Nitrogen impact of onsite sewage treatment and disposal systems in the Wekiva Study Area

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INTRODUCTION

Wekiva Parkway and Protection Act

The act was signed into law on June 29, 2004. It authorizes the building of the Wekiva Parkway and provides protection to the Wekiva River system. The Wekiva River Basin Commission was established consisting of many local and state government representatives. The act requires coordination of land use and waste water supply to protect the Wekiva River.

Health of the Wekiva River

The Wekiva River is designated an Outstanding Florida Water, a State Canoe Trail, and has recently been added to the federal Wild and Scenic Rivers program. The majority of flow to river comes from Wekiwa Springs and Rock Springs. The Wekiva River and its contributing springs are sensitive to excess nitrogen. Nitrogen reduction goals have been set to protect the springs and the river.

What does wastewater have to do with building the Wekiva Parkway?

Good roads encourage development, more development results in more onsite systems. The proposed routes go through an area with a sensitive Kertz environment. The river and groundwater in the area are interconnected and sensitive to nitrogen pollution. Conventional septic systems work well at removing pathogens, but do not make much to reduce nitrogen.

2006 Legislative Mandate

In May of 2006 the Department of Health was tasked to quantify onsite system nitrogen contribution to groundwater, assess relative importance of onsite systems in comparison to other sources, and recommend cost-effective solutions. The Bureau’s Research Review and Advisory Committee was tasked with oversight of this study. The deadline for this study was June 30, 2007.

APPROACH

Field Work: What does one system contribute to the groundwater?

The provider was Ellis & Associates, Inc. They performed detailed field sampling of three onsite systems in Wekiva Study Area to determine how much nitrogen comes out of the septic tank and how much makes it to the groundwater. Samples were analyzed under the drainfield at the top of the water table. The effluent plume was also identified in the groundwater as it moves away from the source.

Some of the conclusions were:

- Effluent in septic tanks mainly fell within the expected range.
- Definite nitrogen plumes were identified, conductivity was a good tracer.
- Mass loading input of nitrogen to the drainfield was higher than expected in two out of three sites.
- About ½ to ¾ of the nitrogen input was loaded to shallow groundwater.

What categories are important to look at to determine loading from onsite wastewater systems to the groundwater?

The provider was Otis Environmental Consultants, LLC. Two performance boundaries were examined: what comes out of the tank (input) and what enters the water table (load). The flow and concentration were estimated for the load to the water table by looking at the drainage class, depth to water, and organic content in soil.

Some of the conclusions were:

- Nitrogen must be converted into nitrate first (aeration) before denitrification (food source, without air) can occur.
- Two foot separation is maintained from the bottom of the drainfield to the water table.
- Conditions where denitrification is most likely:
  - Water table no deeper than 3.5-feet below grade to allow for maximum contact with air
  - Soils with high organic content
  - Estimated nitrogen removal potential based on water table, organic content and texture
  - Cannot totally rely on soils to nitrate/denitrify
  - Estimated nitrogen removal potential in soils found in the Wekiva Study Area ranged between 0-100% with an average of 33%

CONCLUSIONS / RECOMMENDATIONS

All nitrogen contributors must work together to reduce inputs. Onsite systems are not the major source of nitrogen input, but are similar to livestock and wastewater facilities. Some of the conclusions were:

- Estimate 6% of inputs are onsite systems
- Is the contribution significant as compared to other sources?
- Is the contribution significant to reach springs protection levels?
- nitrogen impacts overall are significant. All contributing sources will need to do something to meet these goals.

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FOR FURTHER INFORMATION

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