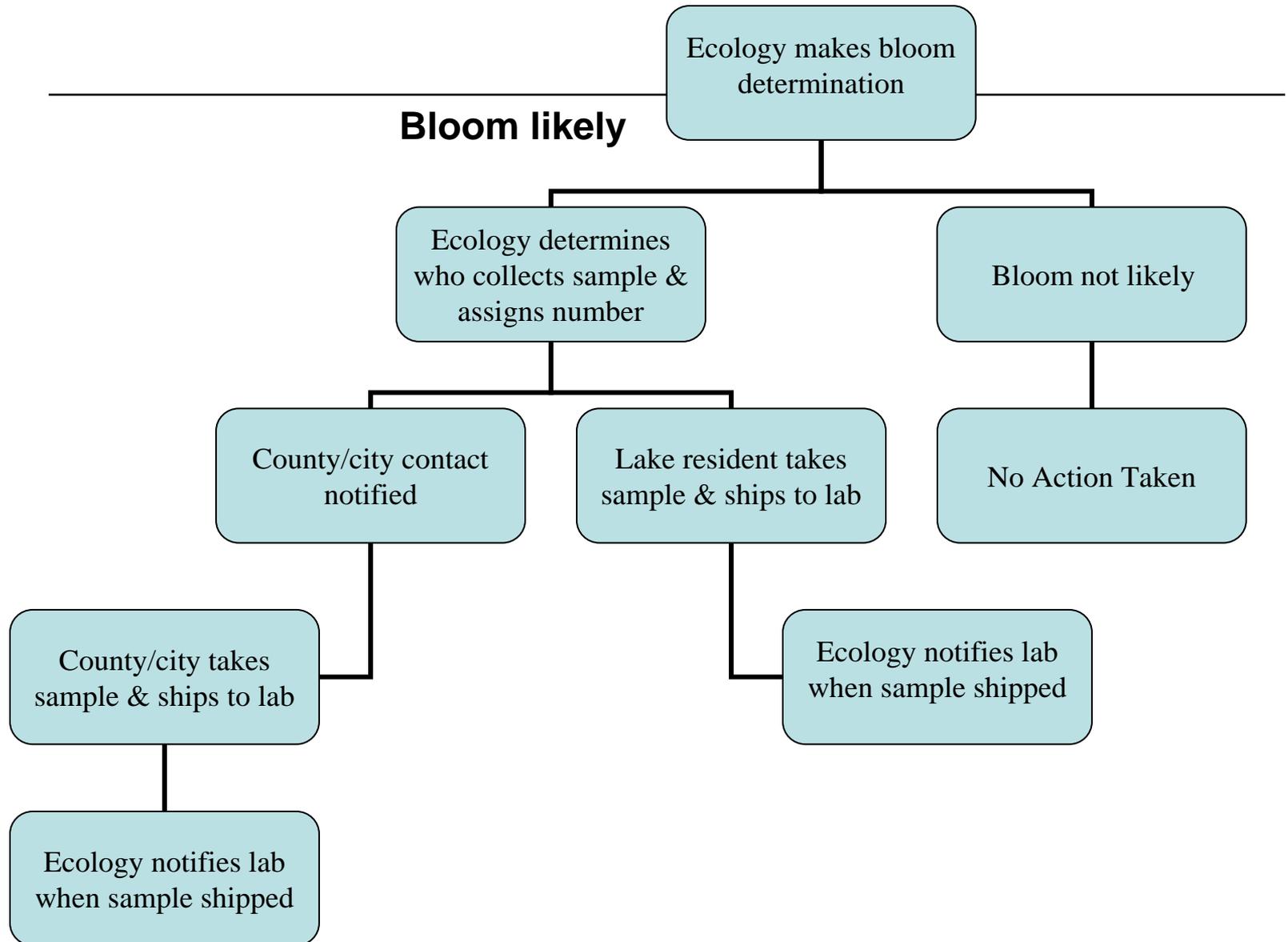
 - Microcystin testing started 2007

 - Anatoxin-a testing started 2008



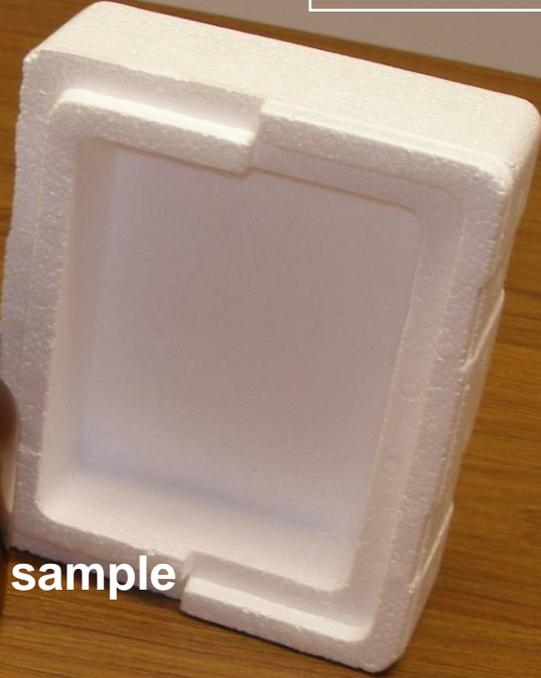
Algae Identification & Toxicity Testing – Process

Bloom Reported



Shipping Container

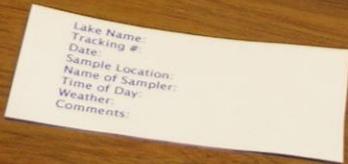
Sampling Kit



250 ml sample bottle



Ice Pack



Shipping Labels

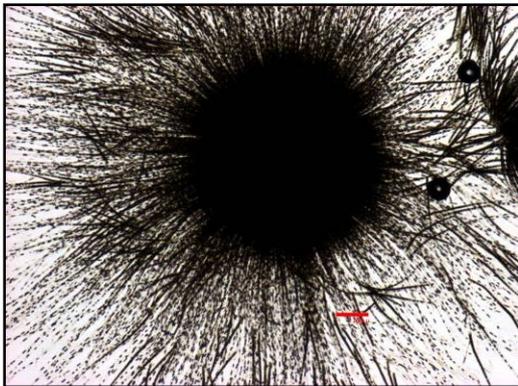


Algae Identification & Toxicity Testing - Laboratory

