



Big Lake Water Quality Improvement Project
Fall Community Check-In: September 19, 2012
Meeting Notes # 9
Facilitated by Shelly Wade, Agnew::Beck Consulting

Welcome + Introductions

- After work session participants introduced themselves, Shelly Wade gave an overview of the purpose and topics of the check-in meeting including:
 - Summer 2012 Water Quality Improvement Activities – What happened? Who participated? What were the main outcomes? What impact did they have?
 - Current Action Plan – Where are we at? What progress has been made? Do we need to revise and/or update? What additional resources do we need, and are available, to successfully implement our action plan?
 - Next Steps – What are the immediate next steps? What are our longer-term plans for improving/maintaining Big Lake water quality?

A summary of the group's discussion on these topics is outlined below.

Summer 2012 Activities

Report from Rachel Lord, Cook Inletkeeper (Big Lake ACWA Grant Project Lead)

- Media outreach went really well. The effort was focused on the positive message of: "We love Big Lake. Let's do our part to clean it up!"
- Observed was a general shift in community thinking regarding the Big Lake clean-up effort. General sentiment gathered during the outreach process was this is a proactive, common sense community effort (i.e., of course the community wants to clean up Big Lake!).
- The Big Lake newsletter distributed by Ina Mueller featured regular updates on the water quality project.
- Work continued with local marinas.
 - Shilanski Family Marina requested and was provided with bilge pillows and full clean boating kits.
 - Burkeshore installed two new large signs with Keep Big Lake Clean logo that outline clean boating practices.
 - Burkeshore hired Emerald Alaska to assess their spill response capacity and to make recommendations regarding what to have onsite. The on-site equipment was actually used this summer when a boat moored at the marina sank.
 - Burkeshore purchased a smart ash burner to eliminate oily waste, including used bilge pillows. The marina is looking at using residual heat from burner operations to run their shop.

- In general, Burkeshore continues to build their capacity as the area's largest fuel dock. They have 170 slips now. There was also a question regarding their capacity to service larger, ocean-going vessels. It is common for owners of these larger vessels to test out their motors in Big Lake at the beginning of the boating season.
- A local repair shop owner that received bilge pillows from Rachel during the 2011 summer season called and requested another box of absorbent pillows.

Report from Catherine Inman, Mat-Su Conservation Services (Big Lake ACWA Grant Project Partner)

- Coast Guard auxiliary was on the lake doing their own outreach this summer and gave out bilge pillows as well.
- Pilot Launch Host Program
 - Getting volunteers was a real challenge.
 - Verbal reports from Holly Petersen, State Parks concessionaire, activity at the North and South State launch sites was down 40 percent from summer 2011. More specifically, July 2011 had more activity than all of summer 2012.
 - Catherine was approached by a local Girl Scout to work on the project. The young woman was working on her "Gold Star Award" and volunteered to develop a display regarding clean boating. The display was erected at the Big Lake Library. (Catherine brought the display to the check-in meeting).
 - She thinks she will have better luck targeting and working with organized groups like the Girl Scouts, the Big Lake Lions Club, versus a more general volunteer recruitment process.
 - Randi Pearlman did significant outreach including contact with the Frontiersman and a local news station. See link to results below:
 - May 12, 2012 - http://www.frontiersman.com/news/big-lake-discusses-cleaning-upits-act/article_81bab44c-9cac-11e1-99ec-001a4bcf887a.html
 - July 10, 2012 - <http://www.youralaskalink.com/Keep-Big-Lake-Clean-161888575.html>
 - August 23, 2012 - http://www.frontiersman.com/valley_life/campaign-to-keep-biglake-clean-is-catching-on-with/article_7e4a29a2-eda4-11e1-8cac-0019bb2963f4.html
 - Over 100 surveys were collected via the pilot launch host program and contact was made with 300-400 people. Rachel is still compiling the survey results that includes recommendations from survey respondents regarding water quality improvement/clean boating strategies. Results from prior surveys are compiled in the FY12 Clean Boating on Big Lake Report, http://dec.alaska.gov/water/wnpspc/protection_restoration/biglakewq/docs/CleanBoating_Report_WV-Appendix.pdf.
 - Catherine made and displayed/shared water bottles illustrating the difference between 2-stroke and 4-stroke engines.
 - There is a sustainability requirement for the Gold Star achievement. Right now, it is unclear who will continue to fund the launch host program. Part of next steps, outlined below, includes further investigating potential options (e.g., Big Lake Sailing Club and other local business that have a vested interest in improved and continued water quality). The current ACWA grant will provide information on costs.

