



Reference SON: *Strategic Research Initiative: Proactive Ecosystem Restoration*

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Project Development

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Proponent(s)/District

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Proactive Ecosystem Restoration: Improving Native Plant Establishment Performance Through Assisted Population Migration

Research Need

Research and development are needed to ensure the long-term persistence and performance of vegetation communities associated with USACE Civil Works (CW) projects under environmental variation. Historically, native plant restoration projects have sourced plants from adjacent local native plant populations. However, range shifts, evolving plant distributions, and environmental disturbance are beginning to challenge this long-held best practice. An emerging approach utilizes assisted population migration, the intentional movement of native species or subspecies to adjacent areas within or slightly beyond their traditional range. While these proactive restoration techniques have been successfully applied in upland ecosystems, utilization in wetland and aquatic environments has not been widely explored. This research work unit is testing a variety of plant establishment methods in replicated field studies under different environmental variations. The goal is to lead to improved establishment, performance, and resilience of native plant communities while decreasing monitoring and adaptive management costs.

Project Purpose & Objectives

Identify and evaluate efficacy of assisted population migration in restoration-relevant aquatic plant species for CW vegetation establishment efforts.

Primary objectives:

1. Evaluate how different aquatic plant species population's provenance types (project area local v. not) persist and perform.
2. Assess the effects hydrologic disturbance (static v. fluctuating) on said aquatic plant species populations.
3. Compare the environmental and biological benefits, functions, and services of assisted migration v. traditional local AER approaches/populations.

Value of Research and Development (Payoff)

Development of new USACE ecosystem restoration (ER) methodology in sourcing plant material for wetland vegetation restoration. Research will inform future USACE ER efforts on where best to source potential focal plant species populations to maximize the resilience and long-term ecosystem services provided by restored habitat. Increasing the sustainability of USACE ER efforts will decrease the frequency of follow-up efforts due to disturbance events, biotic interactions, etc. in-turn increasing the return on investments (ROI) of ER projects.

Products and Deliverables (Scheduled)

DELIVERABLE DESCRIPTION	SCHEDULED DUE DATE (Mon/Yr)	CURRENT PERCENT COMPLETE (%)	PROJECTED COMPLETION DATE (Mon/Yr)
1. Pond set 1 preparation, propagation, and planting	06/2025	100%	08/2025
2. Pond set 1 data collection & analysis	06/2026	35%	06/2026
4. Pond set 1 comm. of results (JA & conference)	09/2026	10%	09/2026
5. Pond set 2 preparation, propagation, and planting	05/2026	30%	05/2026
6. Pond set 2 data collection & analysis	06/2027	0%	06/2027
8. Pond set 2 comm. of results (JA & conference)	09/2027	0%	09/2027
7. Long-term veg, disturbance monitoring (JA)	09/2028	5%	09/2028

Initial progress

Figure 1. A) Propagation of source populations used in mesocosm pond study at the Lewisville Aquatic Ecosystem Research Facility (Lewisville, TX). B) Map of source population locations for *S. platyphylla*, *Vallisneria americana*, and *Vallisneria neotropicalis* used in mesocosm pond study.

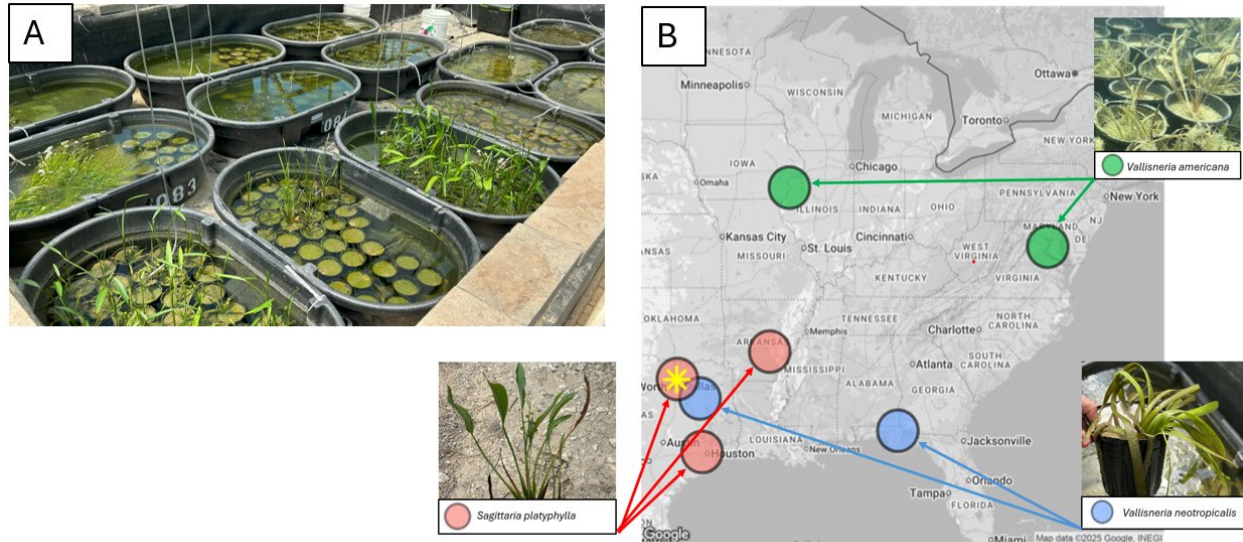


Table 1. Provenance, MAT, mean monthly precipitation, and Palmer's Z-index associated with of *S. platyphylla*, *V. americana*, and *V. neotropicalis* used in the mesocosm pond study. (\pm) indicates the standard error associated with each value.