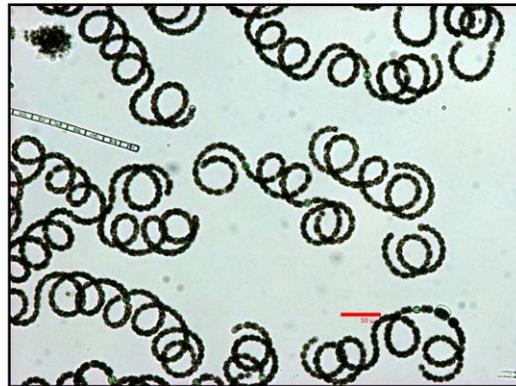
➤ Laboratory

- ❖ Identifies algae to genus level
- ❖ Laboratory runs toxin analysis
- ❖ Emails results to Ecology

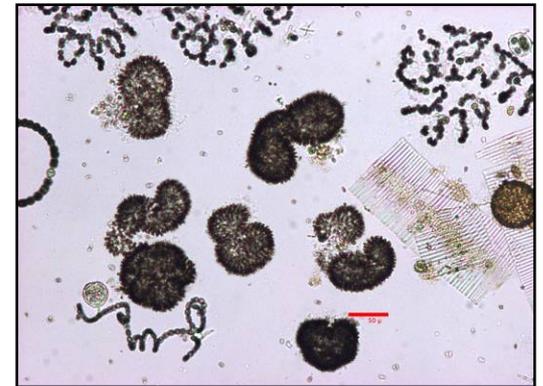
Gleotrichia



Anabaena



Woronichinia



Algae Identification & Toxicity

Testing - Reporting



- Ecology reports results to the sample collector and local health jurisdiction (if toxic).
- If toxic, the local health jurisdiction decides whether to take action.

