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# Harmful Algal Blooms: An Overview

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Finger Lakes Water Hub

Division of Water, Bureau of Water Assessment & Management

EFC Roundtable  
March 15, 2018

# Acronym time: HABs

## H: Harmful

production or potential to produce  
toxins

## A: Algal (ish)

(freshwater HABs refer to  
cyanobacteria, not truly algae)

## B: Blooms:

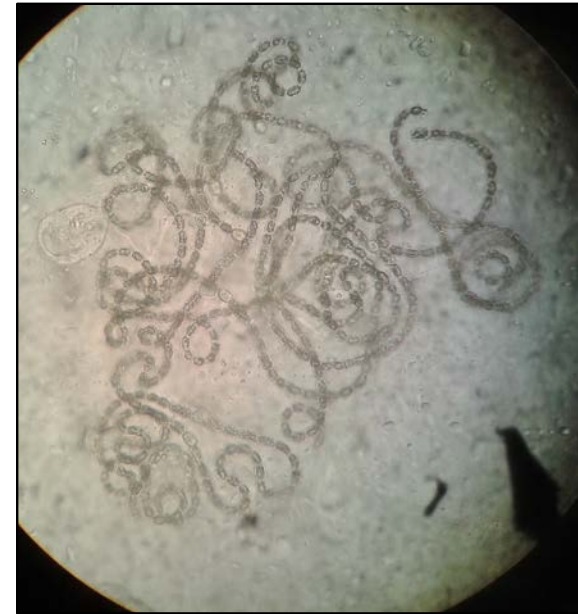
proliferation of cells, dense  
accumulations/concentrations



# Cyanobacteria (a.k.a. Blue-green Algae)

- Present in nearly every aquatic environment
- Prokaryotic bacteria, numerous types/forms
- Contain **chlorophyll** and **blue-green** pigments (**phycocyanins**)
- Highly specialized and competitive:
  - gas vacuoles (moderate buoyancy)
  - fix nitrogen
  - produce toxins

Anaebena – Cayuga Lake, July 2017



# Characteristics of HABs: Know it when you see it

DEC Harmful Algal Blooms webpage:  
<http://www.dec.ny.gov/chemical/77118.html>



Spilled Paint



Pea soup



Streaks



Dots/clumps

**Avoid exposure!**  
Keep children and pets away  
from scums or discolored water

# Algae, Cyanos need Nutrients and Light to Thrive

- Lakes that have higher nutrients are more likely to have HABs
- HABs are present in low nutrient waterbodies too (Finger Lakes, Lake Placid)
- Causes not fully understood
  - Some low P systems bloom, some high P systems don't bloom
  - Interannual variability within lakes



# Three Main Toxins

## Microcystins (liver toxin)

- Most common toxin in New York

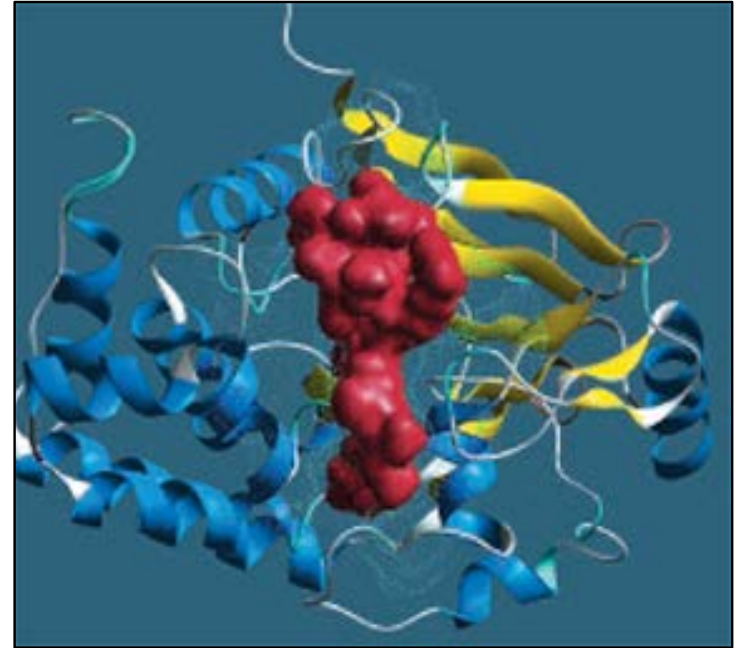
## Anatoxins (nerve toxin)

