SJRWMD Springs Protection:
Solving Scientific Mysteries and Developing Effective Solutions

Silver Springs BMAP Meeting
September 2013

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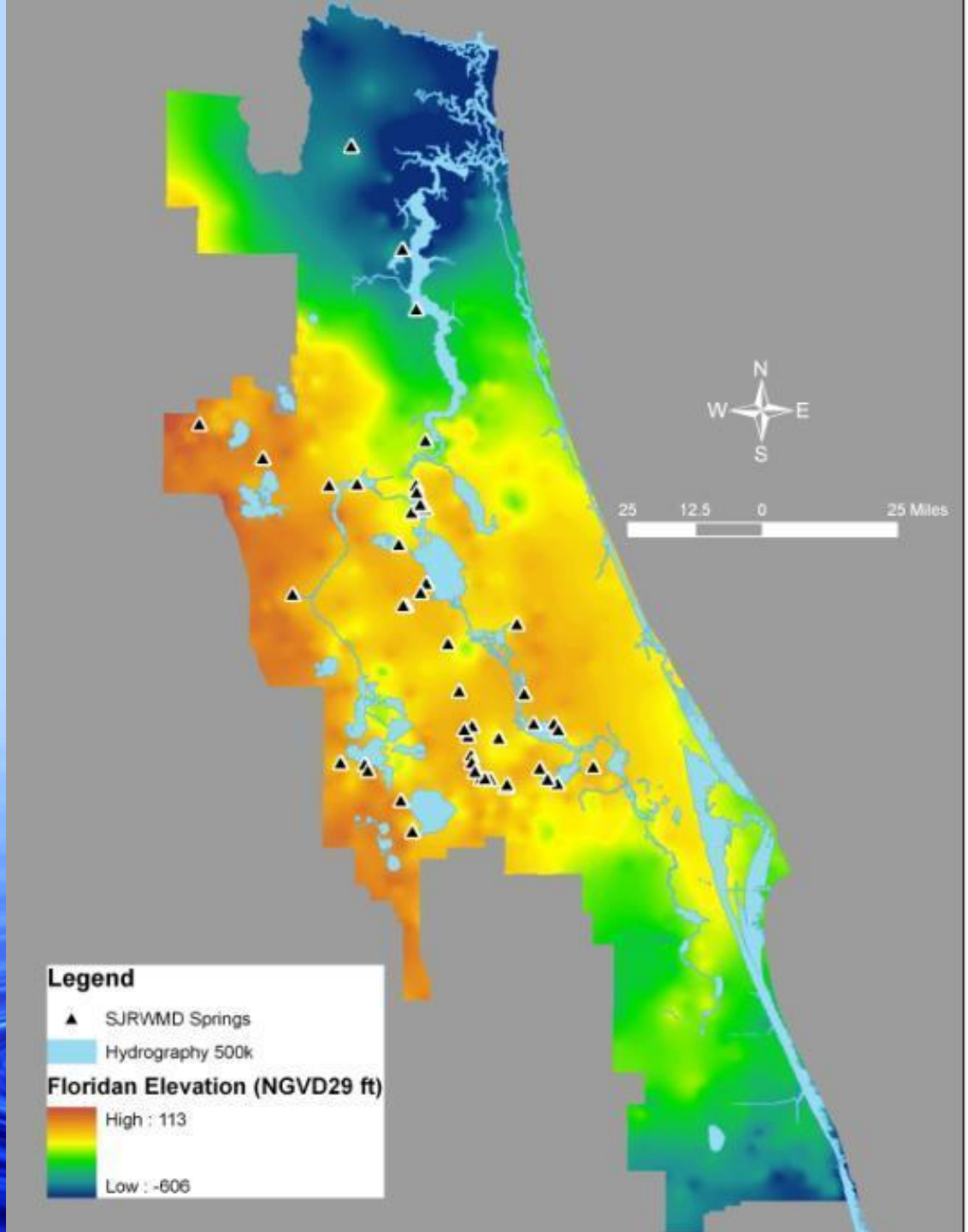
Leader, Springs Protection Initiative

Presentation Outline

I. Springs Overview
   - Geomorphology, Ecological Value and Economics
II. Restoration Challenges and Goals
III. Springs Protection Initiative
   - Science
   - Restoration Projects
   - Regulatory Support
   - Water Supply Planning Support
   - Outreach

Occurrence of Springs and Geomorphology

Springs are concentrated where the Floridan aquifer is closest to land surface and/or is unconfined.



Selected SJRWMD Springs

Volusia Blue Spring

Wekiwa Springs

Rock Springs

Alexander Spring

Juniper Spring

Silver Glen Springs

Ecological Values of Springs

- Extensive SAV beds (important stream habitat)
- Thermal refuge (manatee and striped bass)
- Endemic fauna (hydrobiid snails, cave fauna)
- Maintain stream baseflows during dry season
- Landscape-scale diversity (mesic/aquatic habitat "islands" in terrestrial landscape)

Procambarus horsti
(*www.floridasprings.org*)

Economic and Historical Values of Springs

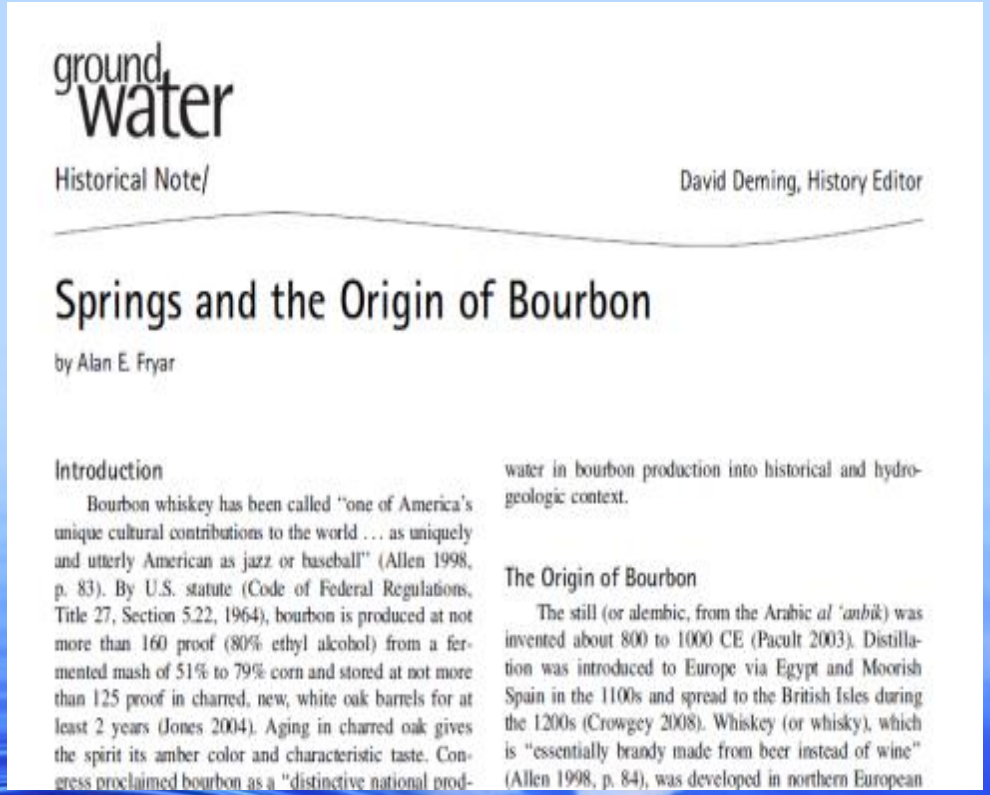
- "Original" Florida tourist attractions
- Centerpiece of a number of major state parks
- Generate millions in economic activity for local economies