Algae Identification & Toxicity Testing – Reporting

PROJECT: 421520-300 Locator: ECYALGAE07
 Descrip: ECOLOGY ALGAE CONT
 Client Loc: FIOKI01_07-1
 Sampled: 09/14/07 12:00:00 AM
 TimeSpan:
 Lab ID: L43956-1
 Matrix: FRESH WTR
 % Solids:

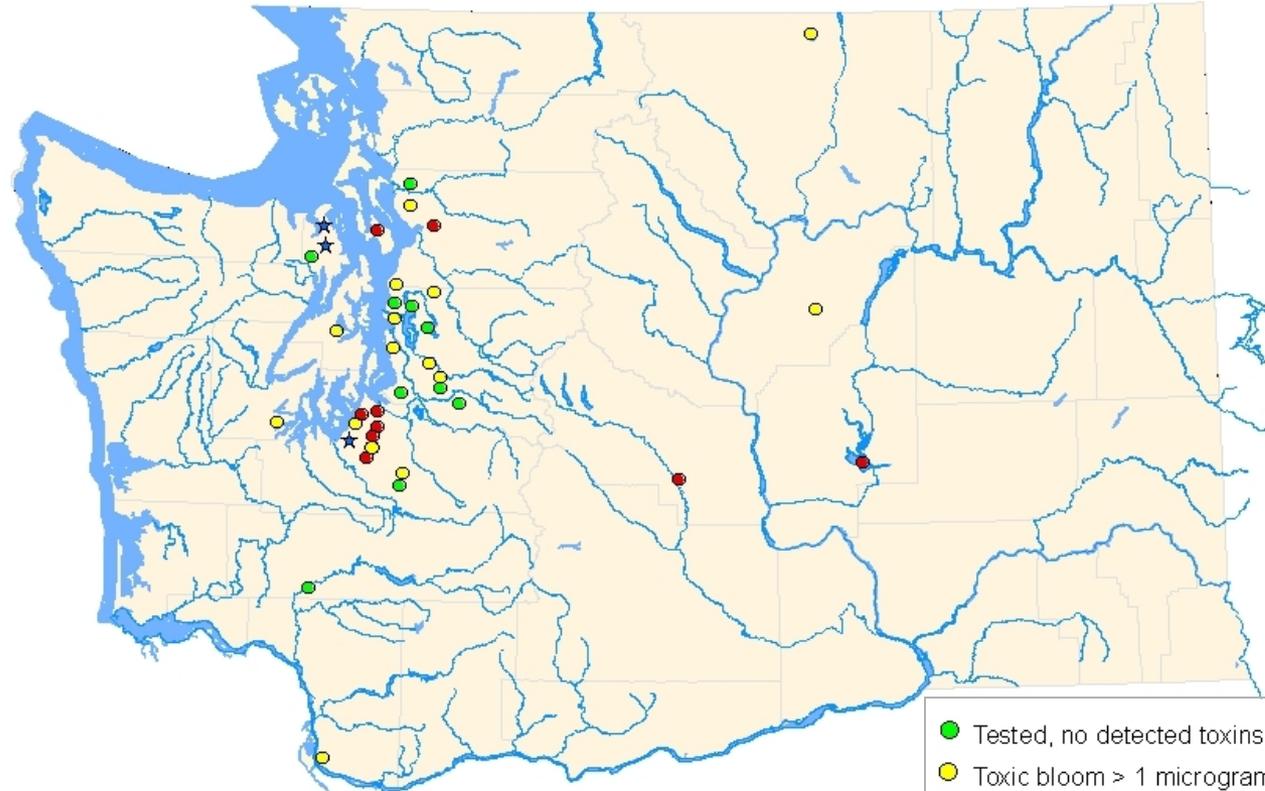
Parameters	Value	Qual	MDL	RDL	Units
-Wet Weight Basis					
COMBINED LABS					
M=AQ ENVIROLOGIX 2003 (04-02-009)					
Microcystin	55		0.05	0.05	ug/L
M=ES NONE					
Sample Information	blue-green scum along shore- sampled by Jenifer Parsons				none
M=MC NONE					
Amphora sp		P			none
Anabaena sp.		D			none
Botryococcus sp		P			none
Coelosphaerium sp	Woronichinia sp.	P			none
Cymbella sp.		P			none
Fragilaria sp.		P			none
Gomphonema sp.		P			none
Microcystis sp		S			none
Navicula sp.		P			none
Synedra sp.		P			none