- Potentially fatal to dogs

## Lipopolysacharides (endotoxins)

- Skin irritants and allergens
- Produced by most cyanobacteria

## Others



# Routes of Exposure

1. Consumption:
  - drinking water, incidental swallowing (recreation)
2. Inhalation:
- sprays, aerosols created during household use or recreation
3. Dermal exposure:
  - skin contact during swimming, fishing



# HABs and Health



Health department email:  
[harmfulalgae@health.ny.gov](mailto:harmfulalgae@health.ny.gov)

- Symptoms include:
  - diarrhea, nausea or vomiting; skin, eye or throat irritation; and allergic reactions or breathing difficulties
- If exposed to blooms/scums:
  - stop using the water, rinse off yourself, children, and animals with clean water
  - seek immediate medical assistance for symptoms consistent with exposure
  - report any symptoms to local/state Health Department



# What is the DEC HABs Program?

The program consists of DEC staff who:

1. oversee HAB monitoring and surveillance activities,
2. work to identify bloom status,
3. conduct outreach/education and communicate public health risks,
4. conduct research
5. provide data, insights for the management of NY waters



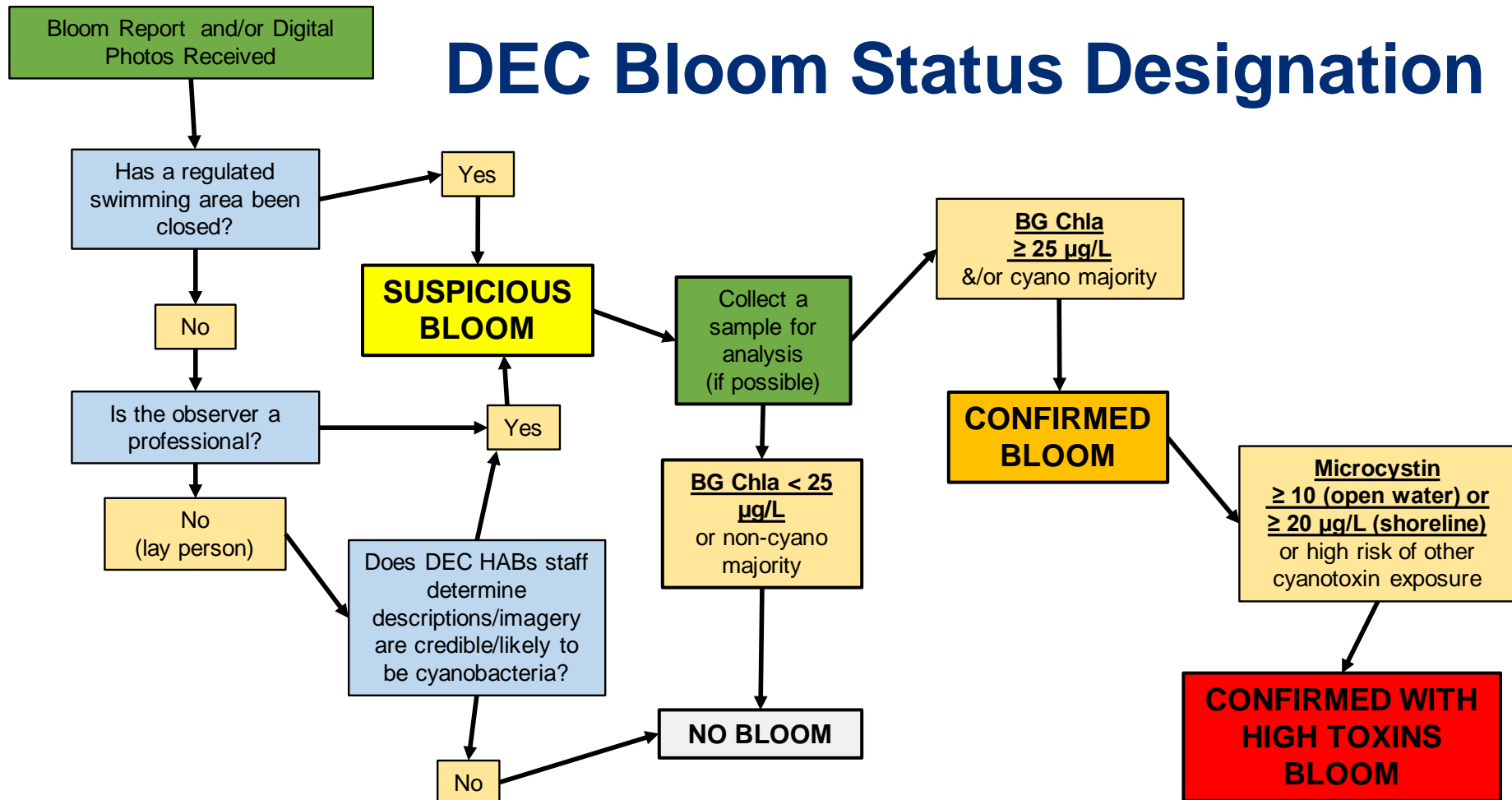
# DEC HABs Program

## Surveillance/sampling

- DEC works DOH, SUNY ESF and Stony Brook researchers for lab analysis
- Sampling mostly by trained volunteers, DEC staff
- DEC oversees HABs and lake monitoring programs (LCI, CSLAP)
- Drinking water and regulated swimming areas (beaches) are the jurisdiction of DOH & State Parks



