UF-SJRWMD Silver Springs Report

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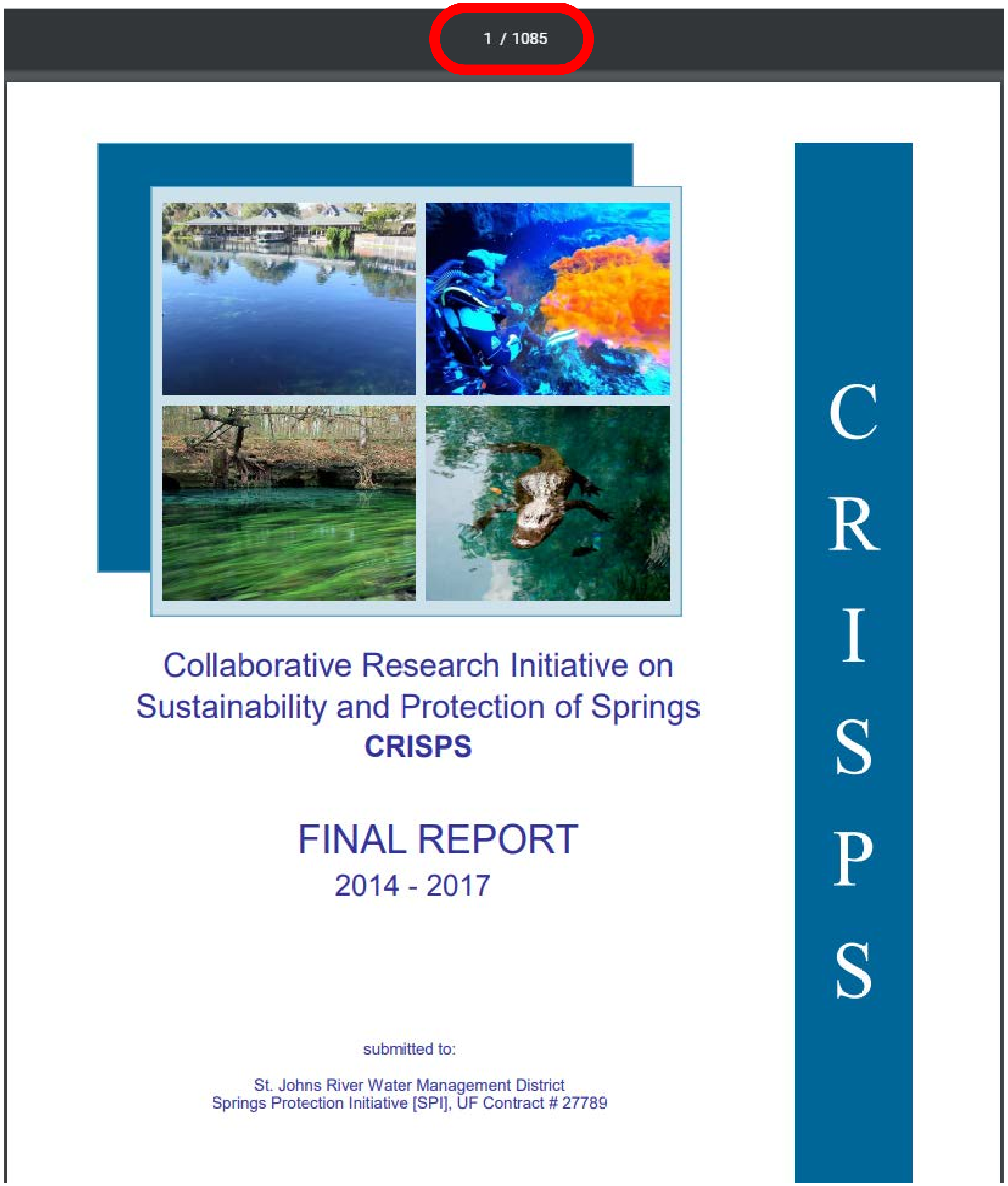


Three Objectives

1. Improve the scientific foundation for management of nitrate loading to springs.

2. **Evaluate whether a reduction in nitrate alone will be sufficient to restore the desired plant community structure.**