Observations Regarding Impact

- Potentially less sheens on the lake than previous summers. However, there has been decreased activity this summer due to weather conditions including coldest July on record and frequent rains.

- Not sure if the sheens that are observed are from gas or are naturally occurring. Is there a way to differentiate? University of Maine has done work on how to tell petroleum based sheens from naturally occurring sheens (see attachment).
- Is there a way to tell if petroleum in the water column is from spills or incomplete combustion of fuel from motorboats? See note below regarding “testing capabilities”.
- More businesses are carrying clean boating kits.
- Burkeshire is handing out bilge pads and also modifying fueling practices. Staff ask boaters how much their tanks can handle and are not filling completely, making a spill less likely (e.g., 45 gallons instead of 50).

General Comments

- Are there any existing rules or regulations around fuel storage and transportation? What are they? Can they be enforced and how? Both the US Environmental Protection Agency and the Department of Environmental Conservation have rules regarding fuel storage and transportation. An on-site inspection by the agency is often needed to determine which regulations apply. Frequently with fuel storage and transportation, a storm water permit is required from DEC and a Spill Prevention, Control and Countermeasure Plan is required by EPA. The community can request the regulatory agencies conduct inspections of businesses in the area. See note below regarding new community action item on this topic.
- Some boats have an automatic discharge system as a safety precaution. For example, if these boats are left uncovered, the bilge pumps will fill up and could ultimately sink the boat. The auto discharging mechanisms keep this from happening. There are in-line filters that could be installed to ensure gas is not getting dumped into the lake when the auto discharge goes on. However, these are better suited for larger vessels. Decreased insurance rates may be another incentive to have an in-line filter installed.

Current Action Plan

- **Action Item #1 – Clean boating campaign**
 - Bill Kramer and Dan Mayfield will work on developing clean boating signs, similar to the metal signs posted at North and South Rec Sites, for Horseshoe Lake. DEC may have some funds to help with that effort and can provide information on cost of signs installed at launches. The signs could also include some of the other materials/information shared in the Girl Scout display. NOTE: Cindy Gilder has provided cost information.
 - Big Lake Community Council also has some funds available (\$2,500) for other clean boating signage projects in other areas around Big Lake. Need to announce the opportunity at the next BLCC meeting.
 - Launch Host Program – Target organized groups for future efforts.
 - The community needs education on DEC and EPA regulatory requirements to help them better understand what rules apply to businesses that might impact Big Lake’s water quality.
- **Action Item #3 – Improve state launch ramps**
 - This item is on the community’s CIP list.
- **Action Item #5 – Resample Big Lake**

There were several questions raised regarding the resampling process including:

 - *Testing Capability* – There was some discussion around whether or not the water quality testing process can tell us the origin of the petroleum hydrocarbons (i.e., what has gone through an engine vs. spills from refueling, dumping bilges, etc.).

Update from Cindy Gilder, as of 9/27/12: It does appear that NOAA has done some work on Kachemak Bay **sediments** looking at what is spent fuel versus spills from diesel fuel and making some assumptions about the relationship of spent versus virgin. Diesel fuel differs from gasoline in the chemical makeup; diesel fuel has considerably less BETX (benzene, ethylbenzene, toluene, and xylene). The water quality standard that we are exceeding at Big Lake is BETX or TAH). When I asked one of the laboratories if an analysis could be done in **water** to determine spent versus raw fuel, they responded that such analysis would require complex statistical calculations along with detailed fingerprinting. I imagine the analysis for Big Lake's water would be more complicated because of fuel manufacturing and engine differences (size & efficiency) would all change the analytical outcome. Also, early on in the project DEC included sampling for the chemical constituents associated with diesel fuel and did not find any above state allowed limits in the water column.

