

Get the Facts: Natural vs. Unnatural Foam

What is river foam?

Foam is often observed in and along the Charles River. Most foam observed in the river is the result of degrading organic matter which is a natural part of the riverine ecosystem and does not necessarily indicate a problem. On occasion, however, foam may be the result of wash water entering the river through runoff or illicit sewage discharges to the river. This fact sheet is intended to provide information that will allow you determine whether foam is natural or unnatural.



Natural foam below the Watertown Dam



Unnatural pollution foam (Credit: The University of Maine)

What causes the formation of foam in a river system?

Water has a property called surface tension, which causes molecules at the surface to be attracted to each other, creating the effect of a “skin” at the surface. Surface tension is the reason some insects can glide across the surface of the water. Foam is created when the surface tension of water is reduced and air is mixed into the water column, causing bubble formation.

Causes of natural foam in the river

Naturally occurring organic matter reduces water’s surface tension when it decomposes, which can result in the creation of foam. Foam formed in this manner is a natural part of the river ecosystem. High levels of organic matter often stain water a dark color. Therefore, dark colored water bodies such as the Charles commonly experience natural foam. Natural foam is especially common during late fall and winter, when leaves fall in the water and decompose, along with aquatic plants. River currents, waves, rapids and even boats can mix air, water and these organic compounds together to produce foam.

Causes of unnatural foam in the river

While natural foam is the most common type observed in rivers, unnatural foam from household and industrial detergents can also be found in rivers. Products such as detergents, personal care products (shampoo, toothpaste, etc.) and chemicals used in industry also reduce surface tension, allowing this product to mix easily with water. This mixing also creates foam in the river, in the same way these products foam in our sinks and washing machines at home. This foam is not a normal part of the river system; it is a sign of pollution. Household or industrial products can enter a river system through leaky sewer pipes, illegal sewer cross connections to the stormwater drainage system, or stormwater runoff.

When and where is foam likely to occur in a river system?

Natural foam is often found downstream of rapids or below waterfalls and dams. Unnatural foam is typically observed near to the pollution source such as an outfall pipe.

Is river foam harmful?

Natural foam is a normal part of the ecosystem and does not harm plants or animals. Foam derived from human activities, however, may affect human and environmental health. Detergents may contain phosphorus which causes excess algal and plant growth and can lead to low dissolved oxygen concentrations when this plant mass decomposes. Additionally, some industrial chemicals are very persistent in the environment and can bio-accumulate in organisms and humans, causing various biological consequences. Bio-accumulation occurs when an organism absorbs a toxic substance at a rate greater than that at which the substance is lost.

If you observe foam, how do you determine if it is natural or unnatural?

Differences in the appearance and persistence of natural and unnatural foam indicate whether it is a natural occurrence or the result of pollution. The chart below is a guide to determining whether foam observed in a river is natural or unnatural.

Natural Foam	vs.	Unnatural Foam
Smells fishy or earthy like fresh cut grass		Smells fragrant or like detergent
Not slimy to the touch (don't touch unless you are wearing gloves)		Uniform bubble size
Breaks apart easily if agitated		Persists for a longer period of time
White, off-white, or brownish in color		Usually bright white in color
Presence of organic and decomposing materials in the water		If foaming occurs near to the potential pollution source, such as industry, a wastewater treatment facility or an urban stormwater pipe, this might be an indication of unnatural foam caused by pollution
Usually downstream of dams and rapids and observed over large areas		Generally accumulates near the source and is not observed over a large distance

If you observe foam in the Charles River and believe it is unnatural, please take a photo or video and send to us at charles@crwa.org or call 781.788.0007

About Charles River Watershed Association

An internationally-recognized leader in river management, CRWA is an environmental research and advocacy group founded in 1965. Dedicated to restoring and protecting the Charles River, we use the Charles as our laboratory to develop practical, cost-effective and sustainable solutions for restoring urban watershed health. Learn more at www.charlesriver.org.

References:

- Schmitt, C. "Field Guide to Aquatic Phenomena." The University of Maine. Web. <<http://www.umaine.edu/waterresearch/FieldGuide/onthewater.htm>>.
- "Environmental Fact Sheet." New Hampshire Department of Environmental Services. 2001. Web. <<http://des.nh.gov/organization/commissioner/pip/factsheets/bb/documents/bb-5.pdf>>
- "Foam on Surface Water." Alberta Environment. Web. <<http://environment.gov.ab.ca/info/library/7663.pdf>>
- "Foam Fact Sheet." Indiana Department of Environmental Management. 2001. Web. <http://www.in.gov/idem/files/wqsurvey_025surfacefoam.pdf>
- Davis, Jeffery C. "What Causes Foam in Streams and Lakes?" Cottonwood Creek TMDL Development. Web. <http://www.dec.state.ak.us/water/acwa/pdfs/fyo5_arri_foamfactsheet.pdf>