

Hobbs Pond Enterococcus counts – Most Probable Number/100ml of Pond Water

The HFPA has been conducting bacterial contaminant testing in Hobbs Pond for several years. These tests determine the abundance of potentially harmful bacterial as indicated by the group of bacteria known as Enterococcus in the water, but do not identify from where the contamination may have come. The usual sources of contamination are malfunctioning septic drain fields, farm animals, wild animals and birds, and human swimmers. In general, contamination numbers may rise after large rains in the spring, but quickly return to low numbers. The HFPA urges all cottage owners around the ponds to maintain their drain fields by having tanks pumped at regular intervals so that solids do not leave the tank to eventually prematurely end the useful life of the drain field. When this happens, it's a quick trip into the ponds for the bacteria laden leakage.

The Association tests at three sites, twice a month during the summer:

Site 1: Middle of Hobbs Pond toward the south end, but before reaching the cottages on Luce Lane.

Site 2: Middle of Hobbs Pond just northeast of the narrow section separating the north basin from the south basin.

Site 3: Middle of Hobbs Pond near the north end of the pond out from the brook running under Loon Lane.

The samples are sent to Maine Water for analysis and the results are returned to the HFPA. The tests use a statistical analysis to determine the **“Most Probable Number” (MPN) of Enterococcus bacteria per 100 milliliter (ml) sample. Numbers of bacteria per sample exceeding 61 are deemed potentially hazardous for swimming or drinking.** The most recent numbers were zeros across the board.

	Site 1	Site 2	Site 3
June 6, 2016	88	198.9	238.2
June 13, 2016	0	4.1	1
July 6, 2016	0	0	0

General coliforms, Escherichia Coli, and Enterococcus bacteria are the "indicator" organisms generally measured to assess microbiological quality of water. However, these aren't generally what get people sick. Other bacteria, viruses, and parasites are usually the culprits.

Because it is so much more expensive and time consuming to do so, actual pathogens are virtually never tested for. What are these indicators?

- **General coliforms** indicate that the water has come in contact with plant or animal life. General coliforms are universally present, even in pristine spring water. They are of little concern at low levels. At very high levels they indicate there is what amounts to a lot of compost in the water, which could easily include pathogens (10,000 general coliform bacteria will get you a beach closure, compared to 2 or 400 fecal coliforms, or 50 Enterococcus).
- **Fecal coliforms**, particularly E. coli, indicate that there are mammal or bird feces in the water.
- **Enterococcus bacteria** also indicate there are feces from warm blooded animals in the water. Enterococcus are a type of fecal streptococci. They are another valuable indicator for determining the amount of fecal contamination of water. According to studies conducted by the EPA, enterococci have a greater correlation with swimming-associated gastrointestinal illness in both marine and fresh waters than other bacterial indicator organisms, and are less likely to "die off" in saltwater.

The more closely related the animal, the more likely pathogens excreted with their feces can infect us.

Human feces are the biggest concern, because anything which infects one human could infect another. There isn't currently a quantitative method for measuring specifically human fecal bacteria (expensive

genetic studies can give a presence/absence result). And **the ratio of indicators to actual pathogens is not fixed**. The number and virulence of pathogens present in samples with the same number of fecal coliform indicators can be different by a factor of 10 to 100 or more.

- Feces of non-human origin are of less concern to humans (this is why spreading manure on your vegetable garden is not considered insane).
- Feces from human populations with higher infection rates are of greater concern. Infection rates are around 5% in the US, and approach 100% in areas with poor hygiene and contaminated water supplies.
- All treatment methods and environmental conditions affect pathogens and indicators differently. For example, chlorinated sewage effluent may have zero indicators and zero pathogenic bacteria, but be laden with nearly all its original viruses. Pathogens (and indicators) can "hide" from treatment inside suspended solids. If treated water is cloudy, the safety of the water and the suspended solids can be very different. If the samples don't happen to capture the suspended solids, the reading will be low.

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