



# Texas Wild Rice Genetic Assessment Proposal

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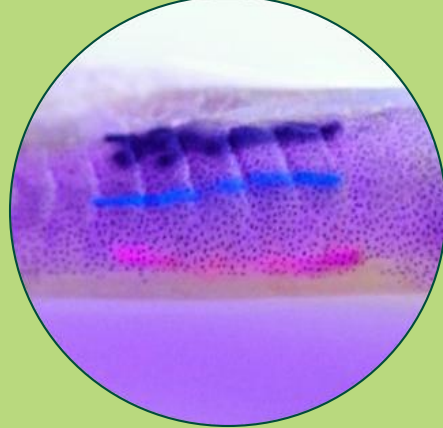
# Conservation through refugia



**Collection**



**Husbandry**



**Research**



**Propagation**

**&  
Genetic  
management**

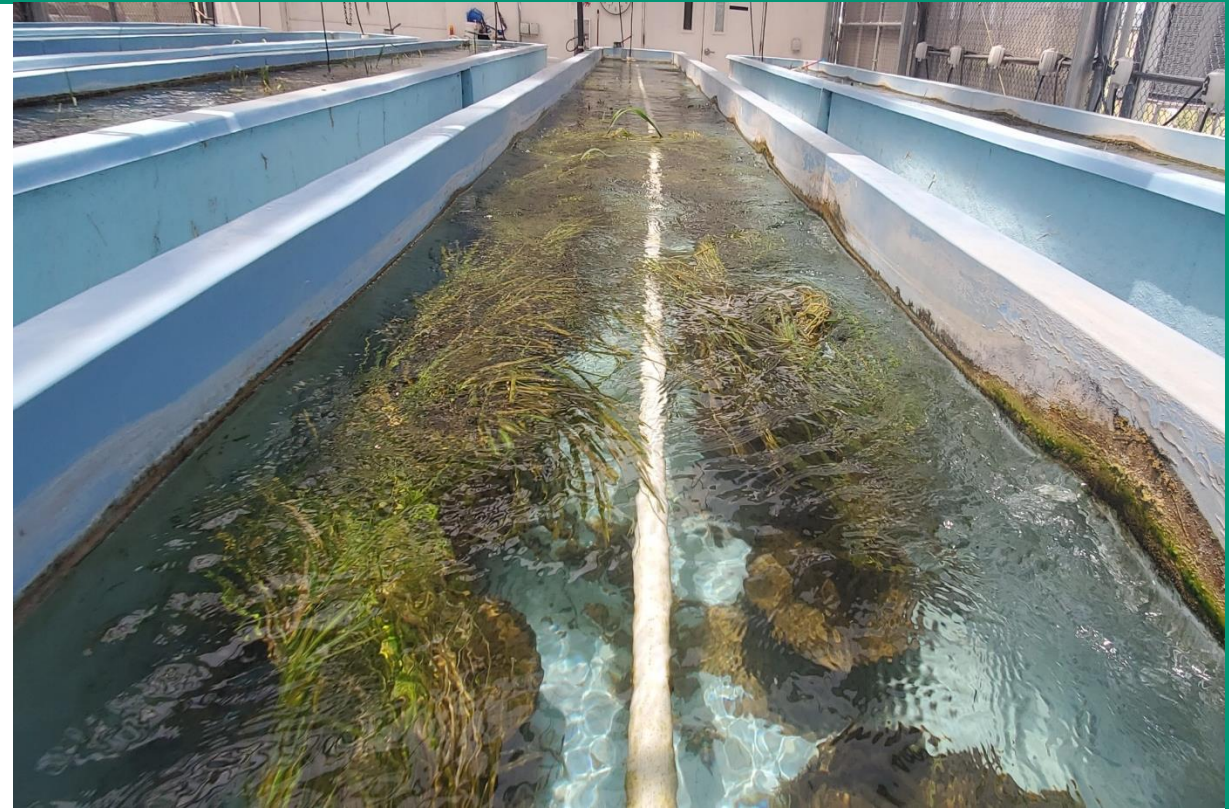


**Salvage  
&  
Reintroduction  
Strategy**

Components of a refugia

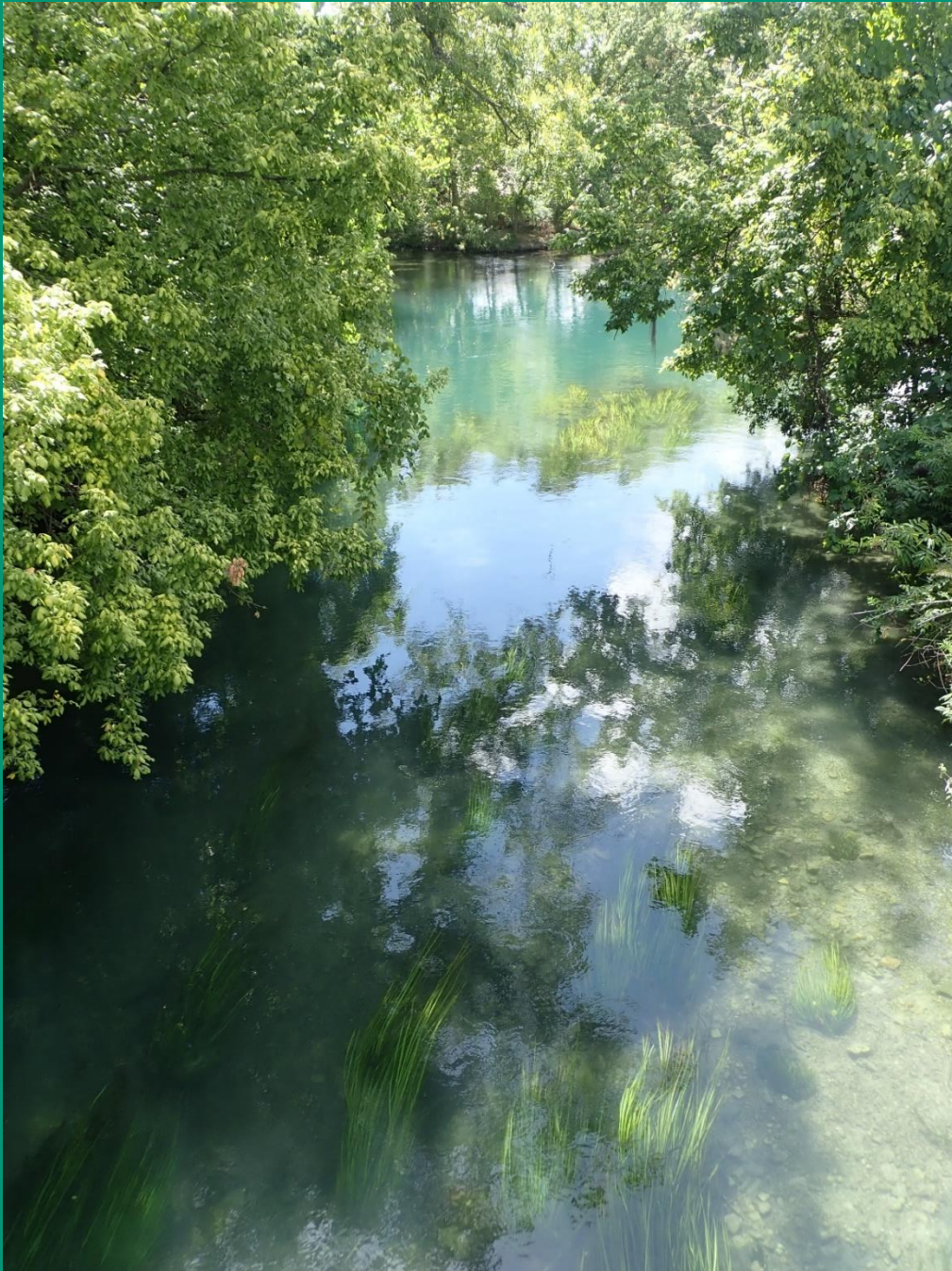


- Refugia requires sufficient numbers of the organism in question



- But also the genetic make up of the refugia should reflect that of the wild population