- *Community-Funded Testing Efforts* –Can they be considered? If not, why not? For DEC to consider data for impairment listing/de-listings they should be done in accordance with a Quality Assurance Project Plan (QAPP). The plan outlines quality control for all testing activities.
- *Retesting Date* – There was confusion regarding the retesting date. Early in the water quality project, the community had discussed retesting Big Lake in the summer 2012. The Big Lake Water Quality Action Plan (updated in Feb 2012) estimates retesting summer 2012; the May 2012 meeting note indicate revisiting testing after summer 2012. Retesting after 2012 will allow the community and their partners to have two full summers of action plan implementation. Added to that are the community's desire to do additional action items that may have some impact beyond the education actions that have already been implemented. Those items are outlined below.
- Retesting is currently planned for summer 2013 to evaluate what progress has been made to meet water quality standards.
- **New Action Items**
 - **Action Item # 9** – Develop a letter to DEC requesting enforcement of current legal requirements regarding fuel storage and transportation. This includes inspection of local businesses to ensure compliance. Bill Kramer recommended the letter come from the BLCC.
 - **Action Item #10** – Research options for an engine buyback program.
 - At past meetings, when the community has discussed the option for doing a buyback program in Big Lake, they decided to hold off on including that action, agreeing to start with education and other actions that would gain community support. The group has also talked about the challenges and the hard work it would take to develop research and secure a funding source for a buyback program in Big Lake. Again, the Kenai situation was unique, as the funding was secured via the Kenaitze Tribe. Tribal entities have access to special pools of funding that non-profits, municipalities cannot apply for. That being said, there may still be funding opportunities, should the community decide to move forward with this action item. At that time, the community will need to designate a local lead(s) on researching and pursuing potential opportunities.
 - Immediate step for this action item is to invite folks from the Kenai program to present an overview of their program to the BLCC. Bill Kramer will take the lead on contacting Robert Ruffner at the Kenai Watershed Forum. Cindy Gilder has provided Bill with Robert's contact information.
 - **Action Item #11** – Train local residents to conduct water quality monitoring.

- Immediate next step for this action item is to assess the potential of the existing MSB Volunteer Lake Monitoring Program to expand to include petroleum hydrocarbon testing.
- Paul DuClos has volunteered to participate in a program, should the option become available.
Update from Cindy Gilder: DEC met with MSB Volunteer Monitoring Program representatives. We exchanged information on sampling requirements and the current program. DEC is exploring ways to include opportunities for volunteers in upcoming sampling events.

Next Meeting

- The next Big Lake Water Quality Improvement Project meeting is tentatively scheduled for some time early 2013 (January or March, well in advance or after Winterfest). The preliminary purpose of the winter meeting is to discuss progress on new action items and to map out plans summer 2013 activities.

Fall Community Check-In Attendees

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Paul	DuClos		ducblk@mtaonline.net
Rachel	Lord	235-4068 x29	rachel@cookinletkeeper.org



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A FIELD GUIDE TO AQUATIC PHENOMENA

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Field Guide Website
[www.umaine.edu/
WaterResearch/FieldGuide](http://www.umaine.edu/WaterResearch/FieldGuide)



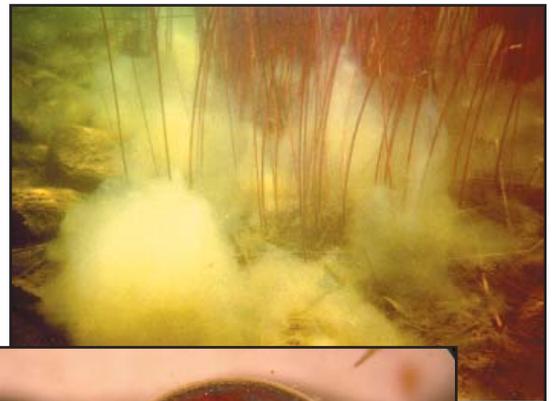
WHY IS WATER DIFFERENT COLORS?

WHAT'S THAT FLOATING ON THE WATER SURFACE?

