Afternoon Breakout
Regulatory / Science

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What was to be covered:

- Ranking testable hypotheses
- Linking science and policy
- Funding needs/funding sources
- Policy instruments

The larger issues is . . . why are springs changing?

1. Trophic level changes
2. Toxicity – build-up of compounds in anoxic conditions (e.g., H_2S, NH_4)
   An example – when *Vallisneria* dies off and *Lyngbya* takes over
   Sediment cycling, especially what happens in the anoxic zone
3. Nutrients
4. Direct human interaction
   What are the implications of our management choices?
   Physical disturbance is a concern – trampling by recreational traffic

Ideas on Testable Hypotheses . . .

1. Select sites with good water quality and a gradient of human physical disturbance (e.g., Silver Glen, Wekiva) – keep people out of ¼ of the area to remove the physical disturbance. This tests the hypothesis that physical disturbance is the primary reason for declines in macrophytes.

2. Experimental design

* . . . that would have different densities of algae, grazers, etc. Test what is the optimal density of each component for community stability? Within the mesocosms, perhaps you could adjust flow, water chemistry, etc.
* . . . perhaps try this in 'high quality' environments first or implement the paired springs approach (reference versus paired impacted) or do so in multiple springs
* . . . may be important to look at springs that are NOT changing and ask why?
* . . . perhaps Itchetucknee would work because it has different smaller springs that are feeding in (e.g., Mission Springs) – make enclosures and add grazers

3. further classify springs based on chemistry, biota, etc. suggested that Bulletin 66 does this, but could expand based on recreational impact that seems to be missing

There is some data available from B. Knight and R. Mattson where they have collected a series of co-variables. The methodologies applied (one time whole system survey and ecosystem metabolism studies) suggest that some of these questions may be answerable

in just a few years of intensive study. Some places that have been studied in this fashion include: Wekiva, Rock Spring Run, Alexander, ?Juniper.

How much money has been spent?
~$1M to date on Wekiva
~$1M Blue Springs/Volusia Blue – for manatee research: a project will be starting soon with Wetlands Solutions, Inc. on this system. NO_3 has tripled in recent years – this project may be tied into MFL (Minimum Flow Levels) work

4. There was a consensus that there is a lack of understanding regarding natural background variation in spring systems such as flows, nutrients, community composition (i.e., SAv, algae, etc.). We need to understand temporal variation of natural background systems over the long term, 5 years, 10 years, longer? Suggested that we could select 3 springs across some gradient . . . salinity, nutrients, reference, etc.

Suggested data exists on dye trace studies on Wakulla, which could make it a decent choice as a field laboratory site, this areas has lower algal growth but lots of *Hydrilla*.

Another suggestion may be to remove nutrient rich organic sediments – test whether you can "reset" the biotic community compositions.

POLICY IDEAS

1. We need to answer the fundamental question: what does a policy maker NEED to know?
    A. Cause partitioning → physical → chemical → etc.
    B. Scientific quantification needed to address what is the level of impairment and how to "fix" it – something that is simple, legally defensible, and cost effective

2. Overall, we need more interaction with regulators – this will help us know what they need and how they need it.

Future Prospects . . .

1 – Water Institute symposium in spring
2 – Seminar with policy makers before that
3 – Need to collect data to validate management activities