Silver Springs 1890s

Weeki Wachee 1946

Economic and Historical Values of Springs

- Cultural and historic significance (Green Cove Springs, DeLeon Springs, White Springs, Worthington Springs)
- Archaeological significance (native American settlements; prehistoric fauna remains)



ground water

Historical Note/ David Deming, History Editor

Springs and the Origin of Bourbon

by Alan E. Fryar

Introduction

Bourbon whiskey has been called "one of America's unique cultural contributions to the world . . . as uniquely and utterly American as jazz or baseball" (Allen 1998, p. 83). By U.S. statute (Code of Federal Regulations, Title 27, Section 5.22, 1964), bourbon is produced at not more than 160 proof (80% ethyl alcohol) from a fermented mash of 51% to 79% corn and stored at not more than 125 proof in charred, new, white oak barrels for at least 2 years (Jones 2004). Aging in charred oak gives the spirit its amber color and characteristic taste. Congress proclaimed bourbon as a "distinctive national prod-

water in bourbon production into historical and hydrogeologic context.

The Origin of Bourbon

The still (or alembic, from the Arabic *al 'anbik*) was invented about 800 to 1000 CE (Pacult 2003). Distillation was introduced to Europe via Egypt and Moorish Spain in the 1100s and spread to the British Isles during the 1200s (Crowgey 2008). Whiskey (or whisky), which is "essentially brandy made from beer instead of wine" (Allen 1998, p. 84), was developed in northern European

Restoration Issues

Restoration Challenges

- Springs of Florida exhibit a diversity of flow, water chemistry and biota. They are important ecologically, historically and economically to the state.
- Many springs are exhibiting significantly higher levels of nitrate and “salinization” — increased levels of dissolved minerals and salts.
- A number of springs are exhibiting declines in flow from historic levels.
- There are evident changes in spring ecology, including increased algal growth, declines in native SAV, increases in exotic SAV, and alterations of aquatic fauna.

Goal

Ensure springs have adequate flows, maintain good water quality, and sustain healthy biological communities

Crucial Health Components

- Water Quality
- Velocity/Flow
- Biological Integrity
- Disturbance and Invasive Species

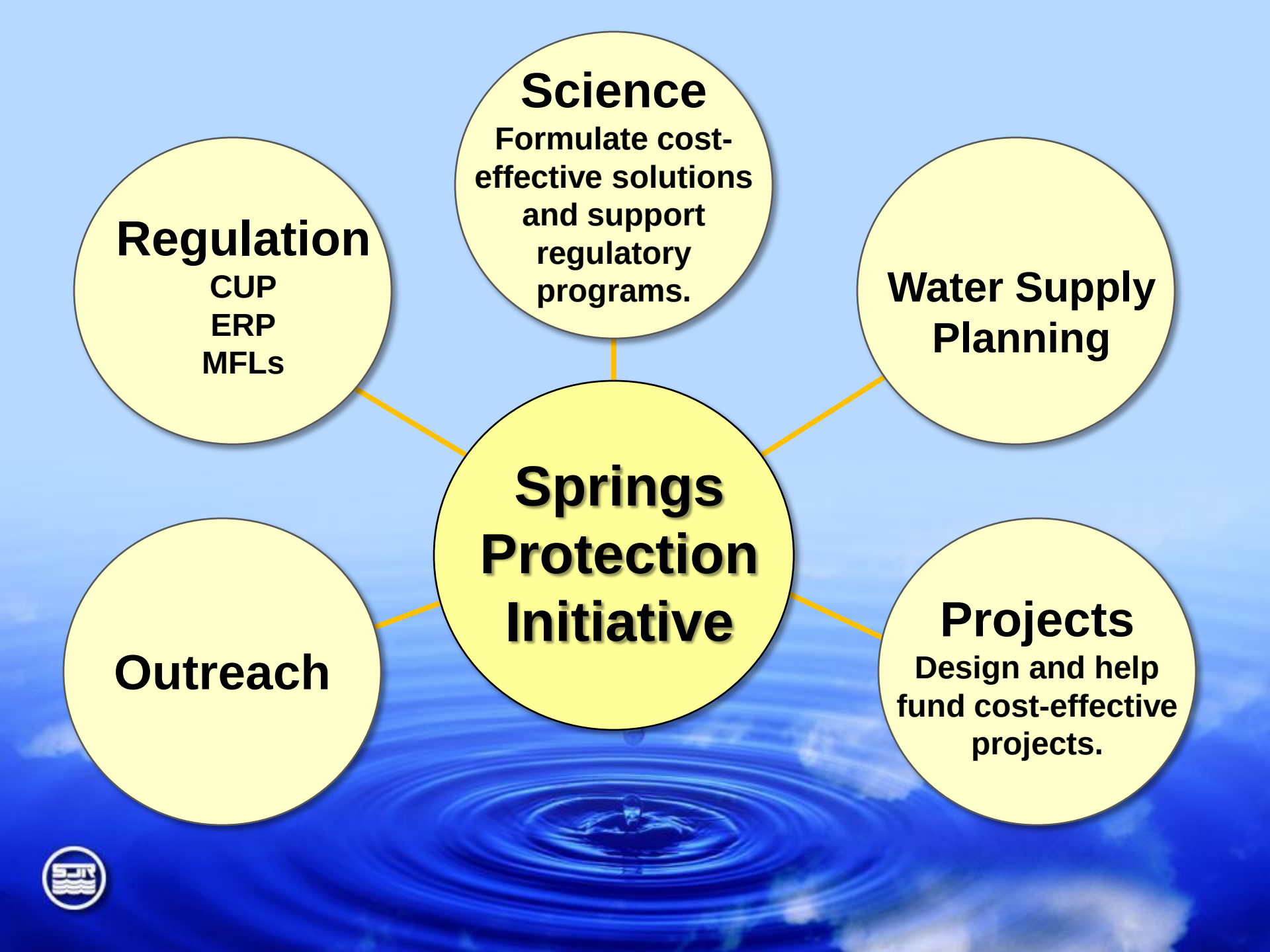
Sustaining Springs

- Sensitive to declining aquifer levels
- Sensitive to activity in recharge areas
- Sustain rivers
- Economic value

Springs Protection Initiative

The Springs Protection Initiative will utilize District resources to develop and coordinate the protection and restoration of major springs.

- **A priority under the District's core missions, addressing water quality and natural systems components**
- **Identified in the District's *Strategic Plan***


Science
Formulate cost-effective solutions and support regulatory programs.
Regulation
CUP
ERP
MFLs
Water Supply Planning
Springs Protection Initiative
Outreach
Projects
Design and help fund cost-effective projects.

The Problem

Ecological structure and function have changed in many springs.

- High nitrate concentrations
- Less aquatic vegetation
- Blooms of attached algae
- Lower fish abundance
- Impaired ecosystem metabolism

The springs are indicators of the state of the aquifer.