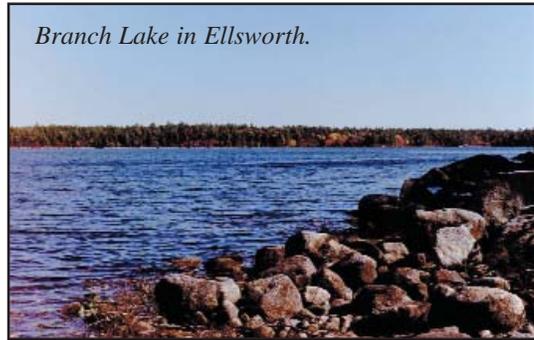


Lakes and streams don't always look
or behave the way we expect.
Water can be full of strange colors,
unidentified blobs, and swimming
creatures. Something that at first
glance looks like pollution actually
might be a natural phenomenon.
The aquatic world is diverse. There
are all kinds of cool, weird, and
interesting things waiting to be
discovered in your nearby lake or
stream. This field guide will help
you identify some common
phenomena, and help you
distinguish pollution from
something natural. To see
more, visit [www.umaine.edu/
WaterResearch/FieldGuide](http://www.umaine.edu/WaterResearch/FieldGuide).

WHAT'S THAT STUFF IN THE WATER?

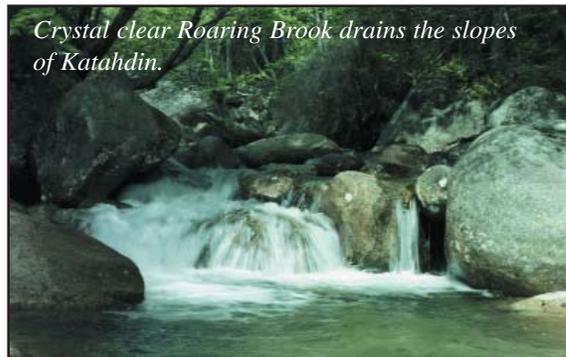


SPECKS, BLOBS, AND CLUMPS?



Branch Lake in Ellsworth.

Why do some lakes and rivers have no color? **CLEAR WATER** has less dissolved and suspended material. Mountain streams that start as snowmelt or runoff are often clear, because they run over bare rock without sediment or vegetation. Seepage lakes in sand and gravel settings may also look clear, and very shallow water is clear because there is not enough depth for the long, blue wavelengths of light to travel and be reflected back, so instead we see the color of the river or lake bottom.



Crystal clear Roaring Brook drains the slopes of Katahdin.

Suspended material makes water look **MURKY OR CLOUDY** (this is sometimes referred to as turbidity). Eroding soil can make water muddy brown in color. Strong winds and waves may stir up sediment from a lake bottom, and water near shore may look cloudy as a result. Runoff from urban areas can make water look gray.

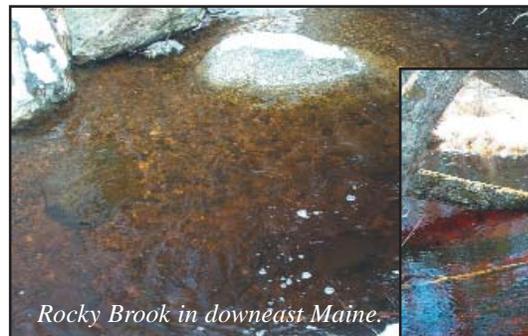


The gray color of an urban stream.

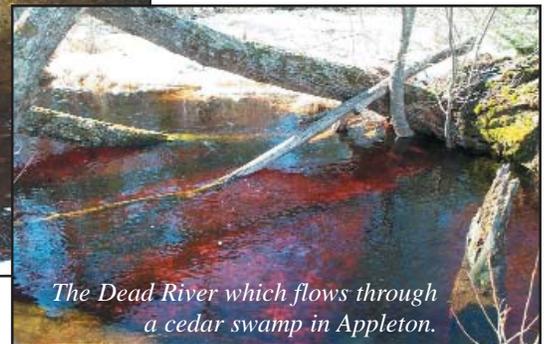
WHY IS WATER DIFFERENT COLORS?

