Assessing approaches to manage *Phragmites* in Utah wetlands

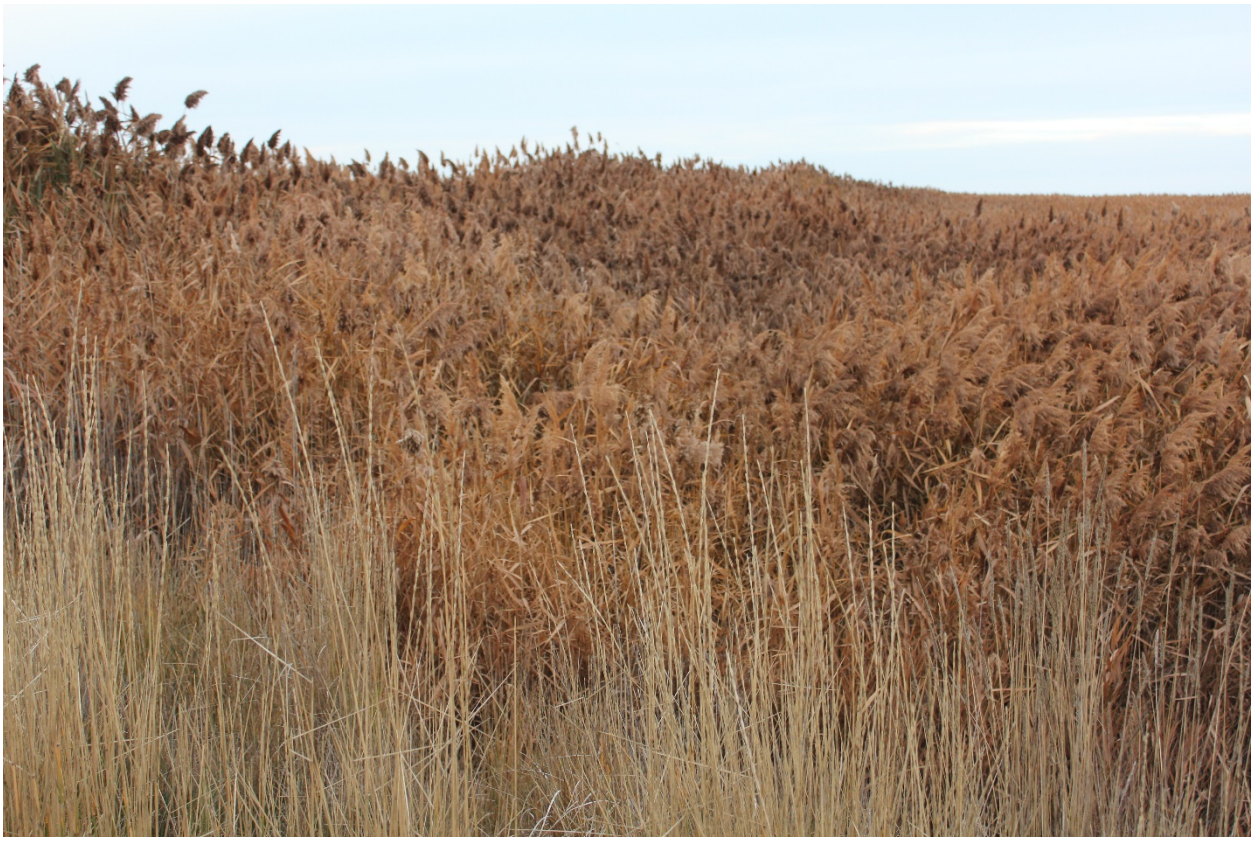

Photo: K.M. Kettenring

Final report to Utah Division of Wildlife Resources

Principal Investigator: Karin M. Kettenring,
Graduate students: Christine Rohal, Chad Cranney, David England

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Project objectives

To determine the most effective means for controlling *Phragmites australis* and restoring native wetland vegetation in Great Salt Lake wetlands.

Study 1: Evaluate different methods for controlling invasive *Phragmites* at small and large scales.