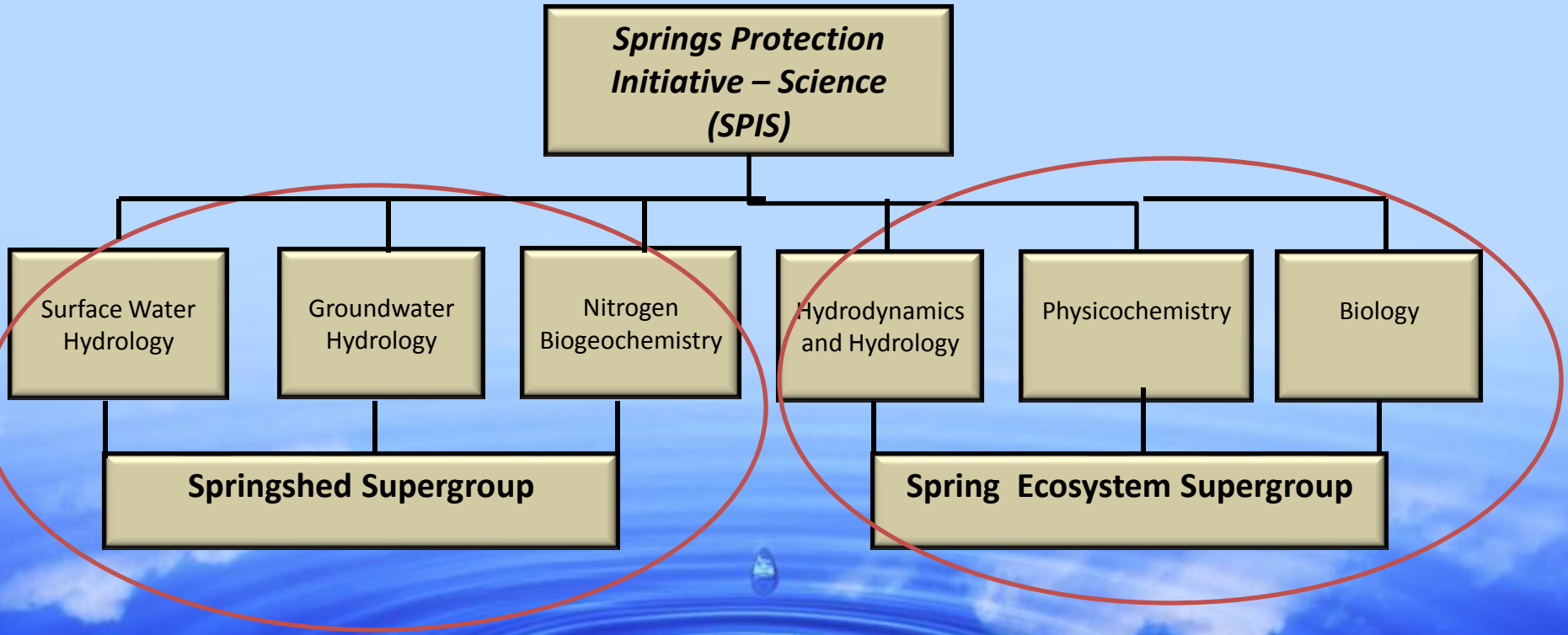
Science Objectives

- Improve the scientific foundation for management of nitrate loadings to spring ecosystems.
- Evaluate whether nitrate reduction alone will be sufficient to restore the balance between attached algae and aquatic vegetation in spring ecosystems.
- Assess the relative influences and manageability of the various drivers controlling the balance between algae and aquatic vegetation.

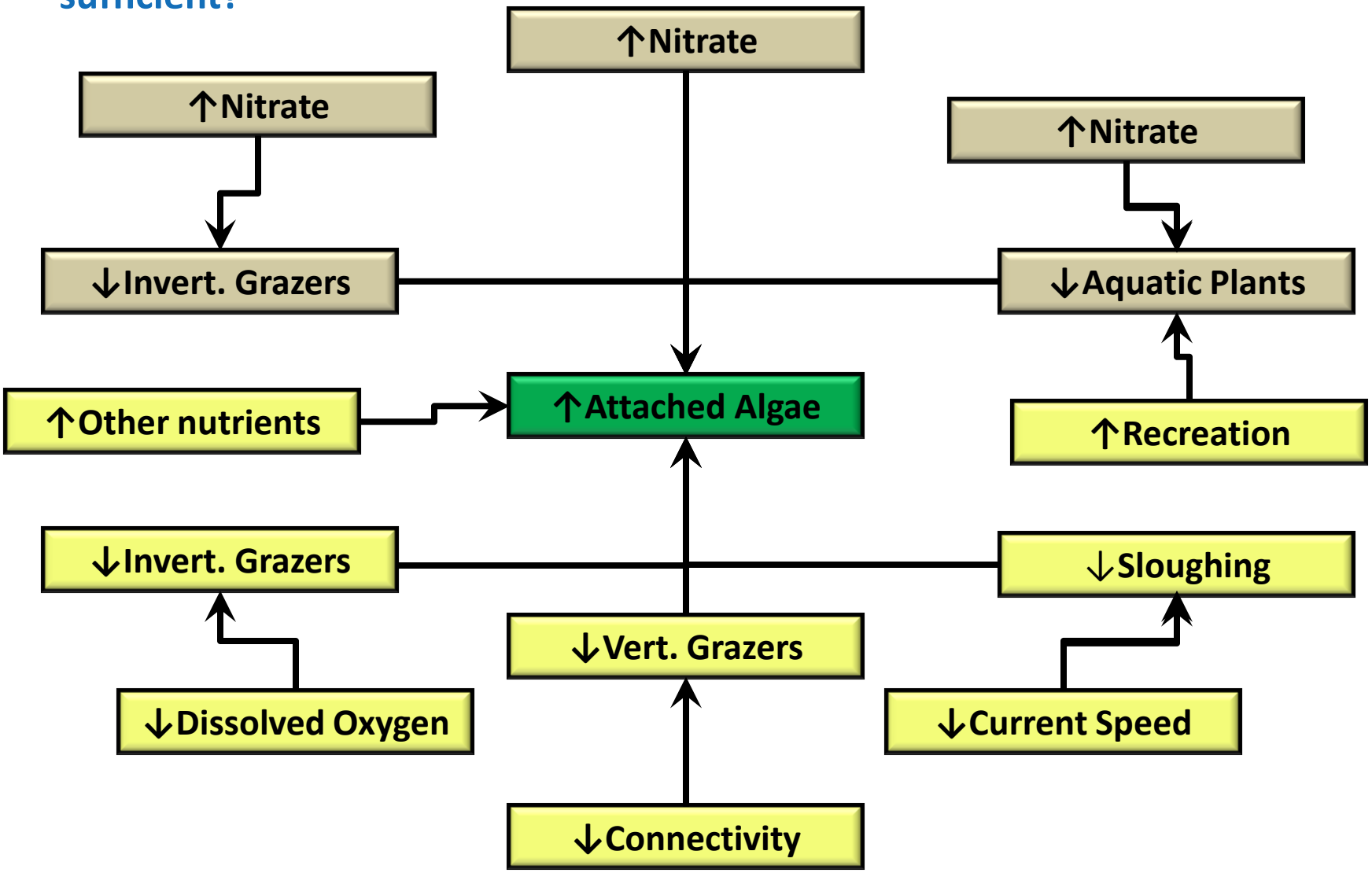
Science Approach

- Assemble a scientific team organized into work groups.
- Conduct an interdisciplinary study of one or more springs systems.
- Develop a suite of empirical and mechanistic models for evaluation of the potential benefits of various management options.