Species	Site Name	State	Latitude	Longitude	Mean Annual Temperature (°F)	Mean Monthly Precipitation (inches)	Palmer's Z-index
<i>Vallisneria americana</i>	Potomac River	VA	38.6601	-77.15017	57.31 \pm 1.14	3.53 \pm 0.14	-0.24 \pm 0.15
	Huron	IA	41.02701	-90.96471	49.22 \pm 1.42	3.18 \pm 0.16	0.42 \pm 0.15
<i>Vallisneria neotropicalis</i>	Merritt's Millpond	FL	30.77839	-85.16777	68.19 \pm 0.85	4.70 \pm 0.23	-0.01 \pm 0.17
	Lake Athens	TX	32.21324	-95.74828	66.39 \pm 1.03	3.67 \pm 0.19	0.10 \pm 0.17
<i>Sagittaria platyphylla</i>	Lewisville Lake	TX	33.06913	-96.95655	66.03 \pm 1.11	3.13 \pm 0.18	0.08 \pm 0.16
	Pine Bluff	AR	34.25861	-92.02074	63.09 \pm 1.07	4.48 \pm 0.19	0.08 \pm 0.14
	Addick's Reservoir	TX	29.82079	-95.63925	70.74 \pm 0.86	4.24 \pm 0.27	0.08 \pm 0.19

Figure 2. Schematic of steps for the pond preparation process and mesocosm pond study planting and surveying.

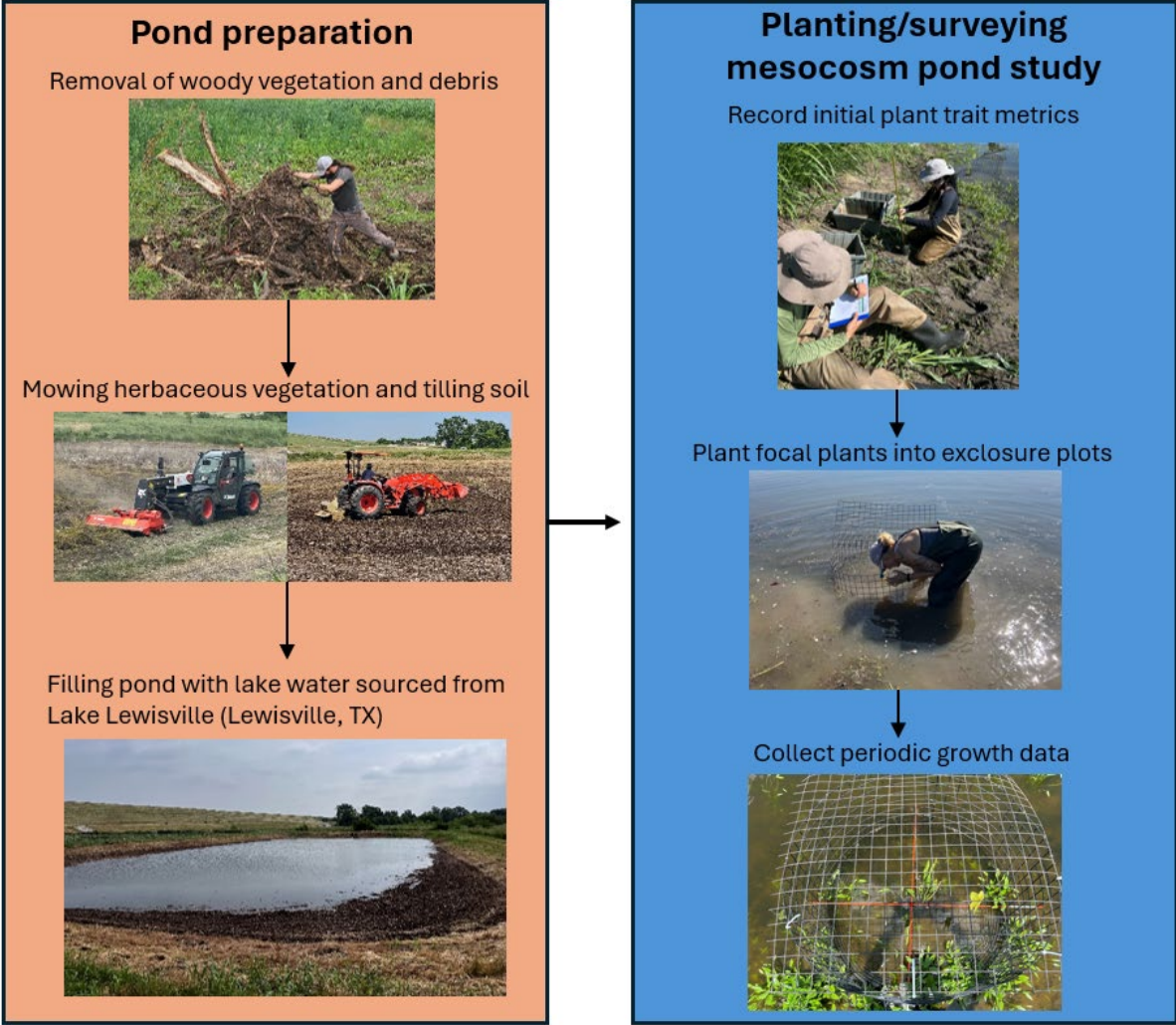


Figure 3. A) Alongshore lateral spread ($m \cdot day^{-1}$) of *S. platyphylla* from exclosures. B) Area spread ($m^2 \cdot day^{-1}$) of *V. americana* and *V. neotropicalis* from exclosures. C) Percent cover of *S. platyphylla* within exclosures. D) Number of flowers produced by *Vallisneria* spp. within each exclosure, variation in flower production within populations suggest multiple genotypes. Tukey's posyt-hoc CLD represents significant pairwise differences (p -value < 0.05). All data were collected on or before September 2nd, 2025.