M.S. thesis research of Chad Cranney and Ph.D. dissertation research of Christine Rohal

Brief synopsis of study methods:

- Herbicide applied 2012-2014, monitored 2012-2016
- Glyphosate or imazapyr herbicides
- Summer (early July) or fall (mid-August) herbicide application
- ¼ acre plots (small patch study) or 3 acre plots (large stand study)
- The 10 sites spanned the full range of Great Salt Lake emergent wetland conditions
- Mowed in winter, except for summer mow/fall glyphosate treatment

Most important findings:

- Fall application is superior to summer application in terms of *Phragmites* mortality.
- There is no difference in herbicide effectiveness between types but glyphosate is less expensive.
- Herbicides do not "take" if *Phragmites* is drought stressed.
- Mowing is an important part of the *Phragmites* control tool kit.
    - Mowing (in approximately late June) can prevent seed production.
    - However, this mowing results in lots of dead biomass that takes time to break down.
    - Burning is likely better than mowing for *Phragmites* biomass removal, but its use is limited by permit access for most agencies.
- *Phragmites* is returning in many areas, especially where well-watered.
    - Once *Phragmites* is killed, drought treatments can be used to keep it at bay.
- Native plant recovery is still limited even when *Phragmites* has been largely removed.
    - Initially native plant recovery is limited by dead *Phragmites* litter, and over time it becomes limited by live *Phragmites* that has returned.
    - Pickleweed and saltgrass are returning in drought-stressed areas following *Phragmites* removal.
    - In areas where remnant native plants persisted, natives are rebounding once *Phragmites* is removed.
- Some native plants hold promise (particularly the bulrushes) for reducing the rebound of *Phragmites*.

Management implications of research findings

- Managers should be strategic about where they control *Phragmites* to ensure that efforts are worth the time and money.
- More effective *Phragmites* control can occur when managers have water control abilities for their wetlands.
- Managers should target small *Phragmites* patches first with natives nearby, and also be proactive with revegetation following *Phragmites* control.
- At least three years are necessary to greatly reduce *Phragmites* cover.

Study 2: Evaluate different methods for reestablishing native bulrush species in Great Salt Lake wetlands

M.S. thesis research of David England

Brief synopsis of study methods:

- We established a large-scale field experiment at the Bear River Migratory Bird Refuge in summer 2015 and monitored plots through 2016.
- The bulrush treatments were seeding (low and high density), planting seedling plugs, staking vegetation mats, and transplanting rhizome masses (**Figure 1**).
- The treatments were installed in 26 - 4m*16m strips in each of two wetland units at the Bear River Migratory Bird Refuge.

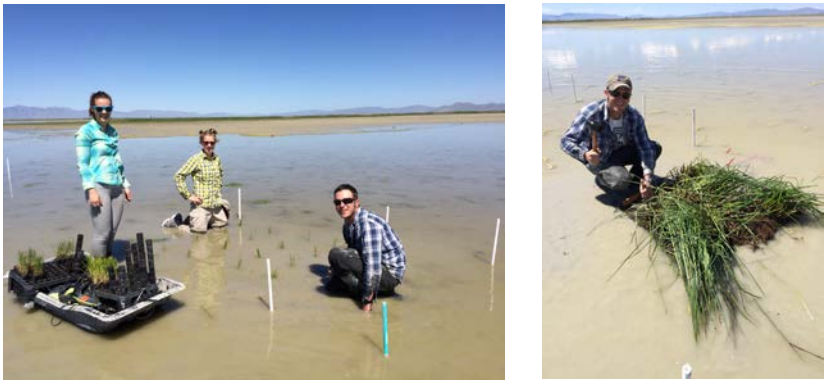

Figure 1. Planting seedling plugs in an experimental plot (at left; Rachel Hager, Karin Kettenring, David England) and installing a sod mat (at right; David England).

Most important findings:

- The plugs, mats, and rhizome transplants all had moderate establishment success (40-50% survival) after one month of installation, but by the end of the 2015 growing season almost all of the plants had completely died.
- Over the winter of 2015-2016, ice scouring disrupted the remaining plants.
- Despite the failure of these treatments, we were able to evaluate the logistics of implementation of these treatments for large-scale Great Salt Lake wetland restorations.

- The consensus among managers we communicated with was that these treatments are not logistically feasible to implement on any broad scale, especially given the high probability of failure.
- Given much higher than predicted water levels, the seeded treatments lost almost all of their seeds and seedling emergence was negligible.
    - Despite the failure of the seeding, we gained valuable insights into additional steps that need to be taken to ensure success for logistically-feasible, seed-based restoration for Great Salt Lake wetland plants.
    - We have since spent significant time and effort evaluating the potential for a tackifier (adhesive substance mostly used in terrestrial restoration) for keeping seeds in place under moist or flooded conditions.
    - Based on results from greenhouse experiments (David England M.S. thesis research), we are continuing to evaluate these treatments in field plots at Farmington Bay (Emily Martin graduate research).