

# Understanding Septic Systems and their influence on drinking water

What do we know, now?

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Control and Prevention  
An Office of the  
Department of Health and Human Services

John E. Baldacci, Governor

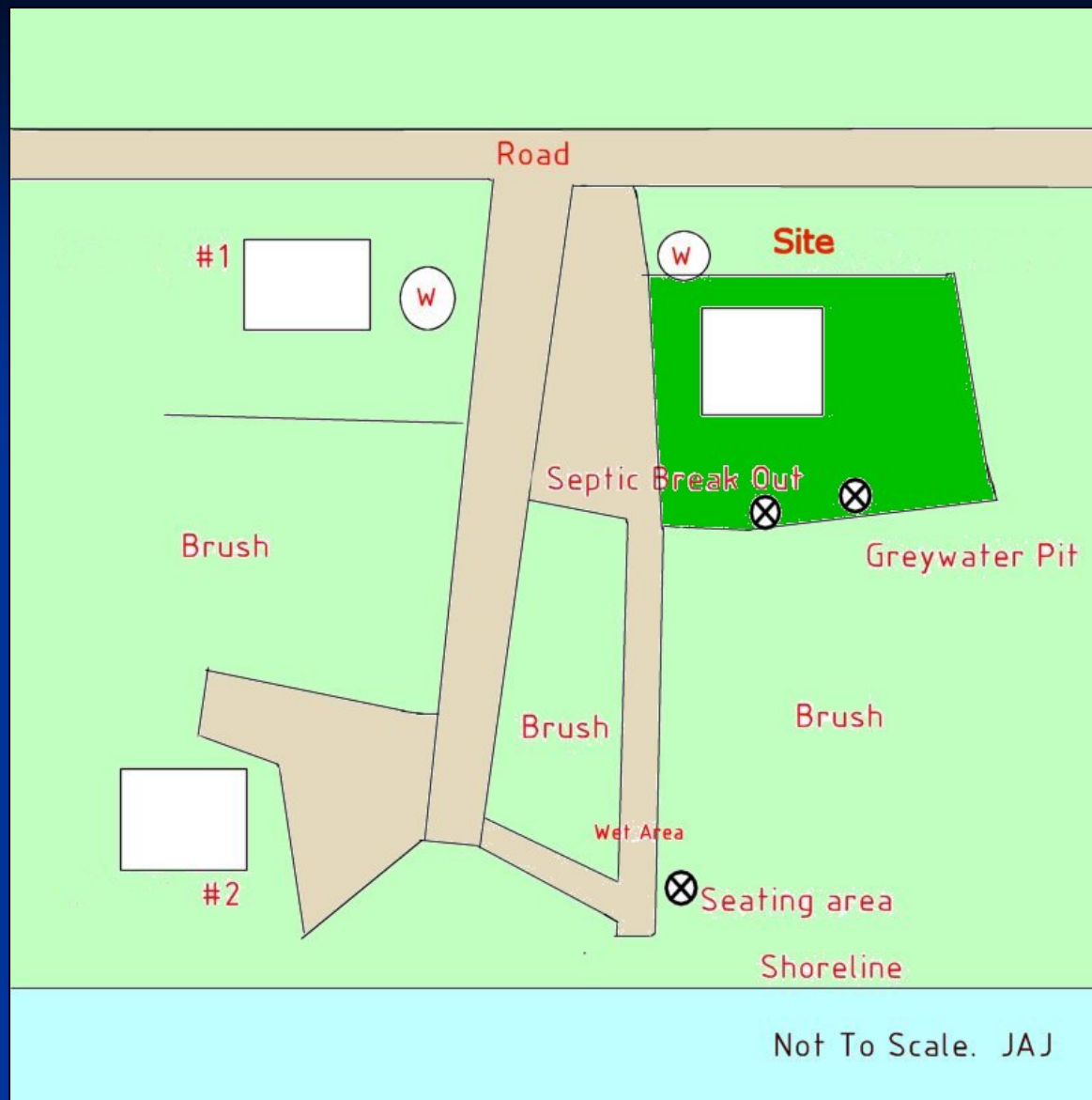
Brenda M. Harvey, Commissioner

# Three very different cases

- Hepatitis A outbreak on Swan's Island  
a geologic cross-connection
- Southern Maine Water District birth control  
detection: influence of one large system on  
groundwater
- Portland Water District Testing: many septic  
system (over 4,400 in the shoreland zone) add  
up.



