Stewards
For the
Coastal Environment

Salt Ponds Coalition

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Preserving our coastal ponds: Point Judith, Potter, Card, Trustom, Green Hill, Ninigret, Quonochontaug, Winnapaug, Maschaug, Little Maschaug

Information on Pollution in the Salt Ponds of Southern Rhode Island

There are two main types of pollution in the salt ponds

1. Bacteria, which can close shellfish beds and beaches.
2. Nitrates, which fuel algae growth and create unhealthy ecosystems.

These two issues are often confused, so please pay close attention to the following descriptions.

Bacteria

Bacteria do not generally damage the ecosystem, but can make people sick when they eat tainted seafood, or swim in contaminated water. They are also a marker to identify the possible presence of other pathogens that come from the same fecal sources.

- Cesspools do not do an adequate job of treating bacteria.
- Functioning traditional septic systems (often called ISDS for individual sewage disposal systems) are effective at treating bacteria.

High bacteria counts are why shellfish beds and/or beaches are closed.

Nutrients

Excessive nutrients can cause great harm to the ponds, and if left unchecked can effectively kill a pond. Nitrates in particular promote algae growth. Algae can be thick floating mats, fuzzy growth on aquatic plants and rocks, or suspended in the water creating a turbid green hue.

As the short-lived algae dies, oxygen is depleted from the water during the process of decomposition. The resulting low-oxygen conditions can kill off fish and shellfish, as well as critical habitat vegetation such as eelgrass, and can fundamentally alter the makeup of bottom sediments. Waters that were previously vibrant can become a barren shadow of their former state. This process is called eutrophication.

Nitrogen enters the ponds through groundwater and surface water. In Green Hill and eastern Ninigret Ponds, **groundwater sources represent approximately 75% of the total load to the ponds**, according to the peer-reviewed watershed management plan recently completed by the Horsley Witten Group and funded by the U.S. EPA. According to the same study, ISDS within the watershed are the greatest contributors of nitrogen to groundwater, accounting for approximately 74% of the load. Calculated out, that suggests that **60% of the total nitrate load to Green Hill Pond is from ISDS sources**.

- It is important to note that conventional septic systems adequately treat bacteria, but do little to treat nitrates.
- The denitrifying septic systems (also known as OWTS for on-site wastewater treatment systems) now required by DEM in many areas are intended to reduce nitrates.
- Nitrates in ground water do not break down quickly and can travel miles.
- There are no hard and fast rules governing how ground water moves towards the ponds. The glacial till is varied - in some areas groundwater moves quickly and in some areas it moves very slowly. In some areas it remains close to the surface and in other areas it drops deeper into the ground.
- The United States Geologic Survey has done some work on modeling groundwater movements in this area, but the data remain sketchy.
- Claims that groundwater drops a certain number of inches per yard traveled and therefore water originating beyond a certain distance from the ponds passes underneath the ponds, are totally unsubstantiated.

Current Status

Green Hill Pond: Several studies generally agree that Green Hill Pond requires a **60% + reduction** in nitrates to arrive at good quality, sustainable water quality, in which the marine ecosystems function well and water remains relatively clear. Additionally, **Green Hill Pond has been over the bacteria limits since the early 90's** and is closed to shellfishing.

- Ground water from local high-density neighborhoods contributes to the problems.
- Teal Brook and Factory Pond Brook collect surface water from additional neighborhoods, woods and streets and feed it into the pond.
- Green Hill Pond is connected to the ocean by a shoaled up narrow passage under a bridge, which is fed off of a constricted corner of Ninigret Pond - an area that has it's own pollution problems.
- A DNA test of bacteria sources suggested that non-human sources accounted for the majority of sampled contaminants, but the test was conducted during a dryer than normal period, so human sources likely account for more when the ground is wetter.

Ninigret Pond: Nitrates are less of a problem in Ninigret as a whole, but it **can't afford to get worse**. Bacteria are a problem in the eastern pond, which is adjacent to many older neighborhoods. The Charlestown breachway, which feeds Ninigret Pond, was partially dredged in recent years, but two large storms quickly brought much of the sand back, which again has restricted the rate of water turnover.

