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Septic Systems and Watershed Pollution Control: Fecal Coliform in Surface Waters

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The next series of articles will explore the fate of pathogens, nutrients and "pollutants of emerging concerns" in soil based treatment and disposal system; that is on-site septic systems.

Around the state, Washington State Department of Ecology (WA DOE) is working diligently on pollution assessments of rivers, creeks, and lakes. These assessments are part of the WA DOE's responsibility to enforce Section 303(d) of the federal Clean Water Act. Any surface water with concentrations of pollutant in excess of state water quality standards are placed on the 303(d) and a clean up program is initiated with stakeholders in the watershed.

This assessment program is requiring people in watersheds to evaluate the sources of fecal coliform and nutrients that are in excess of state standards in the lakes, creeks, and rivers that they enjoy. The sources are generally classified as point and non point sources. Point sources are waste flows that are discharged from a pipe and can be traced back to one source, i.e. a wastewater facility. Non-point sources are more difficult to identify. They represent a variety of sources that together may have a very significant impact on water quality but individually may be relatively small. Predominant non point sources are residential yard fertilizer, agricultural runoff with fertilizer or animal wastes, pet wastes, and on-site septic systems.

On-site septic systems are always suspect for lake and river pollution, even if they were installed yesterday by a Washington State Certified designer and installer and licensed by the local health district according to WA DOH state guidelines. Why is this so? Is it true? Many home owners who care about their lake and want to protect it are asking these questions. Often they may be forced to ask these difficult questions since someone, at some point, is going to recommend eliminating all the septic systems and putting in a centralized collection system and treatment plant.

Washington State regulations for residential on site septic systems are implemented and enforced by county Health Departments. Until recently the regulations were established primarily to protect human health. Therefore current regulations were designed to minimize chances of contamination of surface and groundwater by human pathogens and nitrate nitrogen. New regulations are being established to protect environmental health.

Many waterbodies being assessed by WA DOE have elevated concentrations of fecal coliform. Standard tests for coliform testing does not distinguish between the coliform bacteria from a beaver, deer, mouse, duck or a human....they all equal in the standard test. Therefore "natural" sources of coliform bacteria are often a non point source of fecal bacteria.

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There are several methods to determine if the excess coliforms are from humans. These methods can help determine the proportion of fecal coliform that are from the various animals and can be very helpful in identifying agricultural sources for coliform. Numerous studies around the state and country have found that often the majority of coliform are from warm blooded animals (other than humans) in the watershed. However, often there is also a significant percentage, although lower than the "natural" sources that is from human waste. Pet wastes and small farm livestock production of cattle and horses may also be major sources due to unrestricted access to creeks and/or poor manure management.

Generally, problematic septic systems were installed before regulations were established and should be repaired or replaced. Failing septic systems can be identified by a variety of sampling programs that help locate either surfacing sewage or subsurface failure. Subsurface failure is more difficult to detect and generally will not occur in a properly designed and maintained drainfield. Suspect systems can be identified by either a review of county health department records or interviews of home owner in older houses. If a septic system was installed after about 1985 and has been maintained, then the soils in the drain field should be removing pathogens.

One of the key components in the on-site septic system is the soil into which the wastewater is disposed. The removal of pathogens in soils occurs as the pathogens are filtered out of the water as it moves through the soil profile. The fine soils, i.e. fine sand, silts, and loams are most effective. Generally the organisms do not live long in the soils. The more problematic soils, are very coarse gravels and coarse sands. These soils are not as effective at straining out the organisms. Regulations were established in the mid 1990's by WA DOH to require additional treatment and pressure distribution to improve removal of bacteria prior to entering the gravelly and sandy soils.

Therefore if the soils are good and the septic system has been installed and maintained properly for the last couple of decades it should be safe to assume that they are functioning properly. The next article will discuss the effectiveness of septic systems to remove nutrients.

It is always good to be reminded that, with routine maintenance a properly installed septic system should not pollute the lake. The following practices will reduce contamination from septic systems.

- Have your septic tank checked every other year and pumped when necessary.
- Use nonphosphate detergents, wash full loads of clothes, and use water-saving showers and toilets to avoid stressing your septic system.
- Do not use a garbage disposal.
- Do not use septic system additives. Keep solvents, plastics, paper diapers, and other similar products out of your septic system.
- Do not pave over or park on your drain field. The soil needs to breathe.