# DEC Bloom Status Designation



# Bloom Designation

No Bloom

A potential bloom report is filed

DEC staff determines that the report is not a HAB



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# Non-HABs Examples



# Bloom Designation

No Bloom

Suspicious

Confirmed

Confirmed with High Toxins

A potential bloom report is filed

Credible evidence indicates likelihood of both BGA and bloom conditions from visual, field report, other

Not (yet) verified by laboratory analysis



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**An easy one . . .**



**Bloom or no bloom?**



# Bloom Designation

No Bloom

Suspicious



Confirmed

Confirmed with High Toxins

A potential bloom report is filed

HAB confirmed by:

1. BG chlorophyll-a levels  $> 25 \mu\text{g/l}$   
(interpretation of WHO guidance)
2. Dominance by BGA  
(fluoroprobe, microscopic analysis)
3. or – a regulated swimming area  
has been closed



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# The Difficulty of Confirmation



# Bloom Designation

A potential bloom report is filed

No Bloom

Suspicious

Confirmed ✓

Confirmed with High Toxins ✓

High Toxins confirmed by:

1. Open water microcystin concentration  $\geq 10 \mu\text{g/L}$  (ppb)
2. Shoreline microcystin concentration  $\geq 20 \mu\text{g/L}$  (ppb)

For ALL categories, public advised to AVOID it and REPORT it.



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# The DEC HABs Program


## Education & Outreach

- Website: HABs primer, FAQs, photos, notifications, map, and archived data
- Conduct presentations & trainings
- Weekly updates: MakingWaves, Twitter, FaceBook
- Summary results in DEC & CSLAP reports
- **NEW!** Brochure and Program Guide
- Notifications sent to stakeholders:
  - date, bloom status, photos, raw data, etc.


DEC Harmful Algal Blooms webpage

<http://www.dec.ny.gov/chemical/77118.html>

 Reply
  Reply All
  Forward


 Gorney, Rebecca M (DEC)
 Bill Havener; + 17 •
Wed 3:43 PM

**Confirmed HAB: Lake Neatahwanta (Oswego Co.) 9/12: No PWS, no...**

 You replied to this message on 9/13/2017 3:58 PM.

---

Results from ESF sampling efforts on 9/12 confirm the presence of a continued cyanobacteria HAB in Lake Neatahwanta (Oswego Co.) based on blue-green chlorophyll a levels of 35.7 µg/L (above the DEC Confirmed Bloom threshold of 25 µg/L) and a microscopic analysis of *Microcystis*, *Aphanizomenon*, *Woronichinia*, *Dolichospermum*.

Toxin data are not yet available, but will be forwarded upon receipt if they indicate an elevated risk.

Any questions or comments may be sent to [HABsInfo@dec.ny.gov](mailto:HABsInfo@dec.ny.gov)