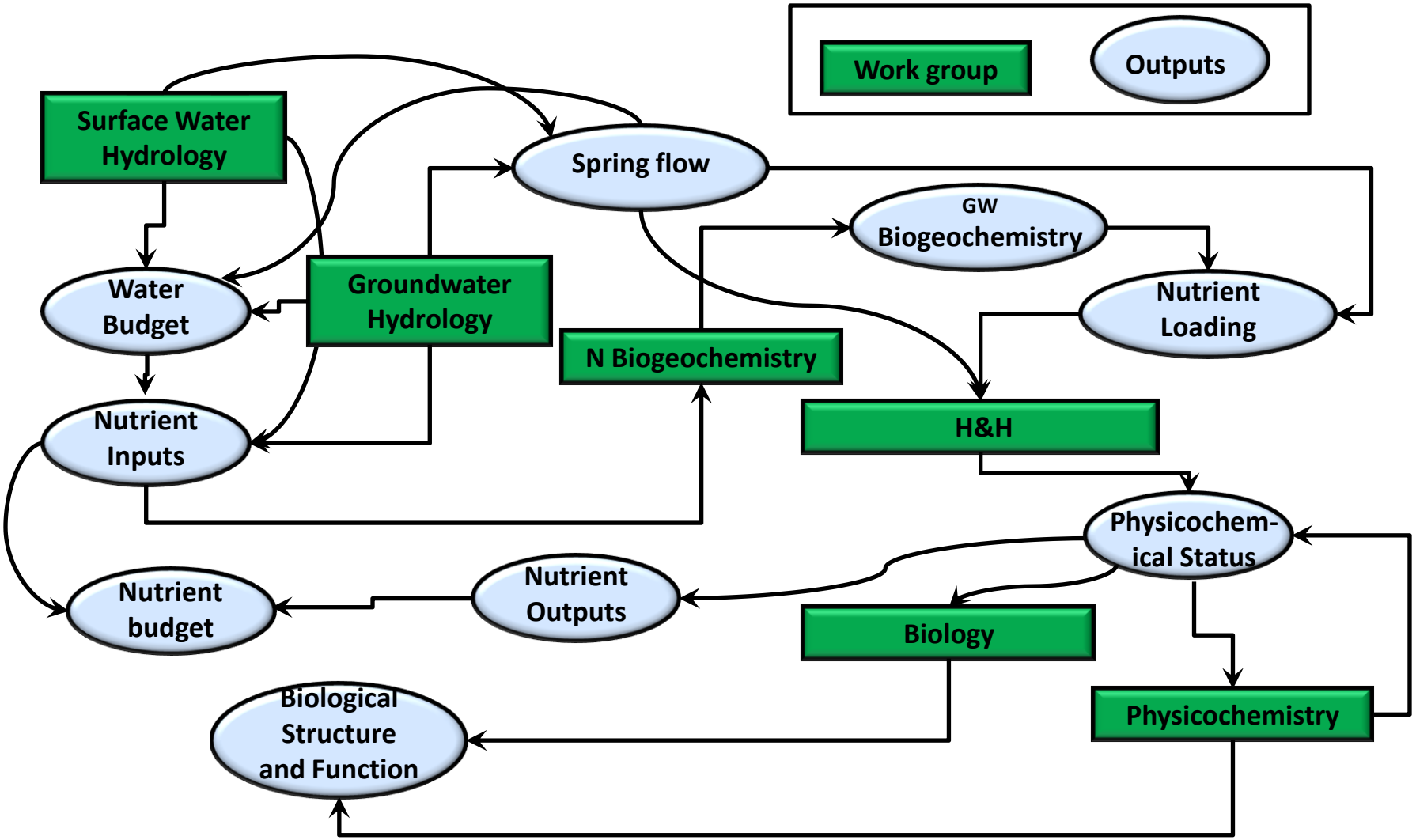
Scientific Team Organized into Work Groups



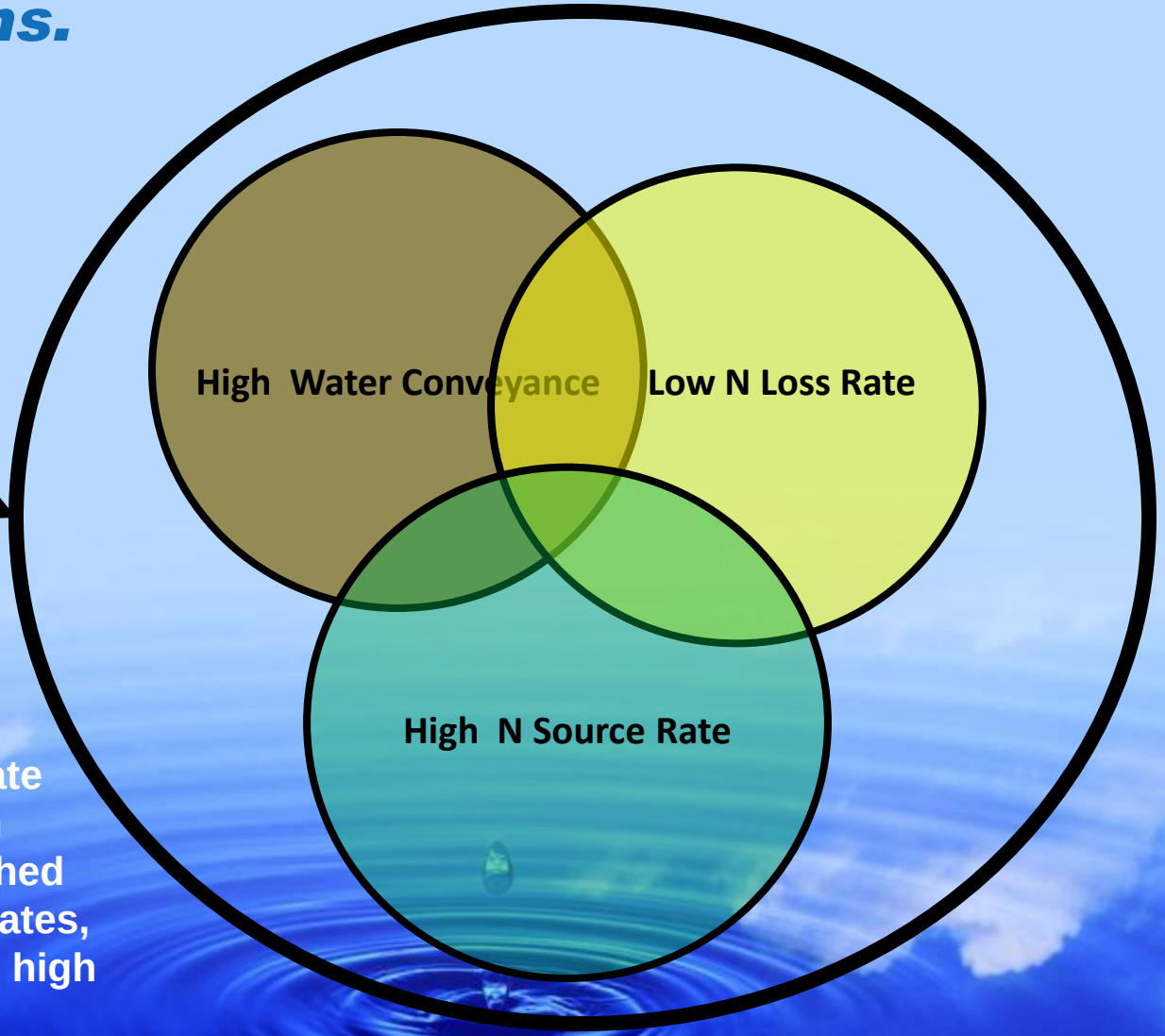
Objective: Evaluate whether nitrate reduction alone will be sufficient to restore the balance between benthic algae and aquatic vegetation in spring ecosystems. Nitrate reduction is necessary, but will it be sufficient?