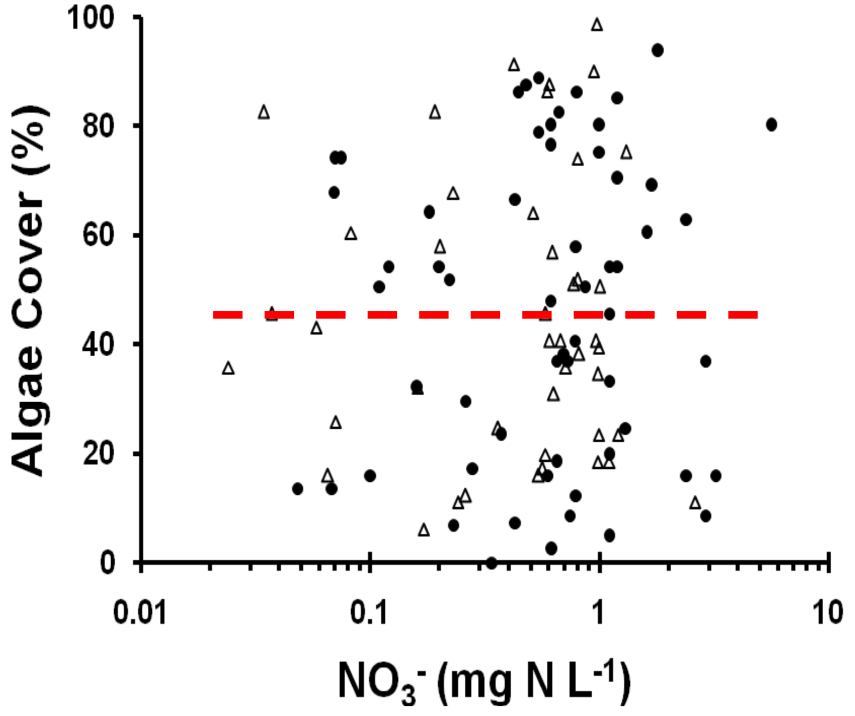
3. **Assess the influence of alternative drivers of plant community structure.**

Dr. N. Reaver

Objective 2. Nitrate reduction alone is unlikely to restore plant community structure.

Primary Production & Nutrient Limitation

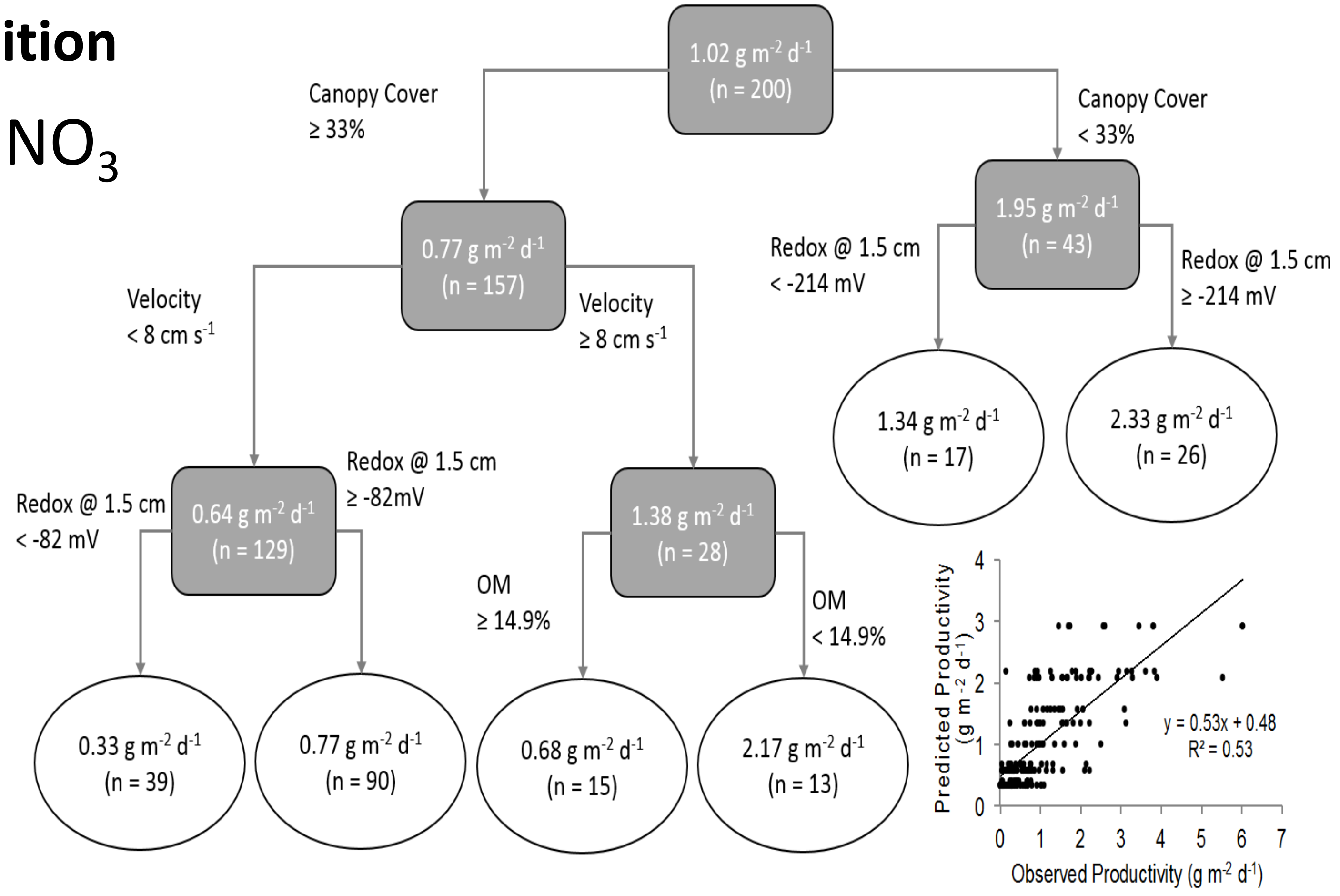
- Algal cover **uncorrelated** with [NO_3] (Stevenson et al. 2004)
- Primary production (GPP) **uncorrelated** with [NO_3]
- Plant tissues **ignore** variation in [NO_3] availability (Nifong et al. 2015)
- *In situ* NO_3 dosing doesn't stimulate algal growth **or** GPP (Silver **or** Alexander)
- *In situ* NO_3 depletion doesn't inhibit GPP
- Total N demand in Silver River (5 km) ~**1.2%** of supply