Fiorito Lake bloom



Photograph by Jenifer Parsons

2007 Sampling Locations and Test Results



● Tested, no detected toxins	10 lakes
● Toxic bloom > 1 microgram but < 6 micrograms	15 Lakes
● Toxic bloom > 6 micrograms	9 Lakes
★ Tested positive for anatoxin	3 Lakes

- 76 samples collected
- 37 lakes tested (some more than once)
- 1 shallow well tested – no toxin detected
- Highest concentration – 4,810 $\mu\text{g/l}$

2007 Blooms

- 4 dogs died due to cyanobacterial toxins.
- Health districts posted lakes over 6 $\mu\text{g}/\text{l}$.
- Most toxic microcystin blooms occurred in the late summer even into December.
- The anatoxin-a producing blooms occurred both early and late in the season.



Freshwater Algae Grants

➤ Purpose of the Algae Program

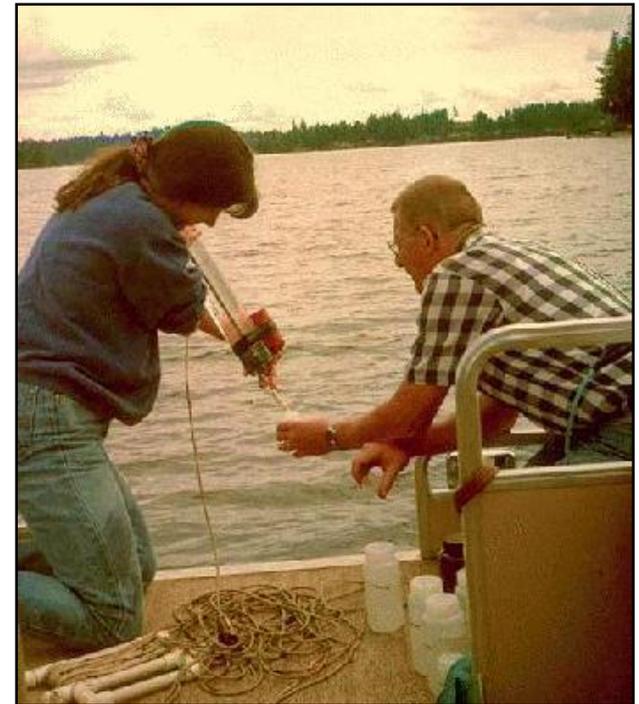
- ❖ Provide financial and technical assistance to state and local governments, tribes, and special purpose districts to:
 - Prevent and control excessive freshwater algae growth (algae blooms)
- ❖ The first grant cycle was in 2007



Freshwater Algae Grants

➤ Eligible grant activities for freshwater algae projects include:

- ❖ • Education and outreach
- ❖ • Control and management
- ❖ • Planning
- ❖ • Monitoring programs
- ❖ • Pilot projects
- ❖ • Research
- ❖ • Sampling equipment
- ❖ • Nutrient reduction activities