Work groups, workflow, outputs

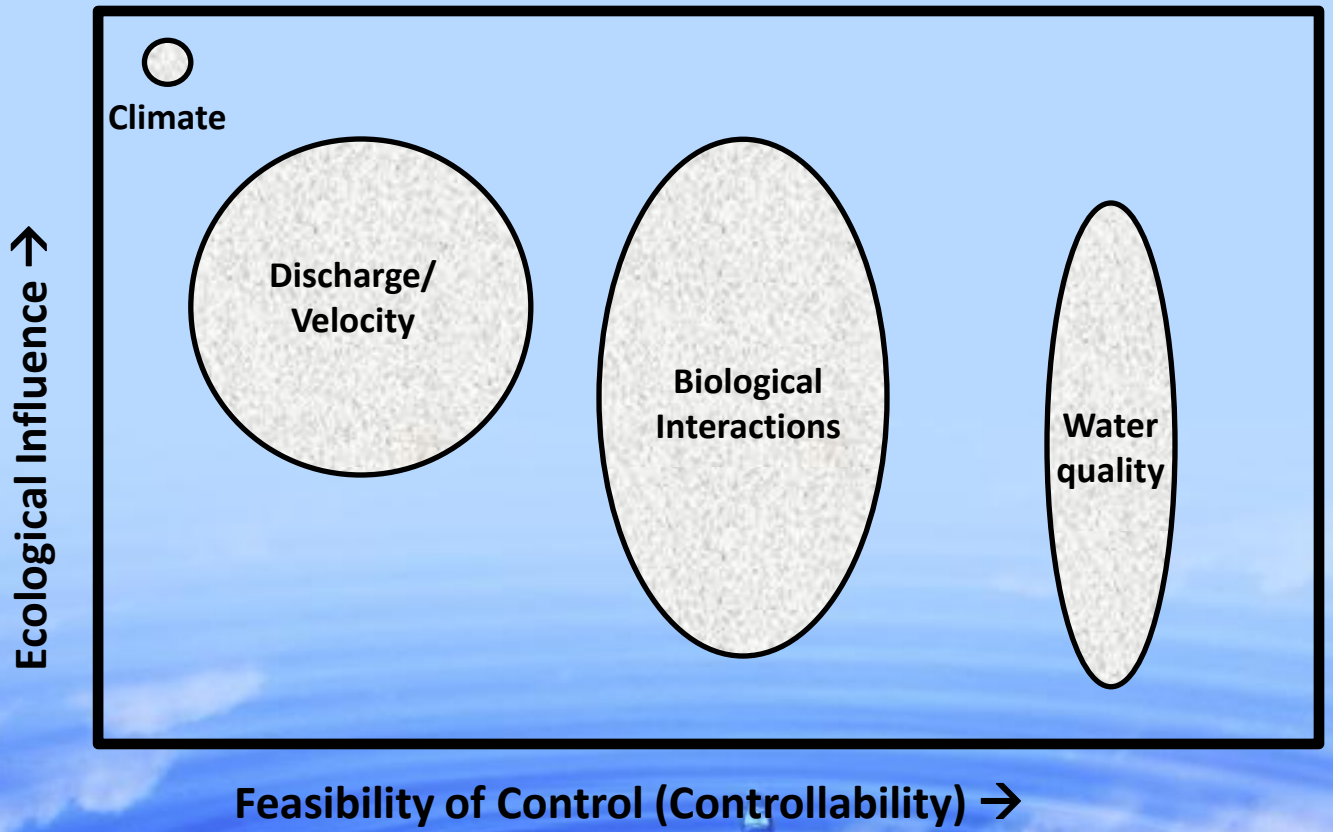


Objective: Improve the scientific foundation for management of nitrate loadings to spring ecosystems.



Cost-effective management of nitrate loads: Will focus on areas of the springshed with high N source rates, low N loss rates and high N conveyance rates.

Objective: Assess the relative influences and manageabilities of the various drivers controlling the balance between attached algae and aquatic vegetation.



If nitrate reduction is insufficient, or economically infeasible, then management of other drivers may be necessary.

Note: The scalings shown here are illustrative only. They do not represent scientific conclusions.

Restoration Projects

Implementation projects based on current understanding and conventional wisdom.

Funding Options: Various funding sources are available to leverage springs restoration work.

