Mini-Workshop on Planning, Regulation and Policy related to Nutrient Effects on Spring Systems

November 8, 2007

1. Discussions of Question 1 centered on 6 topics

a. Water Quality Criteria

{From FDEP personnel} Springs must meet surface water standards; currently the springs are not having problems numerically meeting the standards, but personnel are seeing ecological changes in the systems. Many springs are Outstanding Florida Waters (OFW) and they so can not drop below standards, but there are no control measures in place without a specific project to regulate the effects.

b. MFLs

Crystal Springs has had an increase in NO_3-N. Seen in all springs studied (believe these notes come from Kelly with the SWFWMD). For estuarine areas, MFLs make sure salinity zones are appropriate. Often fresh water MFLs are set for levels and velocities needed for fish. In the Alafia there are regulations for no withdraw under certain flow levels (120 cfs) because of an increase in dissolved oxygen (DO) problems and algal blooms in the downstream estuary.

MFLs are mostly <u>not</u> nutrient related.

Are there MFLs for springs? Setting them for Weeki Watchi is coming up – considering thermal refuge for manatee, changes in salinity zones, they have not identified water quality issues to address flows.

SWIM Management Plan for Rainbow River – increase in *Lyngbya* – no cause and effect - correlated to nitrogen (15-17 years ago) – looking at septic systems . . . back to the question of how do you demonstrate nitrate control leads to alleviating ecological symptoms – must demonstrate success somehow.

Sulfur Springs, Rock Springs, Wekiva Springs – questioned decreasing nitrates because the surrounding areas have urbanized (from past agricultural production), is there a link? There has been some evidence of conductivity changes when the percent contribution from different flows changes.

Question: if there are no manatees, what criteria are used to set TMDLs for springs? For manatees, use thermal needs which are seasonal in nature. Without manatee, can use a reduction in habitat availability, such as a reduction in 15% of what would historically be available for fish. This is area based but also looks at substrate, depths of water, velocity, by species. Could also use salinity changes or similar techniques as for rivers and streams. Have set minimum level for fish passage criteria.

Question: are residential septic systems a significant source contribution to groundwater recharge? SWFWMD responded that they are not a significant contribution in the Weeki Watchi

basin. Suggestions that level of contribution would be dependent on density of septic systems (e.g., 1-4 per acre could be significant).

Examples of current MFLs
? Spring (didn't catch name) – manatee access
Fanning Springs – depth
Blue Springs (didn't specify which) – depth, habitat over shoals

If flows drop below long term averages, permits can be denied.

What research is needed?
1 – We often know stage and flow, but know less (if any) about frequency
2 – Sometimes we only have flow data that may be sporadic over 30-40 years. Sometimes flows are recreated from correlations with nearby springs that have data
3 – physical habitat modeling
4 – define "significant harm" (currently using <15% of what would have been available historically)

c. TMDLs

According to state law – DO must be greater than 5 mg/L and conductivity standards must be below 1275 μmhos (or cannot exceed a 50% increase in background levels, if known). There is currently no tool for basing a spring as "impaired" for things like the presence of algal mats, increased nutrients, or *Hydrilla* spp.

For TMDLs you must find the cause – so can you determine that the pollutant load is changing the DO levels? Further, for groundwater, you expect 2-3 mg O2/L (which is approximately 20% saturation), so are there anthropogenic effects/activities that are altering the DO in groundwater? It was asked if anyone had demonstrated this . . . no one had. Another point was made that organic nitrogen loading has high oxygen demand (when converting organic nitrogen to nitrates), if COD is high you would expect a low DO naturally.

The phosphorus found in springs is generally considered to be background levels of phosphorus entering the springs and is related to latitude and longitude. But nitrogen concentrations are correlated more to human activities and not latitude and longitude.

A may be considered "impaired" according to its numbers (e.g., DO, conductance) or through legislative action (e.g., this has happened for Wekiva)

Research need: developing a tool to access biota (e.g., water hyacinth, algae, etc.)

Consideration: should separate TMDLs be set for springs?

d. On Site Treatment Systems

Septic nutrient allowances are regulated on lot size and setbacks. Loading does not follow political boundaries, so there needs to be a universal policy for springs, and not simply for septic systems. All sources must be regulated.

Marion County has new regulations for installation of septic systems.

Wakulla County had new regulation in place and one year later people were already asking when would they see the results? There are continued concerns after regulations are in place considering the costs. For example, a $3,000 system may have effluent with 35-40 mg NO_3-N/L for conventional treatment. With new performance based treatment systems (PBTS) the cost may be $7,000-$10,000 plus annual costs and maintenance and have effluent with < 10 mg NO_3-N/L. This also means builder get upset about the higher standards and higher costs of PBTS. Are the costs worth the effects? In addition, you have to pump PBTS every 5 years, and then must find a way to dispose of the biosolids.