# Texas wild rice (TWR) Genetics

- Since last genetic assessment:
  - Drought ended
  - Scouring events occurred and
  - Replanting was implemented
- Area covered by TWR has tripled
  - 4,996 m<sup>2</sup> to 15,081 m<sup>2</sup>
- Refugia population has increased from 63 to ~396 plants



*The Edwards Aquifer Refugia Program seeks to improve TWR collection effectiveness and maintain refugia that reflects that of the wild or maximizes genetic diversity of TWR. To achieve this goal, we will genetically assess TWR in refugia and the wild.*

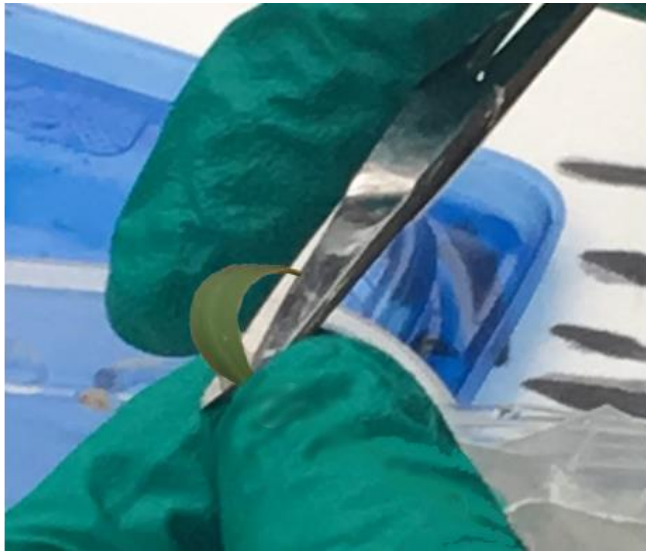


# Objectives

1. Profile the genetic diversity of TWR refugia population
2. Profile the genetic diversity of TWR in the San Marcos River
3. Determine if the refugia population represents the wild TWR
4. Re-evaluate if 430 plants in refugia will conserve biodiversity
5. If refugia plants have unique genetics, should be considered for propagation and replanting efforts?
6. Compare current wild TWR genetic diversity to that of previous studies (Richards et al. 2007, Wilson et al. 2017)



- 10 cm cuttings of wild plants
- 10 cm cuttings of refugia plants
- Freeze
- Ship to Southwestern Native Aquatic Resources and Recovery Center (SNARRC)