Objective 2. Nitrate reduction alone is unlikely to restore plant community structure.

Submerged Aquatic Vegetation Inhibition

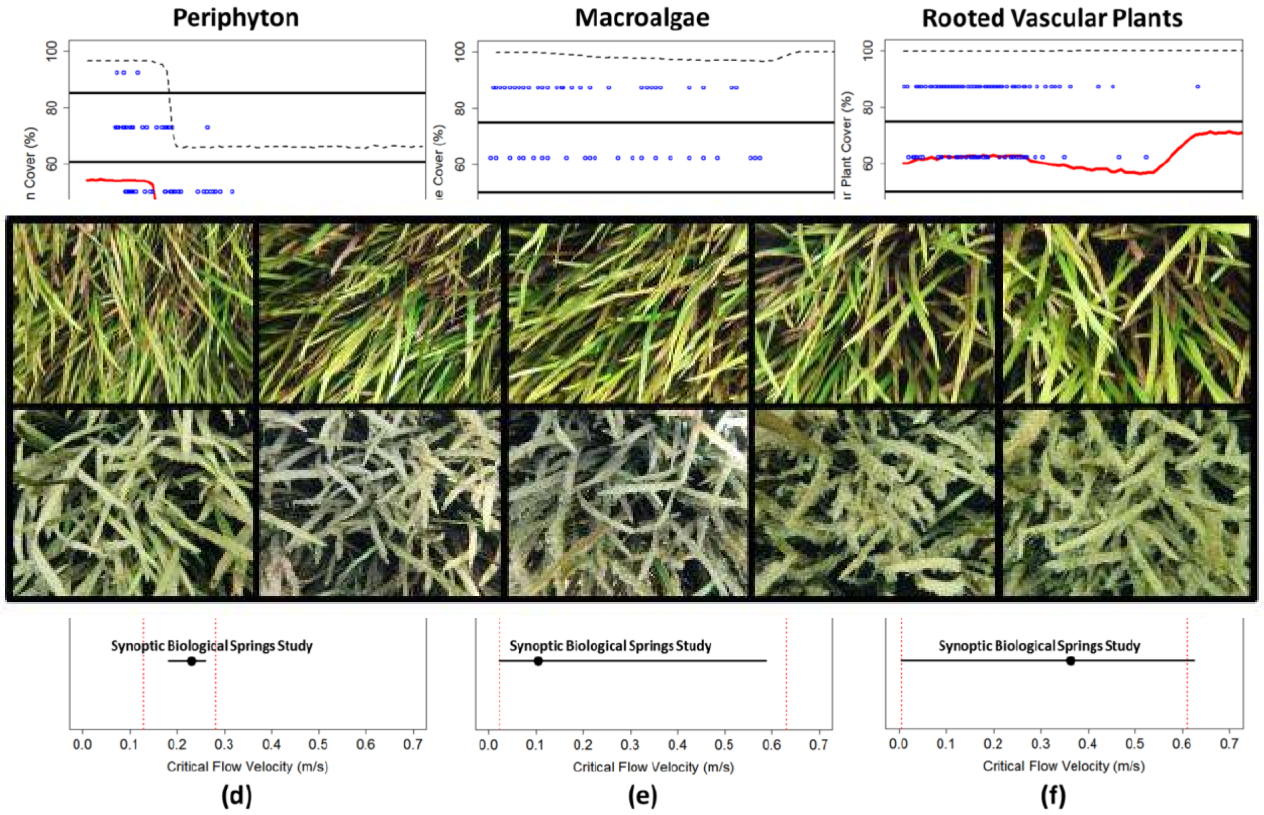
- SAV growth uncorrelated with NO_3
  - No stimulation
  - No inhibition
- SAV growth controlled by:
  - Light
  - Sediment redox potential
  - Organic matter content
  - Phosphorus (inhibition)
  - Velocity (enhancement)