Freshwater Algae Grants

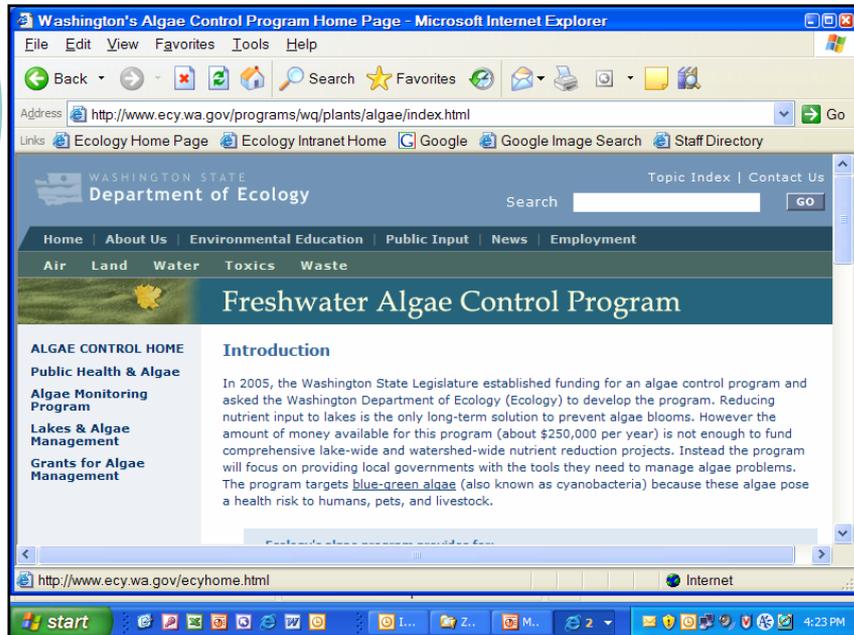
- Projects on any public or private lake, river, or stream are eligible for funding.
- Grants are competitive, but funding is limited (about \$150,000 per year).
- Grants limited to \$50,000 per project.
- Grant cycle opens Oct. 1 and closes Nov, 1 each year.
- Four projects funded this first cycle
 - ❖ Tacoma-Pierce County Health Department
 - ❖ Snohomish County
 - ❖ City of Lakewood
 - ❖ Jefferson County

Information Sharing

- On-line Algae Database
 - ❖ Historical data
 - ❖ New information from algal identification and toxicity testing
 - ❖ Can search by
 - Lake,
 - Algal type (blue-greens)
 - Toxins
 - County or WRIA
 - ❖ Data also available in EIM

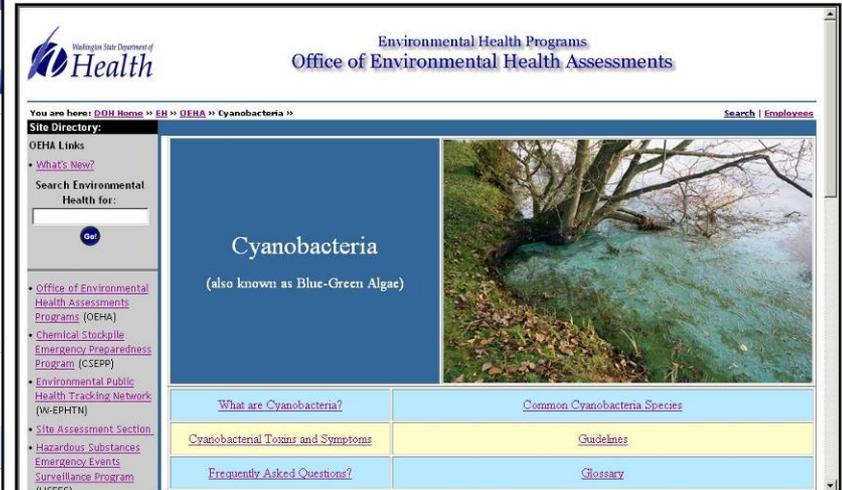


Information Sharing



Ecology Algae Website

Information about why algae bloom, how to sample a bloom, what a bloom looks like, grant information, control information.



Health Algae Website

Information about algal toxicity, human health impacts, statewide guidelines, Q & A about algal blooms and toxicity.

Information Sharing

- Algae Brochure (updated)
- Algae Workshops
- Outreach to veterinarians, Fish & Wildlife, others





Questions?

Liberty Lake