When we think of a lake or river, we picture clear, blue water. But the color of rivers and ponds can range from red to brown to green to gray. Color is the result of material in the water that reflects back different wavelengths of the light spectrum. This material can be either dissolved or suspended. Dissolved material may make water look clear and blue or clear and brown.

What about water that is **TRANSPARENT, BUT BROWN** like tea or root beer? This color is the result of dissolved organic material from the breakdown of plants. The material leaches into slow moving streams and lakes from surrounding forests, bogs and wetlands.



Rocky Brook in downeast Maine.



The Dead River which flows through a cedar swamp in Appleton.

Particles of living material can also be suspended in the water. **GREEN WATER** probably has a large population of algae (microscopic plants). Algae and other microscopic organisms have colored pigments. When they grow in large numbers ("bloom"), they can color certain areas or entire lakes and streams. Blooms of an organism called *Euglena* may appear red. A bloom of diatoms, a kind of algae, can look brown. (See inside for more about blooms.)



*Algae have colored this lake green.
Photo courtesy SCSWCD.*

An **OILY SHEEN** that reminds you of rainbow puddles in an asphalt parking lot might be from spilled petroleum. But "oil" can also come from natural sources. Some bacteria that live in waterlogged places get their energy from iron and manganese, and as these bacteria grow and decompose, they may appear oily, or slimy



Oily sheen near a stream.

black, red or orange as the iron and manganese solidify. • In the spring and summer, a dark cloud in the water accompanied by an oily sheen could also be the outer skeletons of insect cases left behind from a hatch of aquatic insects.

A bloom of diatoms, a kind of algae, can leave an oil behind as the algal cells die. • How to tell the difference between petroleum spills and natural oil sheens? Poke the sheen with a stick. If the sheen swirls back together immediately, it's petroleum. If the sheen breaks apart and does not flow back together, it is from bacteria or plant or animal decomposition.



Clumps of pollen.

A **YELLOWISH POWDER OR DUST** on the surface of still water in spring and early summer is probably pollen from pine and other trees. After becoming water-logged, the

pollen sinks to the bottom or may collect along the shore. Lines of pollen may be left on rocks as water levels drop in summer. Sometimes pollen clumps together and forms small blobs.



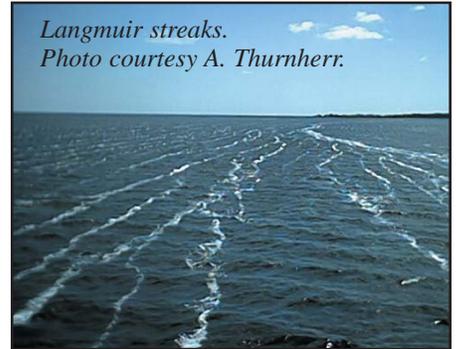
Pollen collects in a cove. Photo courtesy C. Smith.

ORANGE OR REDDISH BROWN SLIME OR FLUFF is produced by a group of bacteria that use iron as an energy source. This is the same group of bacteria that create oily sheens. The masses of bacteria excrete slimy or fuzzy-looking material as they grow and reproduce, and the slime becomes coated with rusty iron hydroxide. This is usually a natural phenomenon and is generally associated with acidic soils. However in large amounts (orange fluff that fills a stream bed) iron bacteria might indicate pollution. • In some areas, iron-rich groundwater may seep to the surface, and the iron solidifies and settles to the bottom as it becomes exposed to air. In this case, the iron will appear as an orange crust or stain, and will not be fuzzy-looking.



Iron precipitate at a groundwater seep.

On a windy day, **LINES OF FOAM OR DEBRIS** may form along the length of a lake, reservoir, or river. These lines are called windrows or Langmuir streaks. Wind can cause water to circulate in a pattern that makes material collect in lines on the surface. The lines are roughly parallel to the wind direction, and the windier it is, the further apart the lines.



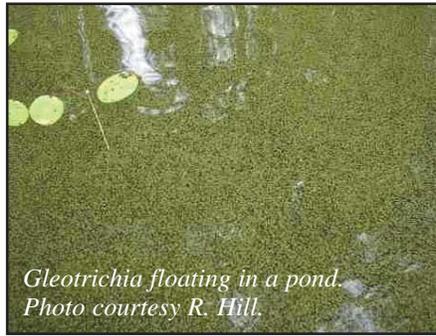
Langmuir streaks. Photo courtesy A. Thurnherr.