# Genetic samples

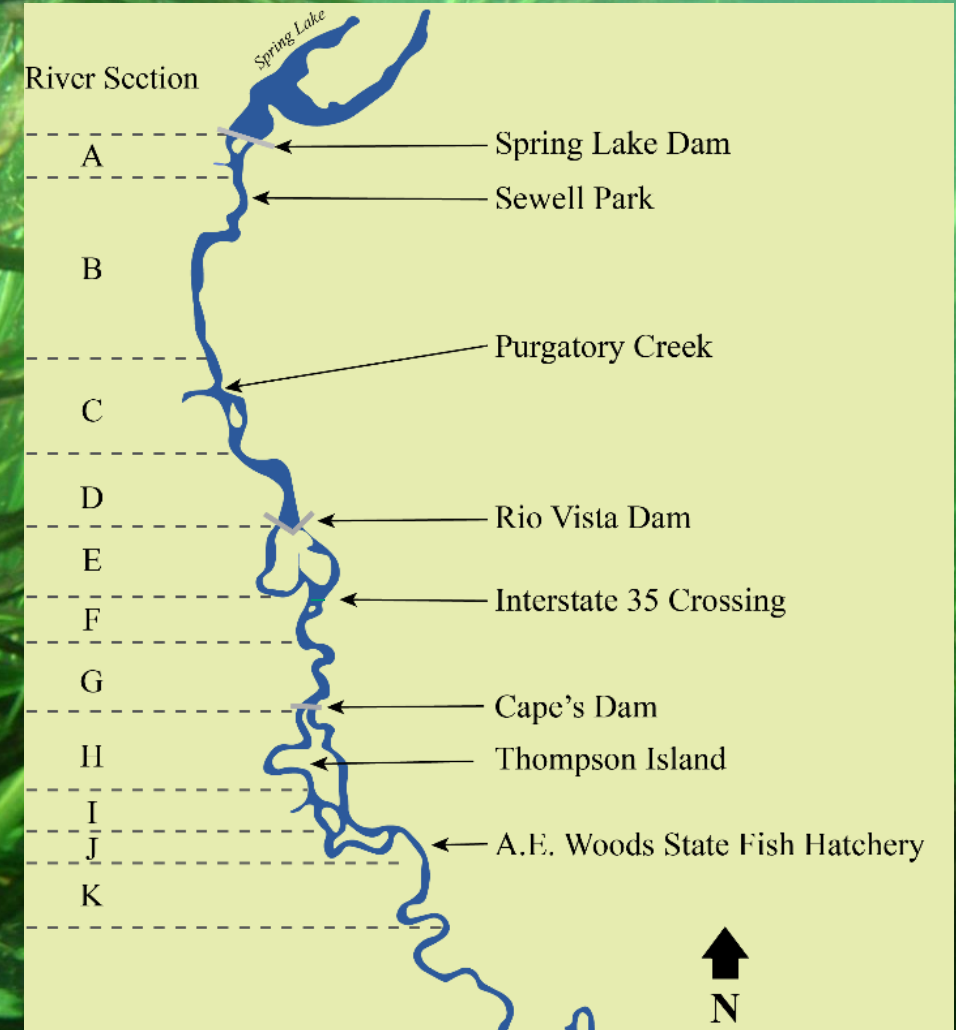




Photo Susan Hanson



# Wild Population Samples

- Over 700 plant stands documented in 2019 TWR survey
- Take samples from up to 400 stands
- Overlay various survey data on georeferenced aerial photos to digitize plant stands for selection
- Take samples from the middle of stands  $\leq 2$  m
- Stands  $> 2$  m samples taken 2 m apart
- GPS location