Quonnie Pond: is in relatively good shape, although the western end of the pond away from the breachway gets murky in the summer. The breachway is heavily silted and sand is extending far across the pond.

Winnapaug Pond: Winnapaug Pond has lost most of its habitat value. It is heavily silted and a new stormwater pumping station, which empties into the western end of the

pond, threatens to increase the problem as storm water from dense neighborhoods is injected into the pond.

Point Judith Pond: Point Judith Pond suffers bacteria and nutrient contamination in its northern end and back bays. Adding sewer service to high density areas would be very beneficial.

What Can Be Done?

Replace cesspools and underperforming septic systems. Replacing cesspools and under-performing septics in the watershed area is a good place to start. Cesspools are simply way past their useful lifespan and represent a public health hazard - it is time for them to go and the sooner the better. Replacing these systems with conventional septic systems would help with bacteria, but not nutrients. Replacing them with de-nite systems would help with both.

Manage storm water flows. Managing storm water is important for reducing both bacteria and nutrients, but particularly bacteria. Whether coming off of town streets, or private yards, surface water should be prevented from flowing directly into the ponds or streams that feed the ponds. Diverting water into constructed wetlands, where it is filtered through a combination of aggregate and vegetation before it flows down to the ponds, can treat larger sources of storm water, such as town roads. In private yards, vegetated buffers, rain gardens, groundwater recharge basins, and vegetated swales help control and treat surface water.

Reduce the use of fertilizer and yard chemicals: The compounds that help make grass green also make algae grow, and herbicides and pesticides can be detrimental to beneficial aquatic plants and some shellfish. Good storm water management techniques can help reduce the impact of these chemicals, but it would be much better if fertilizers and lawn chemicals were not used in areas close to the ponds, or where storm water runs into pond tributaries. Often times application of lime is all that's needed to have decent grass. The Horsley Witten study states that in Green hill Pond, lawn sources of nitrogen account for 8.7% of the problem as opposed to 74% for septic sources.

Managing animals. Controlling domestic and wild animals around the ponds is important, too. Dogs produce a lot of waste and so do birds such as geese. Picking up dog waste and disposing of it in the trash is one way to help reduce nutrient and bacteria levels in storm water. Creating conditions that discourage geese from congregating is also important. Geese like open grassy areas and planting low native shrubs and vegetated borders on yards that reach to the ponds can make conditions much less appealing.

Improve flushing of the ponds. All of the tidal ponds are suffering from siltation in their breachways. This siltation reduces the exchange of water with the ocean and exacerbates the problems with both nutrient and bacteria pollution. Dredging the breachways and then maintaining them over time can improve circulation in the ponds. The challenge here is that the breachways tend to fill in again – sometimes quite quickly

if there is a big storm. Green Hill Pond might benefit from three or four seasonal breachings per year, in which a temporary channel is opened to let the pond drain and refill. This practice is employed on the cape and islands, and from time to time by the US Fish and Wildlife service on Trustom and Card Ponds. The parcel best suited to this is owned by DEM, but it appears the deed precludes constructing a breachway. Its not clear whether the deed prevents a seasonal breach. Seasonal breaches would probably require extensive environmental impact studies, and some environmental/habitat advocates vigorously oppose the idea because it would increase the salinity levels in the pond. Some people have even raised the idea of installing solar or wind powered circulator pumps in Green Hill Pond that would pump water in or out of the ocean at the end of the pond away from the inlet, while the existing channel ebbs and flows.

Solar Aerators. Solar aerators such as the SolarBee are designed to draw water from below and spread it across the surface, creating an upwelling effect. This action can help ensure proper levels of dissolved oxygen throughout the water column. SolarBee claims that the circulators also reduce bacteria levels by exposing more of the pond waters to ultraviolet rays from the sun and reduce detrimental algae growth by breaking up warm, stagnant surface water, and mixing the growing algae into deeper water where it doesn't do as well. Solar aerators require little maintenance other than regular cleaning to control marine growth and they operate 100% off of solar power.