WHAT'S THAT FLOATING ON THE WATER SURFACE?



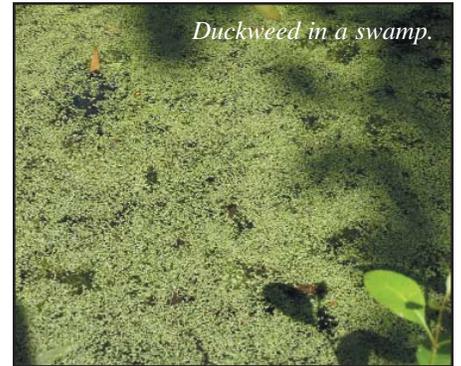
Iron bacteria. Photo courtesy C. Smith.

Fuzzy, **GREEN FLOATING DOTS** on lakes and in the top few feet of water, or tiny green tapioca-like balls might be an alga (microscopic plant) called *Gleotrichia echinulata*. *Gleotrichia* usually appear mid-summer for brief periods, but can persist longer in some lakes. The presence of *Gleotrichia* does not necessarily indicate poor water quality since it is commonly present in Maine lakes that have good water clarity. Wind and currents can concentrate them in one part of the lake and high densities can collect in coves.



Gleotrichia floating in a pond.
Photo courtesy R. Hill.

Don't mistake floating plants like **DUCKWEED** and water meal for algae. Duckweed (*Lemna* spp.) look like miniature lily pads, with a flat, round floating leaf and a tiny root. Water meal (*Wolffia* spp.) also floats but does not have a root, it is a round grain-like plant, about the size of a poppy seed.



Duckweed in a swamp.



Strands of algae from a drainage pipe.

FLOATING GREEN STRANDS, "cotton candy", and **GREEN CLUMPS** are formed by filamentous algae. These colonies of microscopic plants live in shallow water on the bottom near shore or on submerged objects.



Clumps of algae in a stream

WHAT'S THAT STUFF IN THE WATER?

GREENISH-YELLOW CLOUDS that look like cotton candy in shallow water along the shoreline are groups of algae known as metaphyton. Clouds often form in spring after heavy runoff or following a long hot spell in the summer.



Metaphyton clouds in a lake.
Photo courtesy R. Paegle.

Metaphyton clouds, made up of several different kinds of algae, may be a foot or more in length. This kind of algae does not necessarily indicate that there are excess nutrient levels in the water.



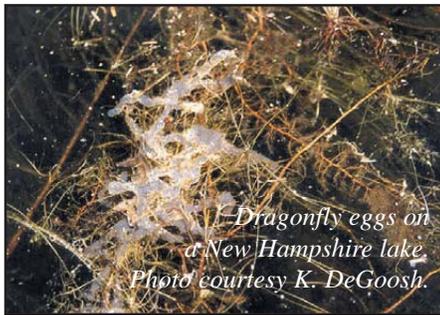
Algae bloom in a lake.
Photo courtesy SCSWCD.

SHOULD YOU BE CONCERNED ABOUT ALGAE BLOOMS?

Algae are an important source of food and oxygen for other plants and animals in the water, and a diverse community of algae is healthy. Sometimes, certain conditions might favor a species that is normally rare in a lake or stream. With the right temperature, light, and nutrients in the water, the organism might multiply rapidly, forming a "bloom". When an algae bloom is persistent or occurs routinely, too many nutrients may be entering the water. Nutrients (especially phosphorus) fertilize a lake just as they fertilize your lawn or garden, causing microscopic plants in the lake to grow. In Maine, to report an algae bloom call DEP at 1-800-452-1942.

GREEN OR BLuish-GREEN SCUM on the surface of a lake, pond, or stream might be a bloom of blue-green algae (cyanobacteria).

