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 m² to 15,081 m²

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

Foot bridge at San Marcos Plaza Park
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
Can we ascertain...

- Have the genetics in the wild population changed?
- Are there duplicates in the refugia population?
- Are there unique plants in the refugia population?
- 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?
QUESTIONS?