Install municipal sewers. Town sewer service could be the best solution in some areas such as Great Island and Harbor Island in Narragansett. These two locations have high-density development and are in relatively close proximity to existing sewer lines. The appeal of this approach is it takes the effluent away from the ponds for treatment in a professionally monitored plant. Sewers would probably be too expensive in lower density areas, but there are conceptual designs for neighborhood – sized systems around Green Hill Pond, where effluent from several blocks close to the pond could be treated in common systems a bit further away. Many people have traditionally opposed sewers, fearing they would open the pond-side areas to new construction. The sad fact is DEM has recently been approving plans for previously "unbuildable" lots based on plans using new de-nite systems or even composting toilets. The practice of relying on septic approval to regulate building density is going away and zoning regulations will have to be revised if density is to be contained.

Wood chip trenches. A simple trench filled with woodchips has proven to be very effective at treating nutrients in groundwater. The chips play host to beneficial bacteria that consume nitrogen. As the water filters through the chips and bacteria, the nutrients are taken up. These trenches are relatively inexpensive to install provided you don't find boulders (which are common in this area) and you have a clear right of way. The chips need to be replenished every five years or so. One of the unique benefits of the trenches is they start to reduce nitrates very quickly, since they are installed at the end of the water's journey to the pond. Some of the issues that complicate the trenches include boulders, property lines, trees and other obstacles, as well as unknowns about groundwater depth. The trenches are only effective at treating water that passes through them. Water that passes under is not treated at all.

Oysters. Oysters are natural filters. One adult oyster can remove nutrients from up to fifty gallons of water per day and in the process clear the water, thus benefiting eelgrass, which does much better in clear water. For a demo of oysters in action, check out the short video at http://www.youtube.com/watch?v=1Zm-yMpHsaQ. The ponds used to be full of them, but oyster disease has wiped out most of the native stock. Researches have recently developed hybrid strains, which are disease-resistant and could be re-introduced to the ponds. There is limited data on how well these creatures would do long-term in the wild, however, Green Hill Pond has retained more oysters than the other ponds, suggesting it is good habitat for them. A large population of introduced hybrid oysters in Green Hill Pond could go a long way towards cleaning up nutrient pollution. Unfortunately, current RI Dept. of Health regulations will not allow transfer of shellfish into areas closed to shellfishing. The two ways to advance this possible solution would be to 1) work to have the law changed, or 2) make a major effort to clean up the bacteria problem, so the shellfishing moratorium could be lifted. This second point would have the added benefit that Rhode Islanders could then eat the oysters, too!

Harvesting of Macro Algae. One member of the Charlestown wastewater commission is a supporter of harvesting macro algae in June and July. The theory is the algae takes up a great volume of nutrients and by harvesting various forms of algae at the peak of algae growth and removing them from the ponds, you effectively reduce nutrient levels. You also reduce hypoxic (starvation of dissolved oxygen) threats because decomposing algae is a major cause of oxygen depletion. SPC knows very little about the merits of this technique.

DEM Rule 39.
On January 1, 2008, DEM implemented rule 39, which requires residents within the salt ponds critical resource area to install a de-nite system when replacing a cesspool or septic system. The rule lays out a number of trigger points that require the installation of these new systems.

Cesspools near water resources will have to be replaced by 2013 under state law, and sooner in some cases under local ordinance. Cesspools being replaced in the Critical Resource Area (CRA) will need to be replaced with a de-nite system.

Residents will not be forced to replace a functioning septic system unless they undertake certain types of alterations to their house. For systems installed with state approval on or after April 9, 1968, the existing system is suitable and no application to the DEM is necessary for any building construction, renovation or change in use, that does not result in an increase in the number of bedrooms in a residential structure beyond the number in the original state approval. However, an increase in wastewater flow to levels greater than the approved design flow, or the encroachment of the building footprint on required setbacks from the existing system, could result in the need to replace the existing system with a new de-nite. If your system was installed before April 9, 1968, or did not have state approval, modest construction on your home could trigger the need to file for D.E.M. review of your system. Additionally, failure in the septic leach fields would

likely result in the requirement that the old system be removed and a new de-nite system be installed.

DEM's philosophy is to usher in a new generation of treatment systems that will eventually replace current traditional septic systems. They view the rule as a proactive long-range program that will deliver results twenty plus years down the road, and will help prevent nutrient problems from getting worse. Their belief is that treating nutrients at the source is more effective than trying to treat them at the end of the pipe – both for groundwater and surface water borne contaminants.