Jelly-like masses and clumps floating on the surface of shallow, calm waters or attached to sticks under the water might be **EGG MASSES** of insects, fish, or amphibians. Frog eggs usually look like a round mass and float on the water surface. Salamander eggs are huge masses with lots of jelly, and may or may not be attached to plants or sticks below the surface of the water. Toad eggs are laid in a string and usually are attached to plants and sticks. While amphibian eggs are found in masses, fish eggs and other eggs



Dragonfly eggs on a New Hampshire lake. Photo courtesy K. DeGoosh.

may be found individually or in small groups. • Female "basket tail" dragonflies (*Epiheca* spp.) carry a batch of eggs and drag their abdomen across the water surface to deposit their eggs in long gelatinous strings. They are clear to milky white with tiny spots of embryos. Toad eggs look similar but they are larger and more silty in appearance. Also, toad eggs are often right along the shoreline in weedy shallows among plant stems, and dragonfly eggs will be slightly further out in deeper water. • In early spring, long, flat, purplish ribbons wrapped around plant stems or on sand bars are yellow perch eggs.



Perch eggs. Photo courtesy S. Diamond.



A water mite trapped inside of an aquatic, carnivorous plant. Photo by K. Ness.

Small, red specks swimming in shallow waters are most likely **WATER MITES**. Often found in and around plant beds, water mites can range in size from a pinhead to a pencil eraser. With eight legs, water mites look like tiny spiders but closer inspection will show they only have one body part, unlike spiders which have two.

Greenish spongy-looking clumps attached to submerged sticks and plant stems in clear, well-oxygenated lakes might be **FRESHWATER SPONGES**.

Sponges are members of the animal kingdom but are often mistaken for aquatic plants or algae. Most sponges are green, because they have algae living in

their tissues. Freshwater sponges vary in size from a less than an inch to three feet. They are usually finger-shaped, and can look soft or hard. They are most commonly seen in summer or fall. They may appear sporadically and be abundant in a lake one year and absent the following year.



The freshwater sponge Spongilla lacustris. Photo courtesy Hugh Clifford & Bio-DiTRL.

SPECKS, BLOBS, AND CLUMPS: MINERAL, PLANT, OR...ANIMAL?

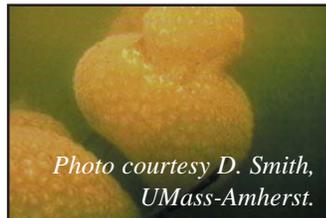


Photo courtesy D. Smith, UMass-Amherst.

Jelly-like blobs, sometimes seen attached to submerged sticks or docks, might be a colony of **BRYOZOANS**. These can be confused with egg masses. Bryozoans are animals, similar but unrelated to corals. Some byrozoans are wispy and moss-like (giving rise to a common name of "moss animals"), others are large and round, gelatinous, firm, and slimy to the touch. While they may be unsightly on piers and docks, bryozoans are not a water pollution problem and in fact help to filter water.

About the size of a quarter, with hundreds of tentacles, the **FRESHWATER JELLYFISH** can occur sporadically as populations explode and decline. They are translucent but may have a white or green tinge. Freshwater jellyfish have been found in rivers but prefer standing water and are most likely to be seen in lakes and reservoirs in late summer, just below the water surface. They do have stinging cells but are not harmful to humans. Only small fish and insects are harmed by their stings.

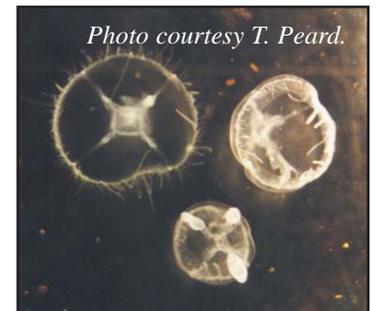
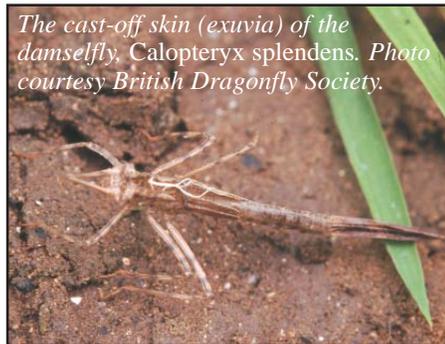


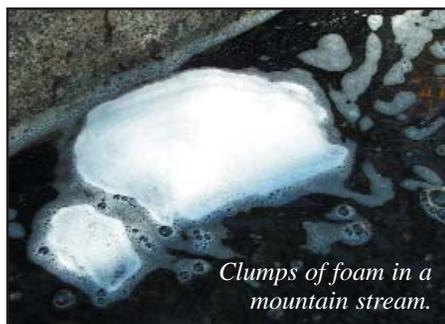
Photo courtesy T. Peard.