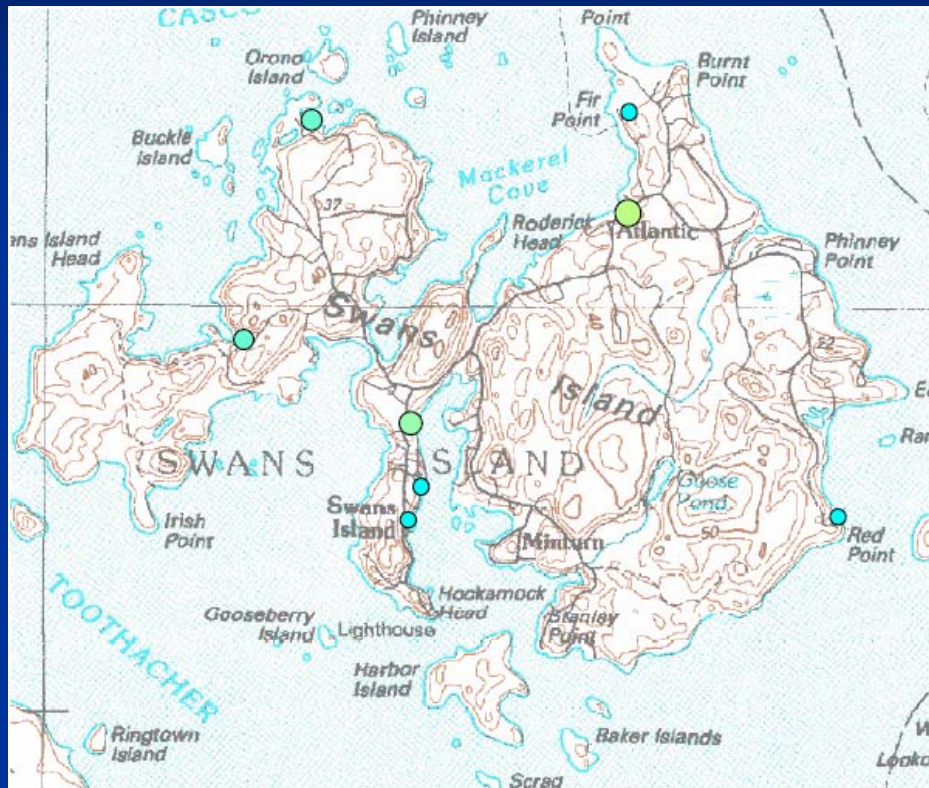
The site is located on an island, as part of a cottage colony



CDC and DMR staff investigated a cluster of Hepatitis A which appeared to be centered on this property. Samples were obtained from a number of locations and analyzed using PCR to identify viral particles



The malfunction to the surface appears to be chronic. The breakout is about 127 feet downslope from the well