**Rebecca M. Gorney, Ph.D.**  
 Research Scientist, Division of Water  
 Lake Monitoring & Assessment Section

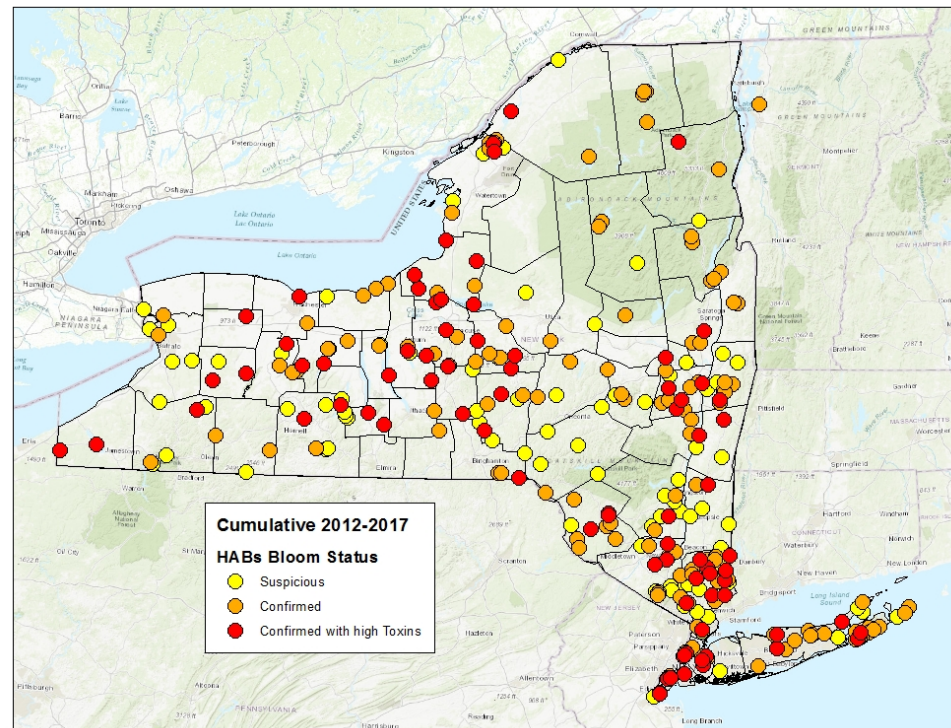
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 DEC website: [www.dec.ny.gov](http://www.dec.ny.gov)  
 HAB website: [on.ny.gov/hab](http://on.ny.gov/hab)



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# HABs in New York 2012-2017

Year	Suspicious	Confirmed	High Toxins	Total
2012	20	29	9	58
2013	17	37	22	76
2014	19	51	23	93
2015	40	62	35	137
2016	41	95	38	174
2017	48	85	35	168
<b>12-17</b>	<b>75</b>	<b>133</b>	<b>77</b>	<b>340</b>



# The Finger Lakes in 2017

All 11 Finger Lakes had algal blooms in 2017

Lake	2012	2013	2014	2015	2016	2017
Otisco				S		C
Skaneateles						HT
Owasco		HT	HT	HT	HT	HT
Cayuga			C		C	HT
Seneca				HT	HT	HT
Keuka						HT
Canandaigua				HT	C	HT
Honeoye	S	HT	HT	HT	C	C
Canadice						C
Hemlock						C
Conesus			S		C	C

**S (Suspicious Bloom):** DEC staff determined that conditions fit the description of a cyanobacteria HAB based on visual observations and/or digital photographs

**C (Confirmed Bloom):** Water sampling results have confirmed the presence of a cyanobacteria HAB which may produce toxins

**HT (Confirmed with High Toxins Bloom):** Water sampling results confirmed that there were toxins present in quantities to potentially cause health effects if people or animals came in contact with the water



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# Measures to Address Blooms



- Support communities in developing avoidance language/HABs signage
- Public education, increase awareness, commitment to public notification
- In-lake management of symptoms (blooms) with physical or chemical means
- Nutrient reduction strategies, Clean Water Plans, development of Numeric Nutrient Criteria
- Enhanced Surveillance Programs
- Research

# Governor's State of the State HABs Initiative

Western Group: **Conesus Lake; Honeoye Lake;** Chautauqua Lake

Central Group: **Owasco Lake; Skaneateles Lake; Cayuga Lake**

North Country Group: Lake Champlain at Port Henry; New York portion of Lake Champlain at Isle La Motte watershed; Lake George

Greater Hudson Valley Group: Lake Carmel; Palmer Lake; Putnam Lake; Monhagen Brook watershed, including the five reservoirs serving the Middletown area