INSECT EXUVIA: The larvae of mayflies and some other aquatic insects molt and shed their skins as they leave the water and become flying adults. The skins are called exuvia, and can be seen floating on the water or piled up on wave-swept shores, where they are sometimes mistaken for fish kills. You can find dragonfly skins attached to docks, plants, and objects near shore. As exuvia decompose, an oily film sometimes forms on the water surface.



The cast-off skin (exuvia) of the damselfly, Calopteryx splendens. Photo courtesy British Dragonfly Society.

toxic pollution. Possible causes include lack of oxygen (especially on hot, windless days where excess nutrients decrease oxygen levels), lack of food, viral or bacterial infections, and fish stranding from low water levels. Some fish die after migration or spawning (like suckers). Smelts die from moderate stress, such as high temperatures or low oxygen. Winter fish kills can occur when oxygen is used up beneath the ice.



Clumps of foam in a mountain stream.



Foam collects in a stream pool.

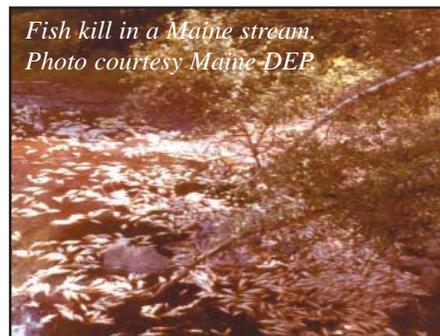
LINES ON ROCKS along the shore are a result of fluctuating water levels, and can be created by several different materials. Pollen that settles on a lake or quiet stream in spring may get left behind on rocks when the water drops in summer. • Algae that live on the surface of the water can likewise adhere to rocks and dry in a line. A white crust on rocks may be leftover diatom shells. Diatoms are a kind of algae with silica in their cells. The hard, white silica may be left behind when the algae die. A wet black zone of algae will form where the water meets the air, similar to bands of seaweed along the coast.



Lines of pollen on rocks in Davis Pond.

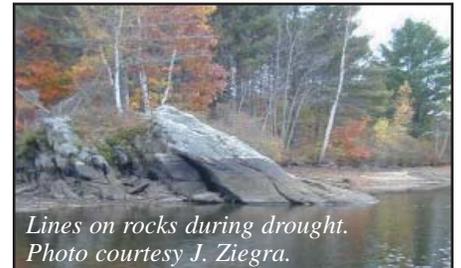
WHAT'S THAT ALONG THE SHORELINE?

FISH KILLS are rarely the result of



Fish kill in a Maine stream. Photo courtesy Maine DEP.

Most **FOAM** on lakes and streams is natural and does not indicate pollution. Foam forms when water is mixed with air, such as by a waterfall or waves breaking against shore. Organic material from decomposing plants and animals lessens the surface tension of water and creates bubbles. Natural foam may smell fishy or earthy, and may be white, off-white, or brownish, and breaks apart easily when disturbed.



Lines on rocks during drought. Photo courtesy J. Ziegler.

Above the bare scour zone is often a band of moss or lichens, where there is enough water and condensation for the lichen to live but above the zone of ice damage. Lichens grow so slowly that they are a good indicator of how high the ice is pushed in winter.

Additional Information

For more photographs and detailed descriptions of aquatic phenomena, visit the Field Guide website at www.umaine.edu/WaterResearch/FieldGuide.

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Other Resources:

- www.state.me.us/dep/blwq/doclake/FAQs.htm
- <http://mainevolunteerlakemonitors.org/index.htm>