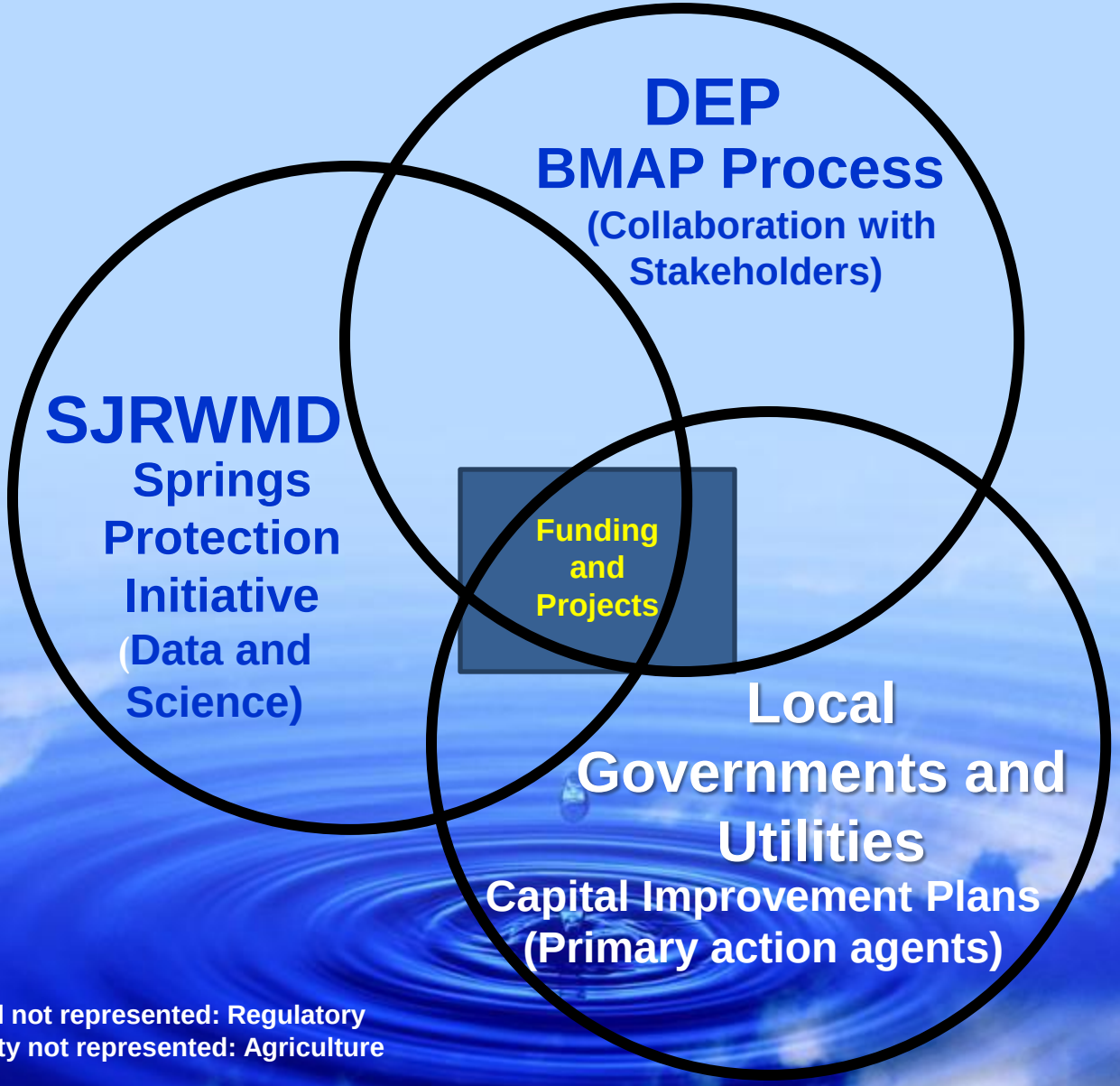
- **Significant District cost-share funding**
- **Legislative appropriation for St. Johns River restoration/springs projects**
- **Working with DEP to identify additional projects for state funding**

Restoration Projects *(cont.)*

Project types: Primarily pass thorough to LG's and Utilities

- Reuse projects that offset groundwater withdrawals
- Effluent relocation projects that move effluent disposal from short-term capture zones and/or conduits
- Wastewater Treatment Plant (WWTP) upgrades or associated wetland/media treatment components in most critical locations
- Stormwater treatment projects and/or upgrades in key areas

Springs Restoration



Key tool not represented: Regulatory
Key party not represented: Agriculture

Springs Projects Funded with DEP Appropriation

City of Ocala WRF 2 Nutrient Reduction Plan

Springs Projects Funded with DEP Appropriation

City of Ocala WRF 2 Nutrient Reduction Plan

- Total project cost: $12,144,000
- DEP: $ 1,920,000
- SJRWMD: $ 1,920,000
- Partner: $ 8,304,000
- Spring benefit: Silver Springs
- Scope: Upgrade existing WRF to advanced treatment to significantly reduce nutrient loads and improve spring water quality.

Springs Projects Funded with DEP Appropriation

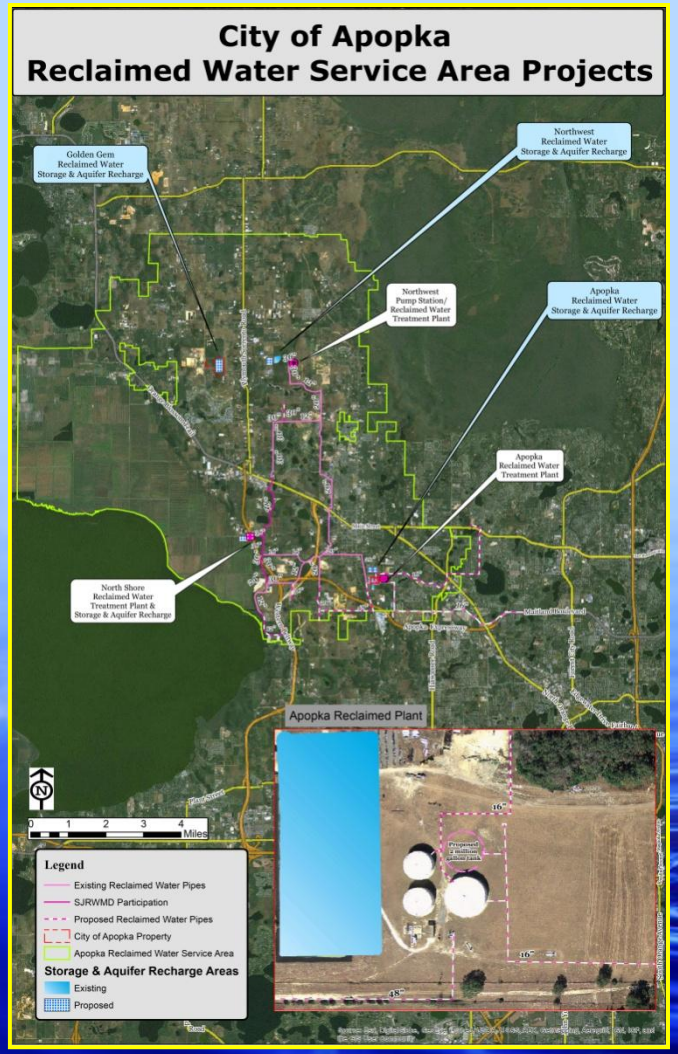
Marion County Silver Springs Shores Reuse

Springs Projects Funded with DEP Appropriation

Marion County Silver Springs Shores Reuse

- Total project cost: $ 8,223,738
- DEP: $ 1,596,000
- SJRWMD: $ 1,596,000
- Partner: $ 5,031,738
- Spring benefit: Silver Springs
- Scope: Upgrade existing WWTP at Silver Springs Shores to reclaimed water effluent standards. Reclaimed water will be pumped to two golf courses rather than disposed of close to the spring.

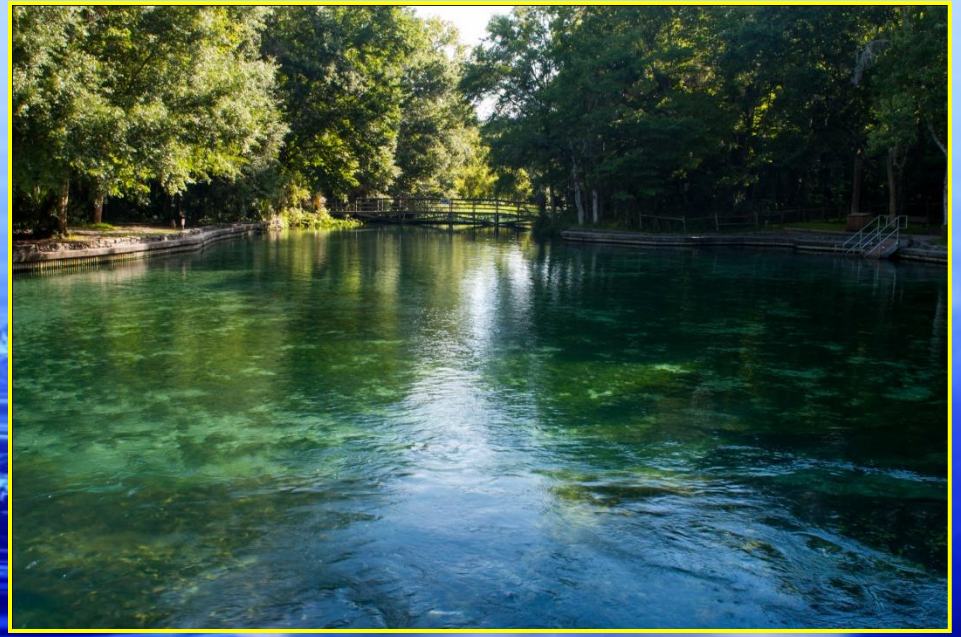
Springs Projects Funded with DEP Appropriation



