

## 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.

### What are the causes of natural foam in the river?

Naturally occurring organic matter reduces water’s surface tension when it decomposes, and this 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.

### What are the 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 the products to mix easily with water. This mixing also creates foam in the river, in the same way these products produce suds 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 toxic substances are concentrated in animal tissue as it moves up a food chain.

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

Differences in the appearance and persistence can help you determine 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		Observed discharging from a potential pollution source, such as industry, a wastewater treatment facility or an urban stormwater pipe
Usually downstream of dams and rapids and observed over large areas		Generally accumulates near the source and is not observed over a large area
<b><i>If you observe foam in the Charles River and believe it is unnatural, please take a photo or video and send to us at <a href="mailto:charles@crwa.org">charles@crwa.org</a> or call 617.540.5650</i></b>		

### About Charles River Watershed Association

Founded in 1965, our mission is to protect, restore, and enhance the Charles River and its watershed through science, advocacy, and the law. We develop science-based strategies to increase resilience, protect public health, and promote environmental equity as we confront a changing climate. Learn more at [www.crwa.org](http://www.crwa.org).

### References:

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