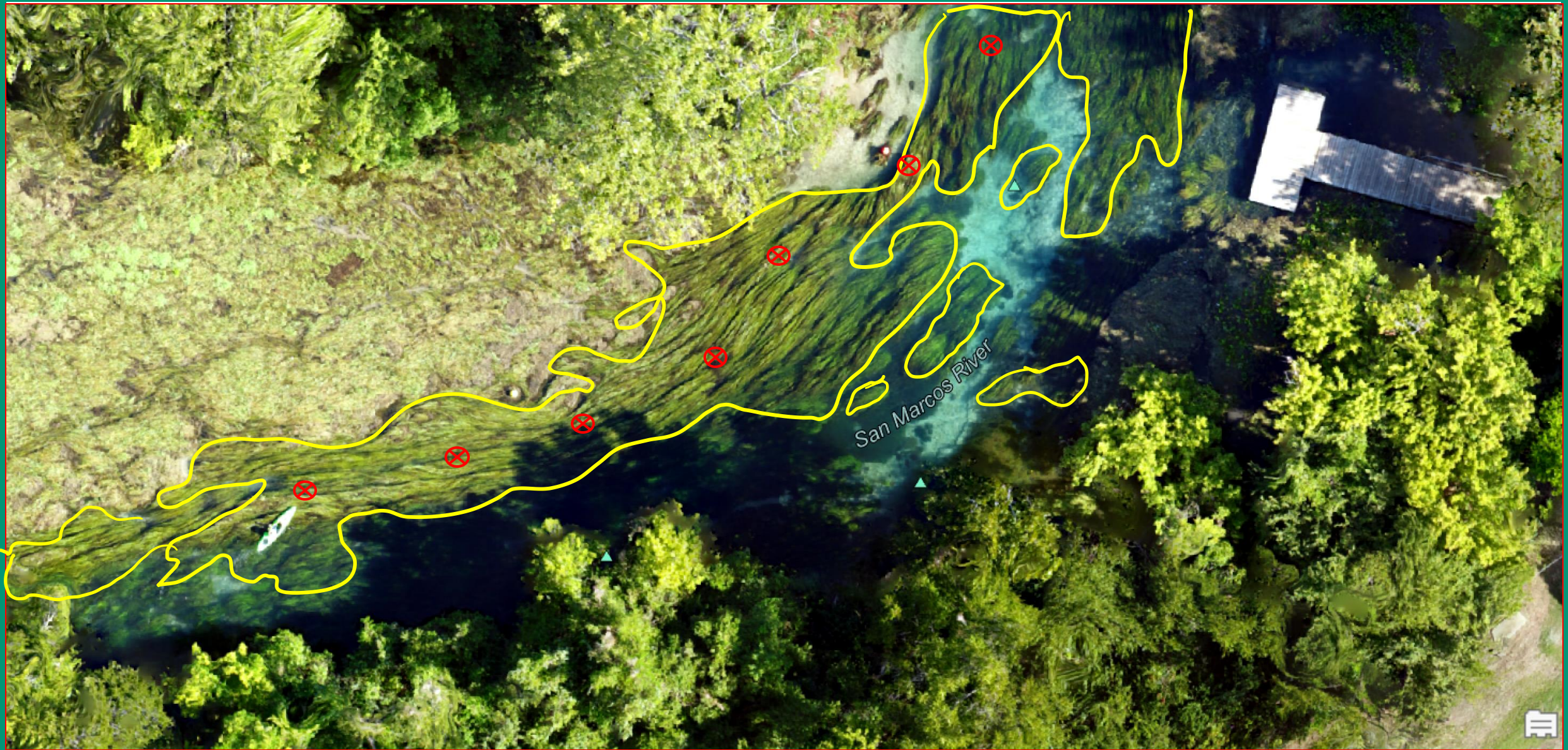
## Section B

Example of small  
patches

Would take  
sample from each  
stand selected







Large Continuous Stand by dock at TxSt

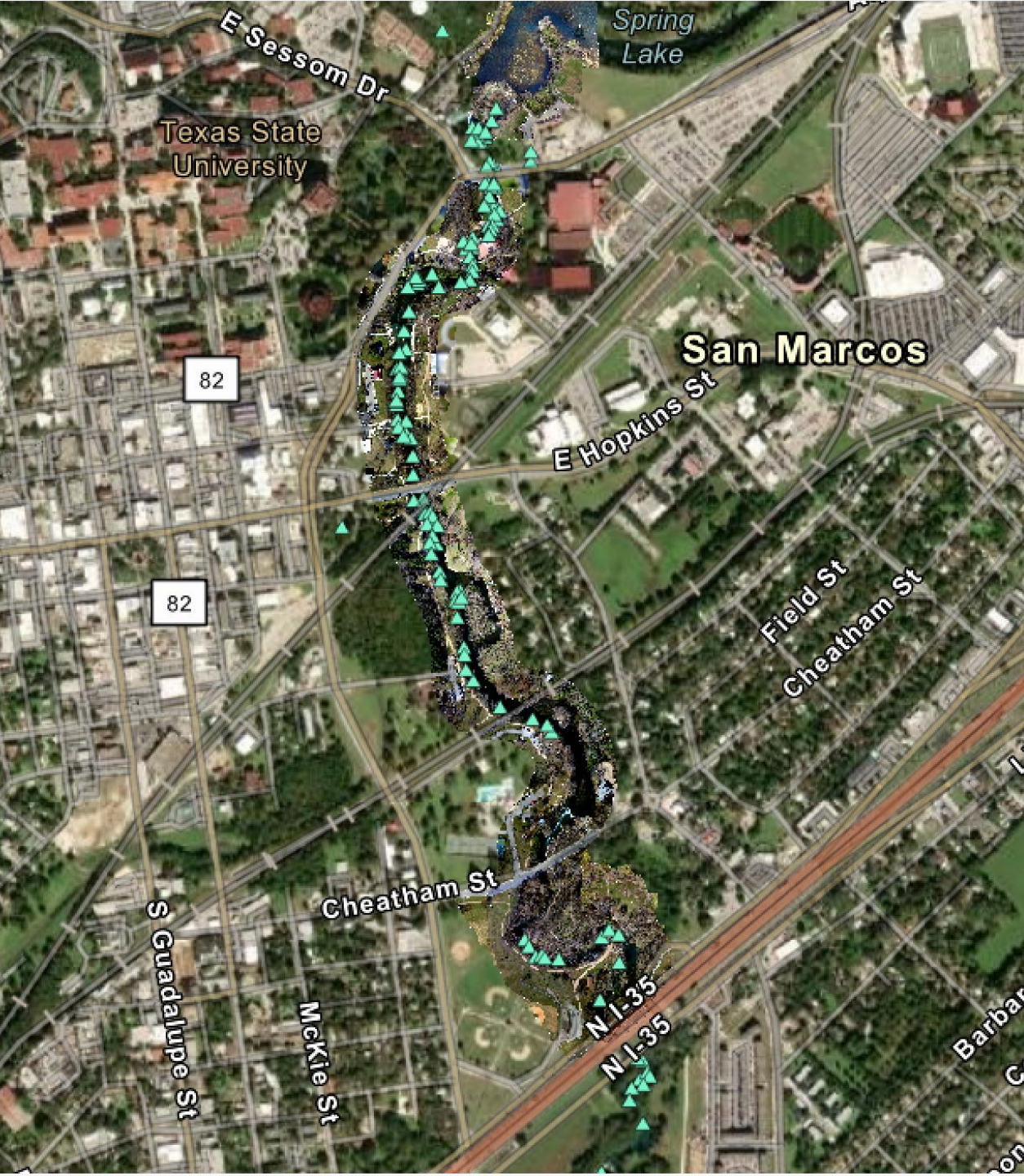




## Section D Rio Vista Park Few TWR Stands

Consider if this would  