Objective 3. Strong support for hydraulic controls on epiphyton (not macroalgae).

Flow Velocity Effects

- Turbulence-induced self-cleaning of SAV at ~ 22 cm s^{-1}
- Flow-velocity reductions increased epiphyte biomass
- Rapid recovery (no hysteresis) when velocity restored

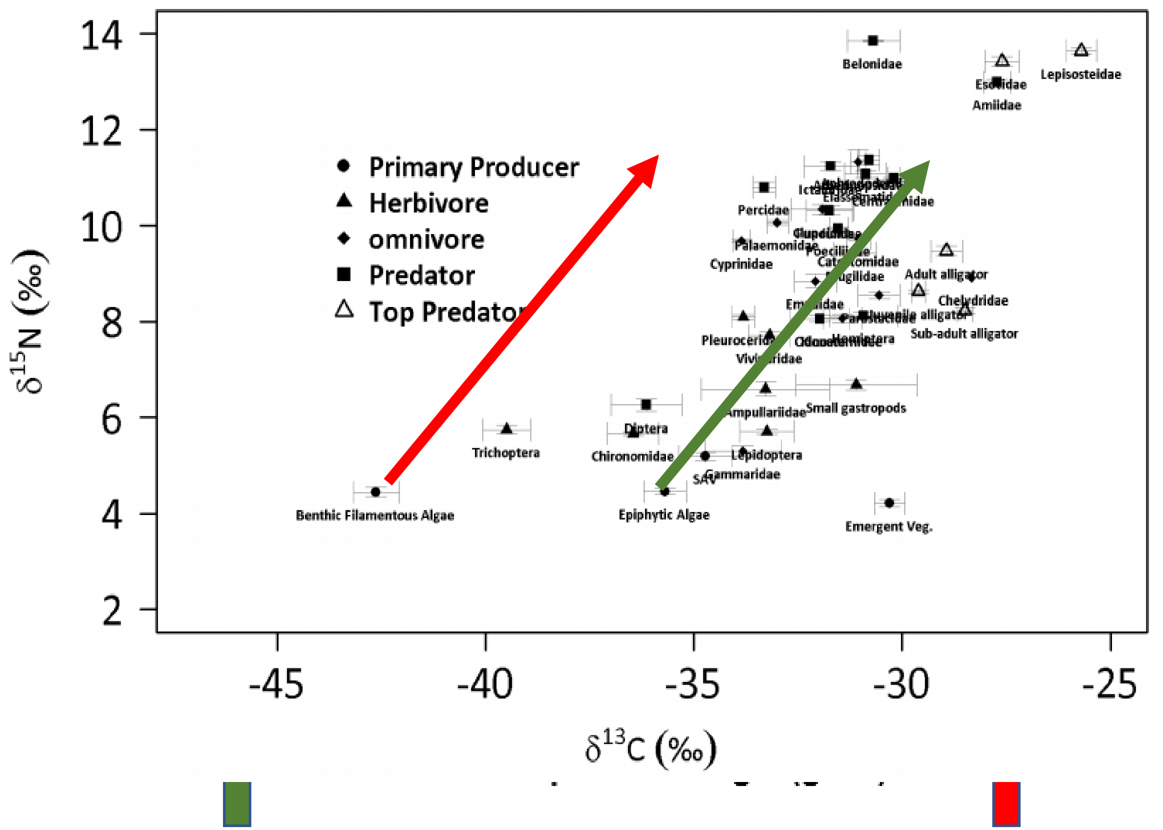


Reaver (2018)