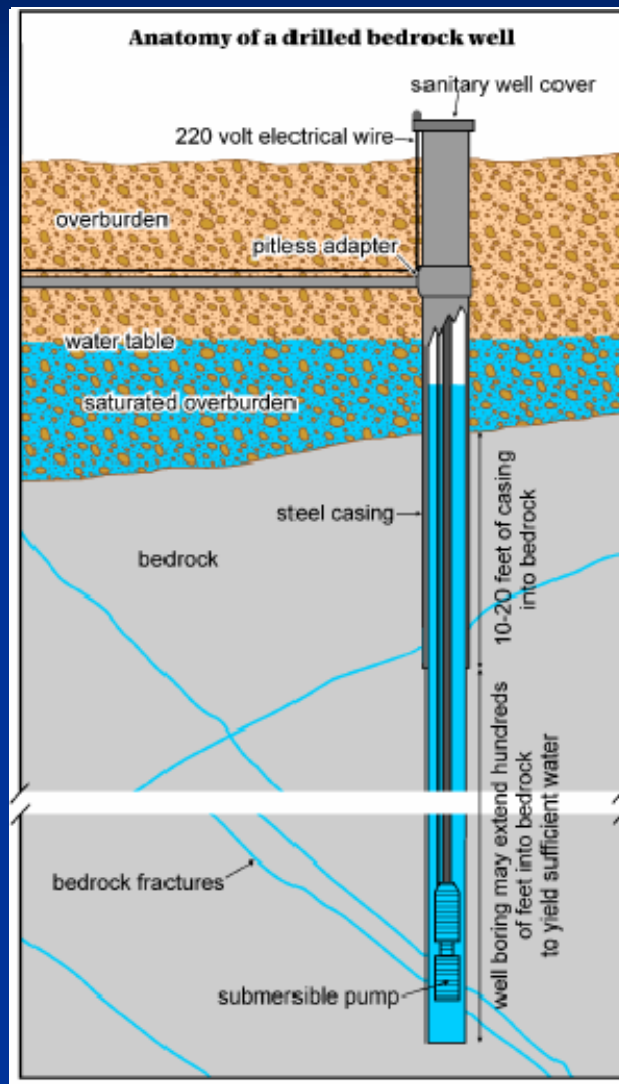


## Explanation

Estimated overburden thickness

- 0-5 feet
- 5-10 feet
- 10-15 feet
- 15-20 feet
- 20-25 feet
- 25-30 feet
- 30-40 feet
- 40-50 feet
- 50-75 feet
- 75-100 feet
- 100-200 feet
- >200 feet

Like most islands, bedrock is shallow and often exposed, as it is near the property.



Contamination of drilled wells generally occurs through poor sealing or broken casing, or through transmission of pollutants through bedrock fractures.

The property's well is approximately 300 feet deep, and is located in a poorly fractured granite.

The well is located approximately 127 feet upslope of the malfunctioning disposal area.

# Findings

- Sampling revealed hepatitis A virus in both the malfunctioning area and in the water in the building
- Our current working assumption is that there is a fairly direct connection between the septic system and the well
- While the system is old, it is also typical of many in the area.

# Pharmaceuticals and Personal Care Products, and other Emerging Contaminants

- We keep getting better at finding trace amounts of organic chemicals
- We also are very good at producing, distributing, and consuming lots of organic chemicals, including pharmaceuticals and personal care products (PPCP's)
- Most of these chemicals end up in wastewater, and are sent to systems not designed to treat them.

# Estrogenic in Groundwater

- A large subsurface system had served a jail that was seriously overcrowded
- The system was monitored, and high nitrates were found near the system
- The jail was closed
- Water system tested monitoring wells near the system, found several PPCP's, including some anti-psychotic drugs then tested their wells and found trace Estrogenic (birth control pills)



Jordan Springs

PWS wells

Large Capacity Septic System

0.1 0.05 0 0.1 0.2 0.3 0.4 Miles

# Thoughts

- Pharmaceuticals and other products pass through the human body relatively unchanged.
- Septic systems are designed to handle sanitary waste, not complex and stable organic compounds.
- Some of these compounds may be adsorbed or otherwise attenuated by soils

**What happens when you put 4400  
septic systems around a lake?**

## PORTLAND PRESS HERALD

**Product chemicals detected in Sebago Lake** Maine's biggest drinking water reservoir contains only trace amounts that don't pose any known threat to health.

*By JOHN RICHARDSON, Staff Writer* October 8, 2009 Chemicals from a pharmaceutical and other consumer products have been found for the first time in Sebago Lake, the source of the Portland area's drinking water.

The trace amounts of a common pain medication, an ingredient in antibacterial soaps and a chemical that prevents carpet stains don't violate any safety standards or pose any known health threat.

# Perspective

- Sebago Lake's watershed is 440 square miles
- Volume is 995 billion gallons
- Detections are low parts per trillion
- Hypothesis: many small discharges from a large number of sources of ibuprofen (painkiller), triclosan (antibacterial) and PFOS (stain repellent).
- Most likely sources are septic systems.
- Loading rate from the watershed of some tens of pounds of each compound, assuming the lake is well-mixed

# Waste disposal engineering

- We are in the early exploratory stages in understanding PPCP's
- Testing and interpretation are expensive
- Well designed, installed and maintained septic systems are an essential public health tool
- Improper use and disposal of chemicals can overwhelm a system's ability to treat.
- The cumulative impact of even proper use may result in impacts we can't yet understand or predict