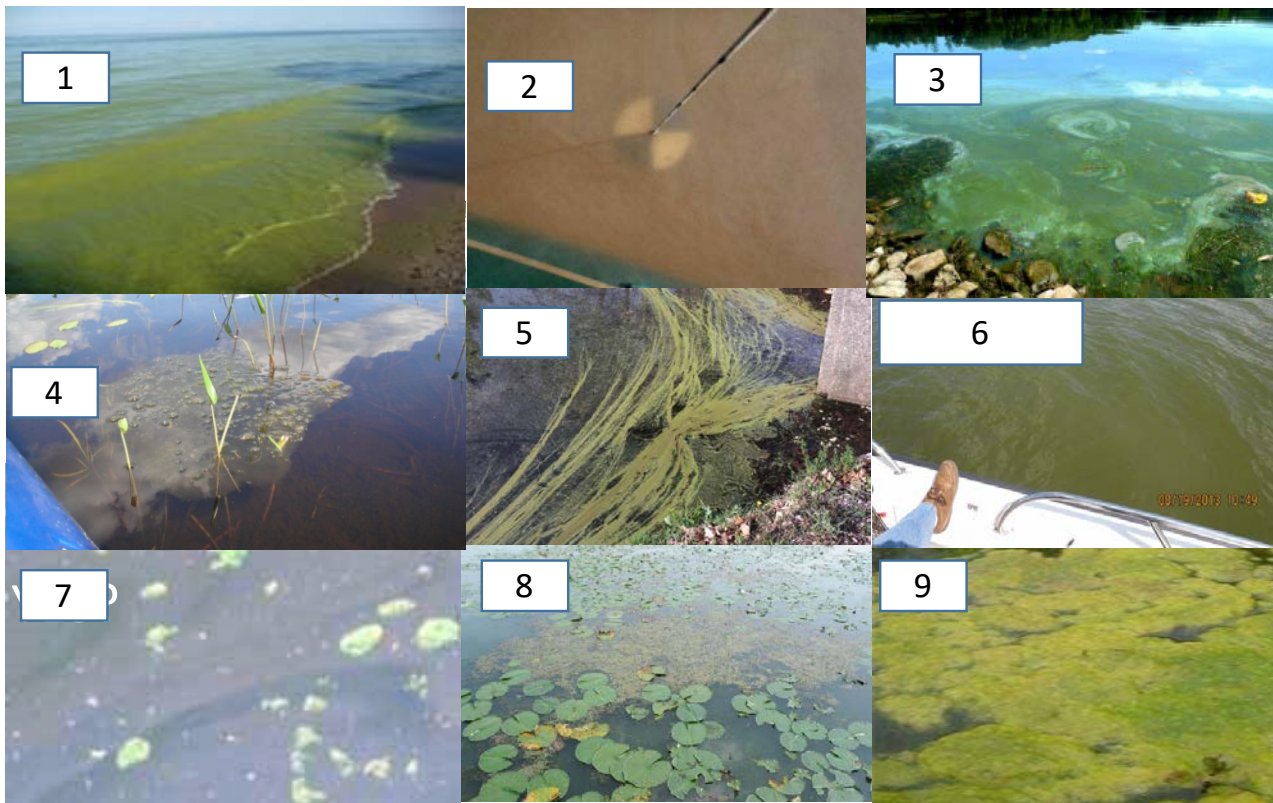


# Governor's State of the State HABs Initiative

1. Convene four Regional HAB Summits in March 2018
2. HAB Action Plan development guided by steering committees by May 2018
3. Advanced Monitoring and Research
4. Pilot Treatment Technologies



# Which are HABs?



# Thank You!

Aimee Clinkhammer

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Finger Lakes Water Hub

Bureau of Water Assessment and  
Management

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315-426-7507

WHAT TO DO		WHAT DO HABs (USUALLY) LOOK LIKE?
 <p><b>1. AVOID IT!</b></p> <p>It can be hard to tell a harmful bloom from a non-harmful algal bloom, so it is best to avoid swimming, boating, fishing or other recreation in discolored water that looks like it might have a bloom. Avoid eating fish caught from areas with a bloom. Never drink, prepare food, cook, or make ice with untreated surface water, even if there is no visible bloom.</p> <p><b>IF CONTACT OCCURS</b></p> <ul style="list-style-type: none"> <li>• Rinse thoroughly with clean water.</li> <li>• Stop using the water.</li> <li>• Seek medical attention if vomiting, nausea, diarrhea, skin, eye or throat irritation, allergic reactions or breathing difficulties occur.</li> <li>• Report your symptoms to your local health department or the NYS Department of Health.</li> <li>• Take care to remove algae from pet fur.</li> </ul>	 <p><b>2. REPORT IT!</b></p> <p>If you think you see a harmful algal bloom, call <b>518-402-8179</b></p> <p>-or-</p> <p>fill out a <b>Suspicious Algal Bloom Report Form</b> (available for download at <a href="http://on.ny.gov/hab">on.ny.gov/hab</a>) and submit it with any pictures to <a href="mailto:HABsInfo@dec.ny.gov">HABsInfo@dec.ny.gov</a></p> <p>If you experience any health effects from a HAB, report them to your local health department</p> <p>-or-</p> <p><a href="mailto:harmfulalgae@health.ny.gov">harmfulalgae@health.ny.gov</a></p> 	<p>The appearance of HABs can vary. Colors can include shades of green, blue-green, yellow, brown, red, or white.</p> <p><b>SPILLED PAINT APPEARANCE</b></p>  <p><b>PEA SOUP APPEARANCE</b></p>  <p><b>STREAKS ON THE WATER'S SURFACE</b></p>  <p><b>FLOATING DOTS OR CLUMPS</b></p> 