Comprehensive, not politically based, boundaries are needed and we must act on all parts, but also noted that you must start somewhere, so why not the biggest "piece of the pie"?

In Leon and Wakulla Counties (Tallahassee is in Leon County) they are starting to take action and have nitrate controls and advanced treatment. They suggest a statewide initiative would be appropriate, considering examples such as the Suwannee Sound with pollution problems and concerns for oyster beds.

Consideration: there should be a cost/benefit analysis. For example if 30% pollution is coming from fertilizer and 6-8% from septic systems, could you consider taxing fertilizer use. This would focus on source reduction elimination as opposed to remediation (once the pollution is in place). Someone suggested a phosphorus tax in the Everglades as an example at $1,000/pound in the Stormwater Treatment Areas.

Considering fertilizer regulations – there is guidance on new development have so much turf for new lots, but it is unclear if there could be regulations on fertilizer applications – currently this is difficult to oversee. Any regulations put in place must be practical and enforceable. For example, in Sarasota and Wellington there are ordinances that ban the use of certain fertilizers. Another example was in Minnesota which has a ban on all fertilizers containing phosphorus without a soils test. Idea: could there be a Florida specific fertilizer?

The Water Management Districts (WMDs) and the Florida Department of Environmental Protection (FDEP) are proposing a stormwater rule. There were mentions of increasing open space, Florida friendly landscaping, consideration of fertilizer applications, etc. You could conduct analysis of stormwater to check compliance.

e. Ag BMPs

Suwannee River Partnership – expanded out from traditional agriculture. There is a problem in seeing the immediate effectiveness of BMPs (e.g., seeing a mixed trend in nitrate levels). Also, a question of where should we target BMPs throughout the WMDs. They are moving beyond dairy and pasture BMPs, land uses which make up the largest percentage of the landscape. Someone questioned how receptive the agricultural community is to BMPs. In the last 5-7 years, a majority of the farmers are receptive because the BMPs stretch fertilizer dollars and water

application so there are lower pumping costs. In the last two years 130,000 ac in Suwannee in vegetable and row crop farms have signed up.

South Florida has a greater concern over surface water and more phosphorus. North Florida has more concern over groundwater and nitrogen.

The question over enforcement comes back to educations (e.g., considering immigration and individuals not familiar with Florida agriculture). This is true not just for public uses but for policy makers and farmers too for BMP development – someone suggested "social marketing" of good behavior.

BUT – compliance with BMPs presumes compliance with TMDLs and avoids enforcement.
BUT – farmers adopt BMPs because they are beneficial to efficiency and productivity, especially considering the increasing costs of diesel and fertilizers.

FYI there is a list of statewide BMP manuals available.

f. Land Use

In Citrus Country – the Commission has a problem tying observable degradation in springs with what percent is attributed to what – for example, how much is from septic systems, from swine, from fertilizers, etc. They are asking for a quantitative means to link surface land uses with ecosystem symptoms. This would be a means to determine where the changed in spring ecosystems comes from. There is a pie chart showing nitrogen loading by land use in the Itchetucknee watershed by Brian Katz, USGS. A study in the Wekiva basin shows loading on land (e.g., 40% from residential fertilizer, 6% from septic systems, etc., not sure these are actual numbers so much as used to make a point), but it is not currently clear how this land loading translates to loading within springs.

Research need: correlate land use loading with the effects/symptoms on springs

2. Discussions of Question 2 centered on those 6 topics. How does or might your program address nutrients in springs?

There is a FDEP Manual (2002) on Protecting Florida's Springs

Comprehensive Land Use Plan

- Ex. Wakulla – whole county
- Marion Springs Protection Area requires advanced septic and or advanced water treatment (centralized)
- Says "protect springs," but doesn't specify how
- Focus on high recharge areas and open space
- Research needs: survey and analysis numbers needed for springs to support protection, show BMPs are working, considers time delays, and considers economic considerations

Back to cost/benefit analysis . . .

- Could offer a tax break for land uses that protects forests over pasture which removes more nitrate
- But discussion turned to unlikely nature considering current budget issues
- Ex. Green Belt Tax Credit – a county can adopt a tax exemption on local levels (this is a local control, not a state control)
- Could base a tax on nitrogen assimilation rates
- One idea in progress – tax credit for gopher tortoise habitat

SWFWMD – water permits do not address this

ERP – does look at water nutrients, but permits presume the right treatment design will meet standards (but find retention basins remove sediment, not nutrients) – but some ponds don't have clay, they have well drained sands and carry nutrients straight down to the groundwater – but the catch is you need groundwater for spring flows versus keeping it as surface water to treat nutrients – but even with this concern, we still don't know what the source of nitrogen really is

Should there be large or small treatment systems?