be over sampling  
**or**  
Making sure all  
potential genetics  
sampled





Refugia coverage representation of distribution of plants along the river habitat

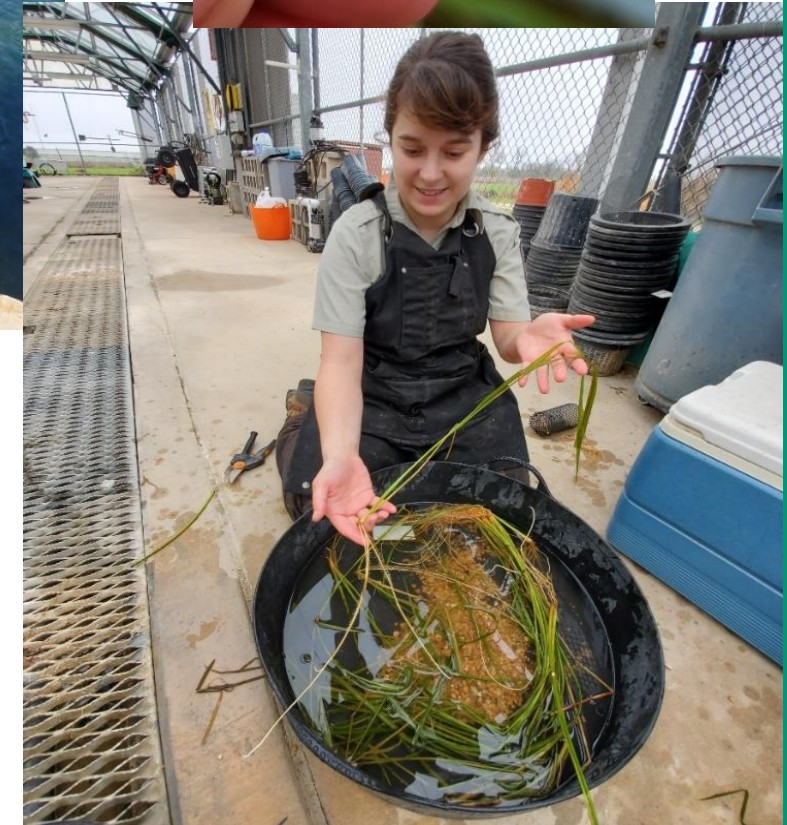
Some areas have few plants (Sections D, E, H)