City of Apopka

Keene Road

RW Transmission



Springs Projects Funded with DEP Appropriation

City of Apopka Keene Road RW Transmission

- Total project cost: $ 3,503,520
- DEP: $ 700,704
- SJRWMD: $ 700,704
- Partner: $ 2,102,112
- Spring benefit: Wekiwa Springs
- Scope: Construct 48” RW transmission main to expand the City’s reclaimed water service into a high recharge area for Wekiwa Springs and Rock Spring, which feed the Wekiva River.

Other Springs Projects

- City of Sanford and Volusia County Reclaimed Interconnect
- West Volusia Water Suppliers
  - DeLand Reclaimed Water Retrofit, Part B and Wiley Nash WRF Upgrades
  - Doyle Road Reclaimed Water Interconnect
  - Reclaimed Water Interconnect Project #2-A

Regulatory Support

Scientific findings, models and other tools will be made available for future permitting efforts and BMAP development.

- **Consumptive Use Permitting (CUPs)**
- **Environmental Resource Permitting (ERPs)**
- **Minimum Flows and Levels (MFLs)**

Both MFL refinement and development of Prevention and Recovery Strategies

Water Supply Planning

Scientific findings, models and other tools will be made available for future water supply planning efforts.

Outreach

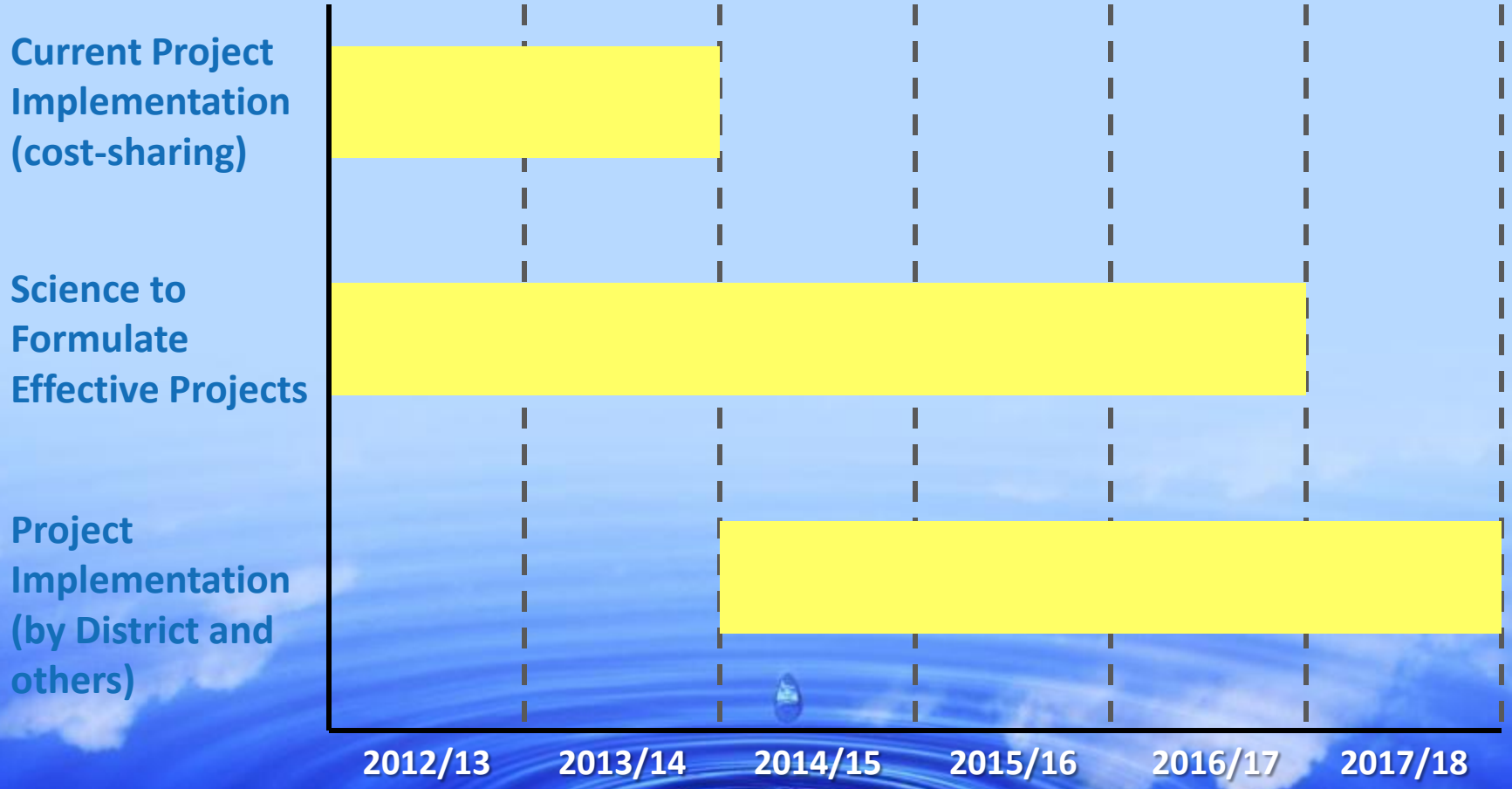
Ensure that stakeholders are kept apprised of the Springs Protection Initiative's activities and scientific findings and are provided timely opportunities to engage in the exchange of information to enhance the formation of policies to protect and restore the region's springs.