- Smaller ones (<10,000 gallons/day) are not consistently providing treatment and not receiving a high level of treatment versus larger systems/facilities that have higher treatment levels and can make more water available for groundwater recharge
- BUT – research has been geared at large systems, we need more development of smaller systems
- Ex. in the Keys – have a hard time meeting 10 mg N/L with small systems
- More complicated systems need more oversight and maintenance

Possible Research

- How do centralized large systems compare to small localized treatment
  - What is the tradeoff of water distribution in the watershed
  - How can smaller systems be effective
  - What are the tradeoffs associated with nutrients being dispersed throughout the landscape (smaller systems) versus centralized

- Do small systems create "anti" urban sprawl
- What effects do the increase in sewage spills with larger systems have?

Ex. Wekiva springshed
Study that looked at what nutrient level should be set in three zones around the springs, varied from 3-10 mg NO_3-N/L. Questioned what advanced water treatment levels were being done around the springs.

. . . so someone asked, what are the results? What do we see happening in the springs or groundwater where these standards have been set?

Possible Research: do we need separate water quality standards for springs? For example, there is lower DO in "old" groundwater. There may also be higher phosphorus concentrations in reference surface water sites (than springs). There is also a difference in Total Kjeldahl Nitrogen (TKN) and springs will need nitrate/nitrite not total nitrogen (TN) levels. Also, what about flows versus concentrations?

TMDLs
- Establish water quality standards
- Enforce to recharge areas and need to allocate loads from land use
- Must consider time delays
- What would you need?
  - Rules for water quality standards
  - Give targets
  - Must have well established cause and effect relationships that is scientifically established, need for public review
  - Can't be over- or under-protected
  - Need clearly defensible weight-of-evidence approach
  - If you have lab experiments you need to test them in "real" ecosystems

Question: can the legislature set standards for springs statewide? Yes, but it was suggested that a very active citizen group would be needed for this to happen

Pilot project in Marion County, passed by legislatively declared "impaired" and see how these do. With success the legislature could designate additional sites as "impaired"

Research question: how do you connect groundwater (with drinking water standards) to the surface water standards? Because this is in fact the springs interface.

Question: are there no springs designated as Areas of Critical Concern?

Research: do inorganic and organic inputs result in different influences on biota? If so, perhaps we could focus on that "piece of the pie" (from pie chart loading contributions mentioned much earlier) BUT – we don't have a great idea of "ecosystem impairment," so we might get loads, but how does that compare to symptoms?

3. Discussion regarding Barriers to Adaptive Management of Spring Systems
Since adaptive management requires acknowledgment and incorporation of uncertainty and a commitment (both intellectually and financially) to employ and evaluate management as a means of reducing uncertainty, we pose the following question: What barriers do you perceive to you or your department managing nutrient impacts on springs within an Adaptive Management Framework?

The idea is to keep your clear endpoint/goal in focus (e.g., restoration of springs to pre-1900 condition). Hypothesis based.

Also requires buy-in from all players, especially considering how you deal with uncertainty in the current political arena.

In the Florida Restoration Act springs can be "declared impaired," which requires a Basin Action Management Plan (BAMP). This requires revisiting the plan every five years until the management plan goals are met. There is the ability to adjust the TMDLs and plans until standards are met, but it is unclear if this is done in practice as revising TMDLs is complicated. This five year revisit requires people to have an open mind to new evidence and includes experimental design, though again it was unclear on how exactly this fit in.

Florida Springs Task Force 2000
- Presents 12 protection strategies (e.g., land acquisition, funding, etc.)
- Weaknesses: land use planning, regulation (almost no progress, except Wakulla has passed regulations for stronger septic tank systems)
- Legislation needed for regulation and also public education

Reuse water could solve some problems
. . . spread out nutrients, spread-out assimilation
Major barrier = no infrastructure/plumbing
Need comprehensive, multi-agency action and foresight before areas are built-out

Need results in election cycles (e.g., four years for the county commission) – larger issues (at larger time scales) must come from the state level, because the rate of turnover of rule makers at the local level is too fast. This highlights a need for a top-down approach that is comprehensive.

Also, the local government may lose an election cycle or easily "unadopt" a policy if it is not politically favorable, so any sense of permanence would come from the state level (or at a minimum a regional approach ?WMDs).