Assessing agricultural production and water resources conservation in the Florida Springs Region (FSR)

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Introduction

- **Springs' classification** based on average discharge of water measured in cubic feet per second (cfs):
  - **1st magnitude:** ≥100 cfs;
  - **2nd magnitude:** 10 to 100 cfs;
  - **3rd magnitude:** 1 to 10 cfs.
- The **Floridan Aquifer System** provides water to more than **1,000 artesian springs in Florida** – largest concentration of freshwater and 1st magnitude springs in the world.
- These locate along **56 counties** that **form the FSR.**
- In 2017, **sales from crop production in the FSR** estimated at **3.1 billion USD** (55% of Florida's sales).
- In 2016, **crop irrigation in the FSR** used 852 million gallons per day (MGD) of water. **87% was from groundwater withdrawal** (GWW).
- Crop fertilizer is a **nitrate-nitrogen** input to land surface which **can overload the soil and leach into groundwater**. Between 2010 and 2014, 13% of estimated nitrogen load to groundwater per year resulted from crop fertilizers In Rainbow Springs.

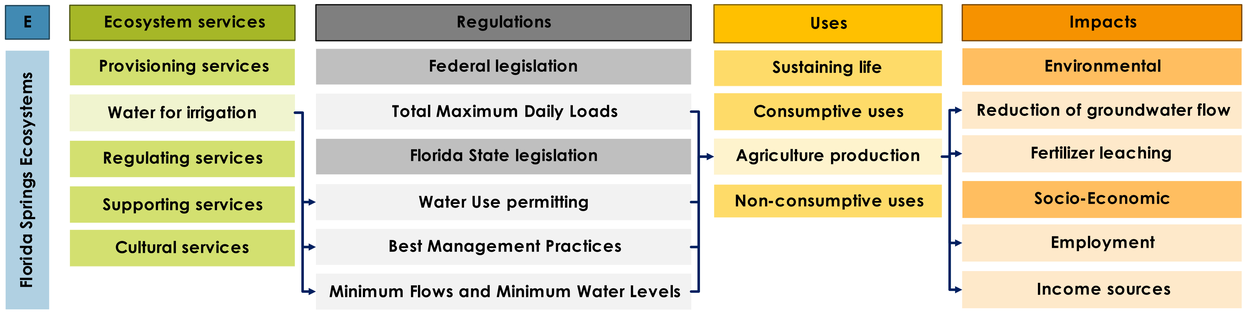
General objective

- Quantify crop production and its groundwater withdrawals and nitrogen application in the FSR to support water resources management.

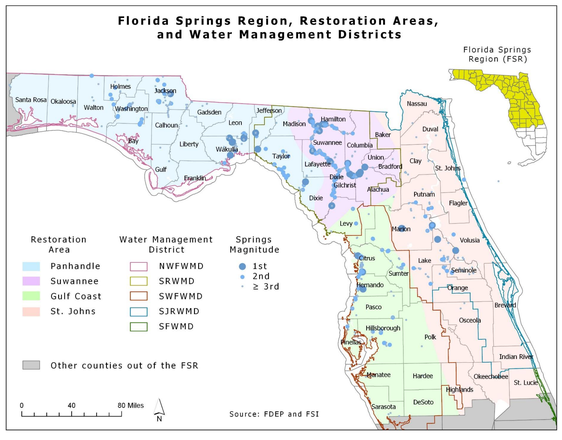
Methodology

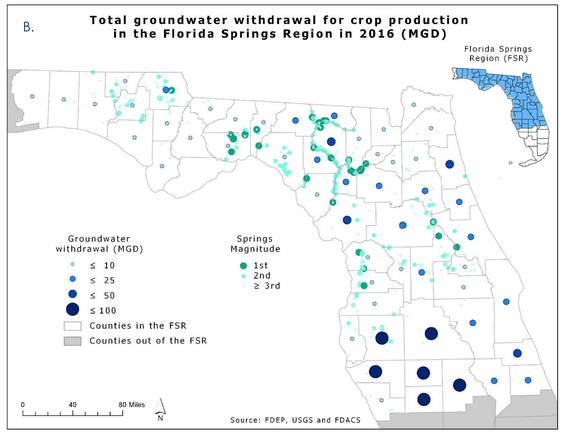
- A **database** was constructed in Excel using **data from US governmental institutions.**
  - **Crop sales:** 2017 Census of Agriculture.
  - **Water withdrawal:** USGS Estimated Use of Water in the US County-Level Data for 2015; FDACS Florida Statewide Agricultural Irrigation Demand Online database; and FDACS Florida Statewide Agricultural Irrigation Demand Geodatabase.
  - **Nitrogen application or inputs:** Literature review on recommendations of nitrogen applications for Florida's crops, and the FDACS Geodatabase on agriculture production in 2016.
- **Intermediate assessment** for each topic, county, and crop group, and **mapping** using ArcGIS.

Conceptual framework

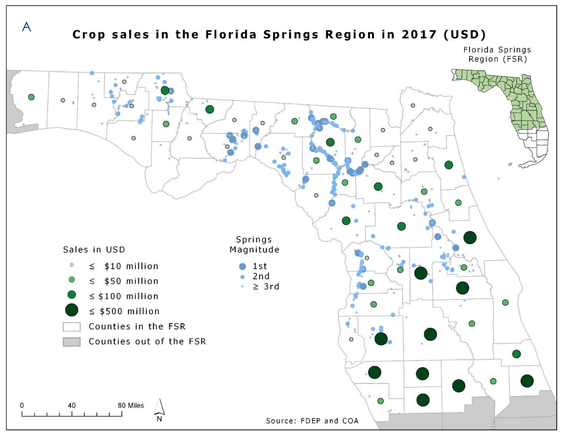


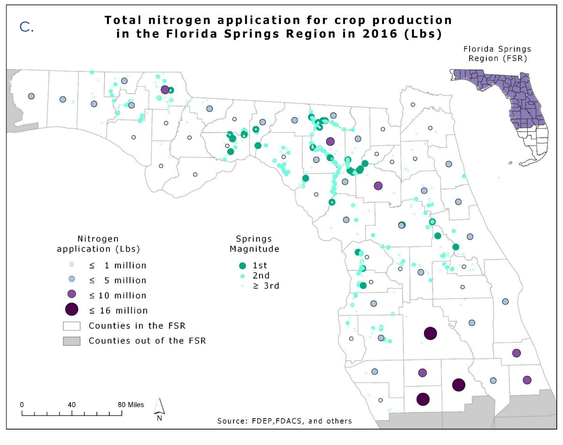
Study site





Results





Conclusions

- A large concentration of the springs is in an area where the **Floridan Aquifer** is most **vulnerable to contamination.**
- The **Suwannee Restoration Area** has an important concentration of 1st, 2nd, and 3rd magnitude springs. It intersects with important levels of crop sales, GWW, and nitrogen application.
  - In the **Suwannee county**, crop sales ~56 million USD (2017), GWW ~32 MGD (2016), and nitrogen application ~7.8 million pounds (2016).

Future directions

- The research results could provide guidance for **future planning and management instruments**.
- For future simulation exercises on **nitrogen inputs,** attenuation, and loading into groundwater, there is a need to create **better databases.**
  - Better and more frequent data collection, GPS and remote monitoring; and incorporation of private and public sources of data (ex. The Nitrogen Source Inventory and Loading Tool and the Blue Water Audit).
- **Continuous communication, knowledge dissemination, and adoption of Best Management Practices** need to continue among the agriculture community and other stakeholders.

Cited literature

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