DEM does not view de-nite systems as the sole solution to the problem, but as a piece of the plan. Estimates in various watershed studies suggest a 60% + reduction in nutrients in Green Hill Pond is necessary to achieve and maintain healthy status. With all cesspools and conventional septic systems in the CRA converted to de-nites, an estimated 27% reduction is forecasted. That would not be a full fix, but it would be a big piece of the pie.

There is a growing concern within the Charlestown town council and wastewater commission, that the de-nite rule is unjust, unworkable and overly expensive, and won't produce results. They also feel that with the economic crash and a decline in home equity, many families are not able to afford the added expense and would be ruined should they be forced to install a de-nite system. Their belief is that for the amount of money that would be spent, there must be more effective and faster-acting ways to achieve results. They are quick to point out that it will take decades to upate all the systems and then years more for the polluted water in the pipeline to work through the ground. By then, they say, the ponds will be dead. They do not have any suggestions at this time on where large amounts of public funding would come from to replace the gradual private investment of homeowners installing denites.

As a result of rule 39 and the economic conditions we face, Charlestown just amended its cesspool replacement act to allow people more time to replace cesspools. Their hope is Rule 39 will be overturned and people will be able to replace cesspools with regular septic systems. In the meantime, cesspool phase out in Charlestown has been delayed.

The economic burden of rule 39 to homeowners is significant, although often overstated. It is common to hear opponents of the de-nite systems compare the cost of a traditional septic and a de-nite at $10,000 and $35,000 respectively. Reality is probably closer to $20,000 for a conventional system and $30 - $35,000 for a denite. That is still a $10 - $15,000 difference, but not the $25,000 that is often implied. It is also common to hear opponents estimate the full cost of the Rule 39 initiative by multiplying the entire cost of a de-nite system by the number of systems eventually to be installed. This produces a skewed number, because most systems replaced by de-nites would have to be replaced by a new conventional system anyway. Therefore, the more accurate way to calculate the expense is by multiplying the cost difference between the two types of systems by the number of units.

Regardless, it's still a lot of money and with incomes and home equity down, some percentage of the population would be hard-pressed to comply with the rule.

SPC Comments

- Cesspools near the salt ponds are a disaster. Often they discharge directly into ground water and even though they aren't bubbling at the surface, they are usually a failure at treating wastewater. Moving quickly to get rid of cesspools within 200 feet of the ponds is essential.

- Cesspools further inland are likely near inland waters, which have their own important roles in Charlestown ecosystems. Some of these wetlands flow into creeks and then on to the salt ponds. Cesspools have been obsolete for forty years and they should all be replaced sooner rather than later.

- Use of fertilizer and lawn chemicals should be restricted in the coastal communities.

- Green Hill Pond should be full of millions of oysters.

- Storm water management techniques, such as those suggested in the Horsley Witten report, should be utilized to reduce and treat surface water around Green Hill Pond. This would help reduce both bacteria and nutrients.

- Wastewater systems in the vicinity of Green Hill Pond and eastern Ninigret Pond should be vigorously inspected and maintained to control the bacteria problem.

- Southern Rhode Island should have its own dredging rig that regularly maintains the regions breachways

- SPC feels de-nite systems are an important tool to control nutrient pollution in areas where ground water has a profound impact on the ponds.
    - Note: The Critical Resource Area delineation traces the ridge line from which surface water drains towards the salt ponds. In some areas that line is quite far from the ponds and it is unknown to us whether treating water at those locations will benefit the ponds. DEM chose this line in an attempt to define a zone boundary that is not completely arbitrary.

- SPC is concerned about the need for maintenance with the de-nite systems, the fact that many houses near the ponds are seasonal and/or rentals, and the risk that common household cleaners might diminish the system's effectiveness

- Small regional sewer systems offer the benefit of directing sewage to a facility that is professionally monitored and maintained.

- The specification of de-nite systems has recently resulted in the approval by DEM of several building proposals on very small pond-side lots that previously had been unbuildable. This is a troubling development, which carries many of the same risks of increased development that go with new municipal sewer systems.

Salt Ponds Coalition is ready and eager to provide non-biased information regarding pollution in the ponds and to help make contacts with people and organizations that can offer insight to the issues at hand.