Some no plants –though recently some have been reported (Sections I, J, K)



# Refugia population

- Collect tillers from plant stands
  - GPS data taken
- Station Botanist collects seeds
- Tillers from same stand planted in one pot
  - Pots individually tagged and plants tracked by GPS, section, date collected







# Refugia Population

- Current refugia population goal 430 plants divided between the two stations
  - Estimate based on last study
- SMARC currently 213 – another collection in December
- UNFH currently 183 reported
- Last genetic study found genetic duplicates within the refugia population
  - Need to know which plants do not serve to boost genetic robustness
- Some plants represent stands no longer in the river



# Genetic Analysis

- Follow methods in Wilson *et. al.* 2017
  - Use the six microsatellites and primers developed by Richards *et. al.* 2007
- Overall heterozygosity ( $H_E$ )
- Heterozygosity per locus ( $H_O$ )
- Number of alleles per locus ( $N_A$ )
- Average inbreeding coefficient ( $F_{IS}$ )
- Allelic richness ( $A_R$ ) and number of genetic clusters ( $K$ )
- Elaborate on trends in the wild population temporally and spatially



Photo Susan Hanson



# Can we ascertain...

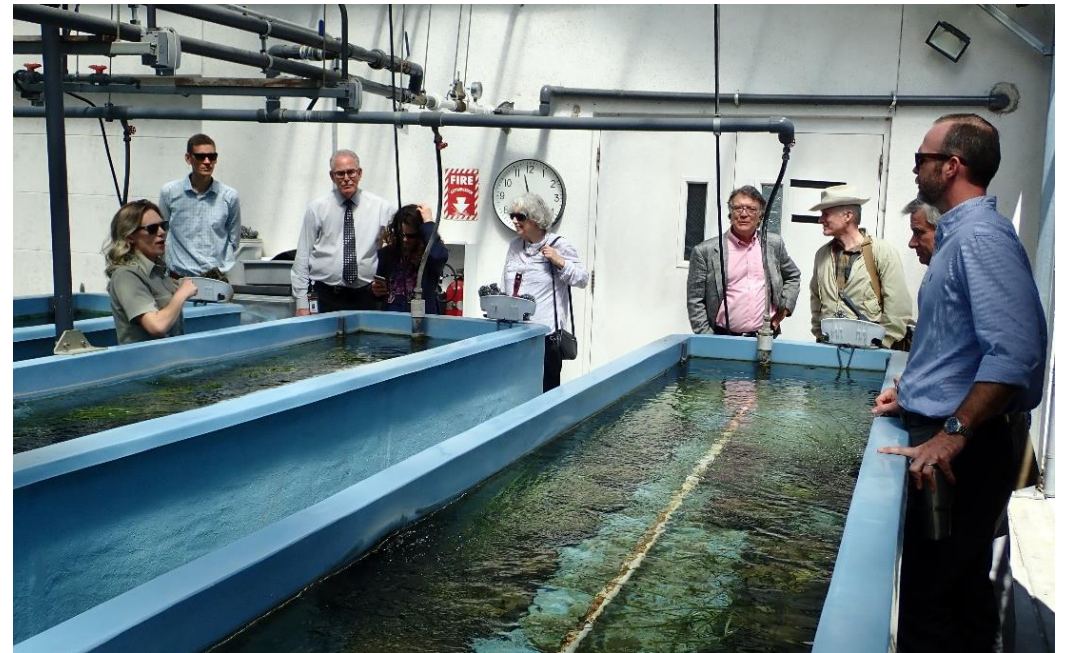


- Does the refugia population reflect the wild population?
- Does the number of plants held in refugia need to change?
- Are there unique plants in the wild that need to be collected?

• Have the genetics in the wild population changed?

• Are there duplicates in the refugia population?

• Are there unique plants in the refugia population?





# QUESTIONS?