Objective 3. Weaker support for trophic cascade (grazer effects) on macroalgae

Top-Down Controls

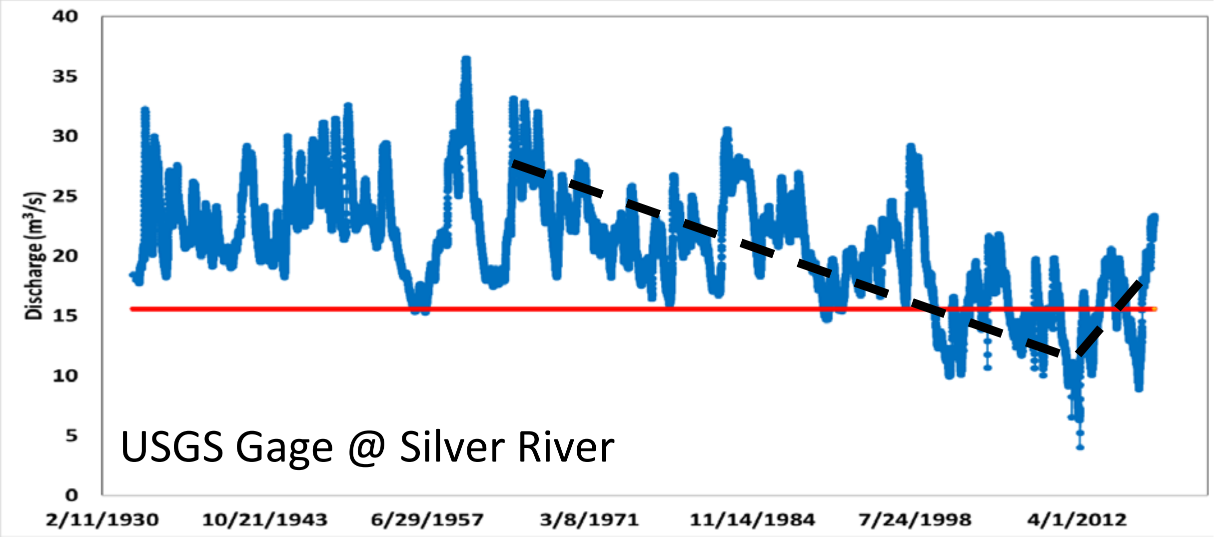
- Strong controls previously observed for periphyton (Liebowitz et al. 2018)
- Food-web evidence that macroalgae are a trophic “dead end”
- No evidence of predator exclusion effects on algal grazers

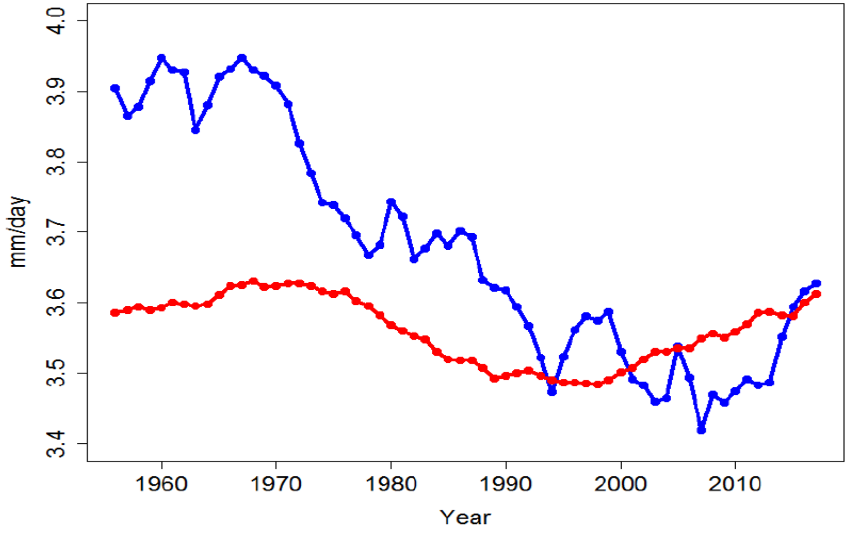


Current Density

Historical Density

Flow Changes in Silver Springs (and beyond)





Reaver (2018)

- Causes
  - Climate variation (and change)
  - Pumping (local, regional)
  - State-change in channel friction
- Consequences
  - Flow velocity
  - Flow reversals

Period	Number of Events	Total Days
80-84	0	-
85-89	1	3
90-94	1	26
95-99	5	205
00-04	14	293
05-09	14	253
10-14	16	330

Hensley and Cohen (2017)