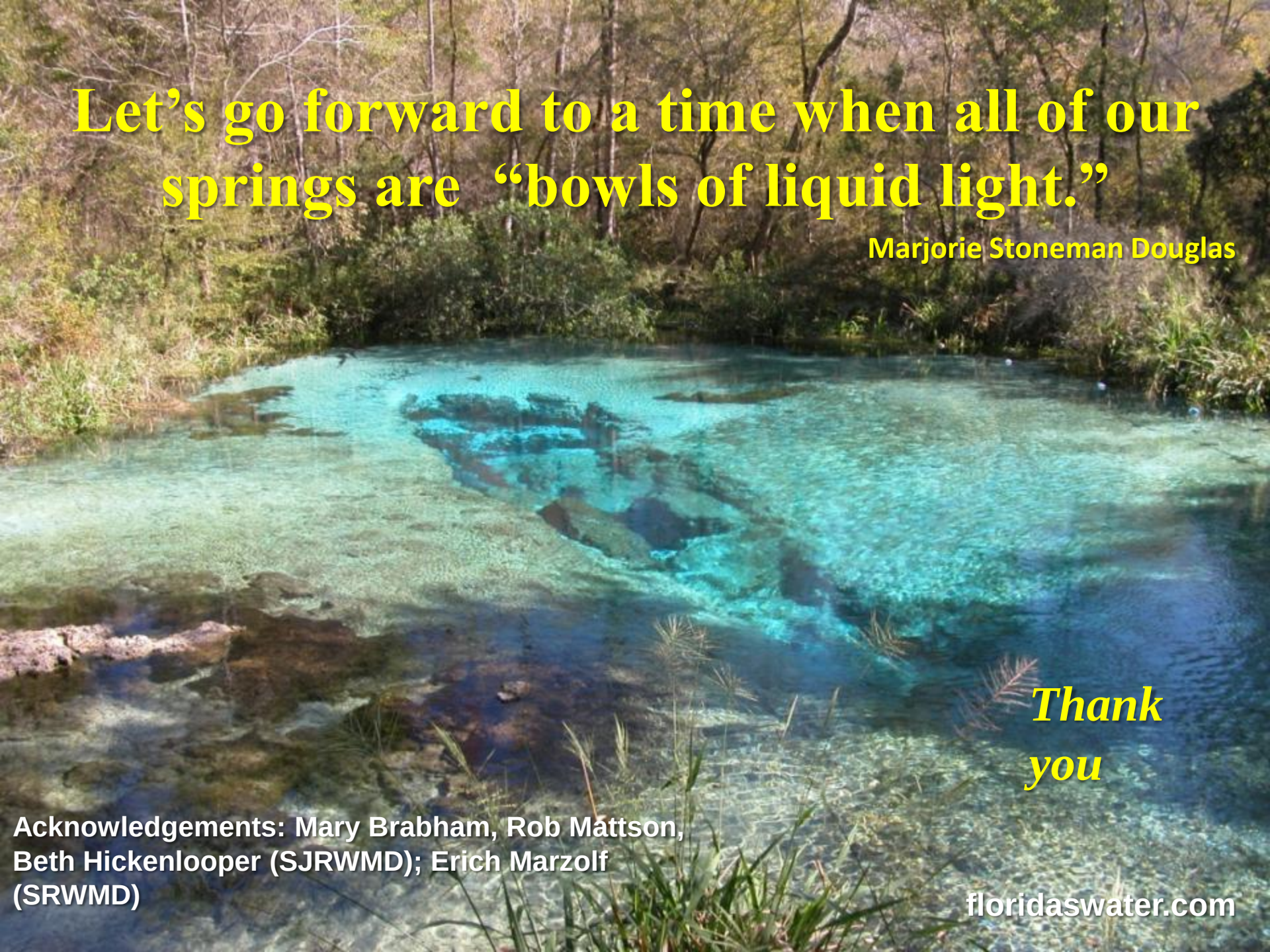
Commitment

- **Schedule**
  - Science: Three-year work plan
  - Projects:
    - Current and ongoing
    - Adjustments based upon scientific findings
- **Budget**
  - Science work plan >$3 million over 3 years
  - Project funding as available: Cost-share + State funds + Partner match
- **Staffing commitment**

  Substantial: 10-15 dedicated FTEs

Schedule of Science and Projects





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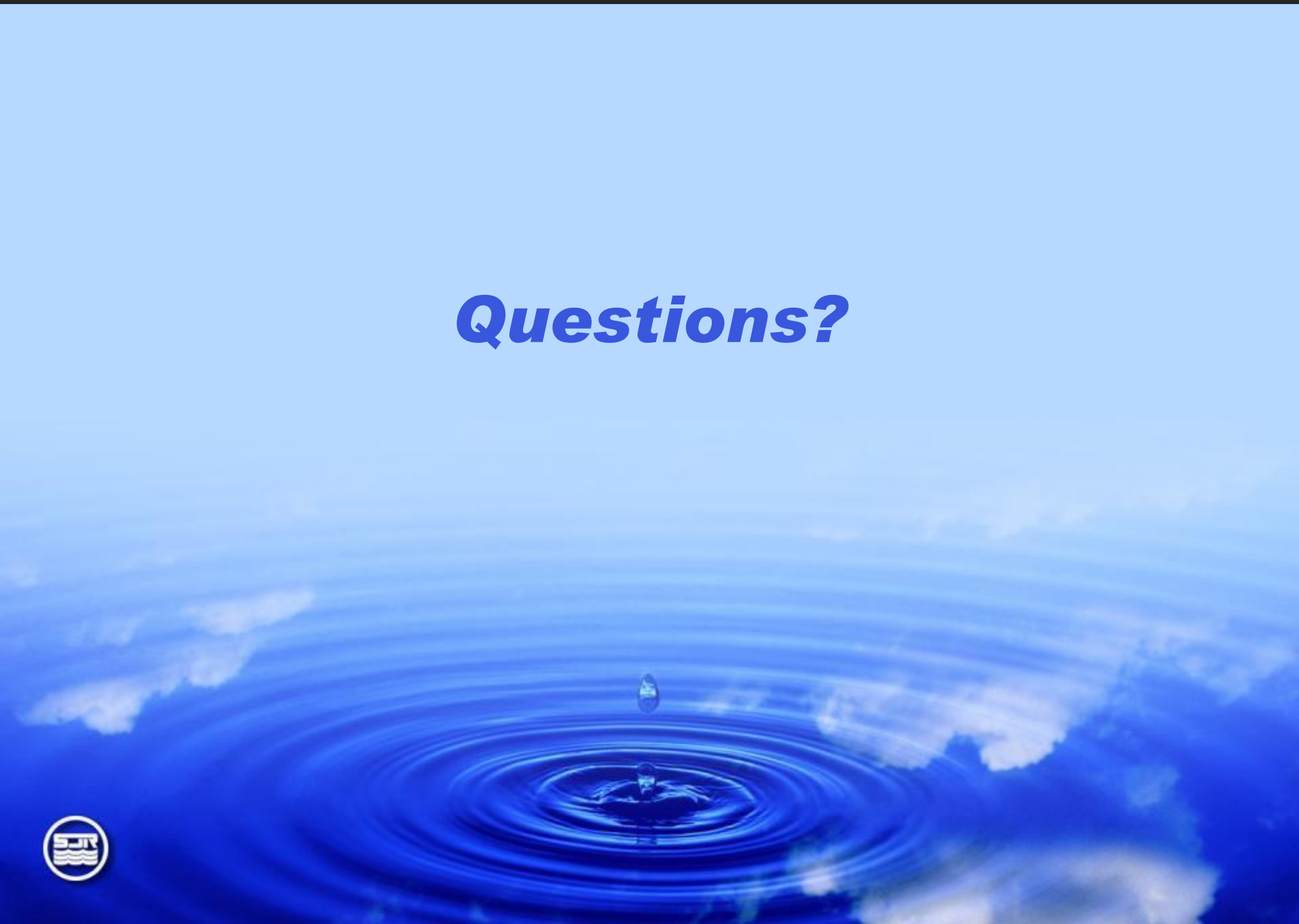
floridaswater.com


Questions?