Invertebrate assemblage response to Phragmites australis invasion and native plant revegetation in Great Salt Lake wetlands

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INTRODUCTION

Great Salt Lake wetlands:
- 75% of Utah’s wetlands
- Playa, emergent, submersed, and wet meadow habitats
- Managed for migratory birds and waterfowl (located along the Pacific and Central Flyways)

Phragmites australis:
- Wetland invader
- Outcompetes native plant species
- Loss of bird breeding and staging habitat

Invertebrates:
- Critical food source for birds
- Effect of Phragmites on invertebrates is unknown
- May be an important factor in wetland restoration
- Incomplete understanding of GSL wetland invertebrates

OBJECTIVES

1. Examine how invertebrate assemblages respond to Phragmites invasion in Great Salt Lake (GSL) wetlands
2. Identify if Phragmites removal and the reestablishment of native vegetation can restore invertebrate species composition, biomass, and diversity
3. Estimate the effectiveness of different restoration techniques in determining invertebrate recovery success

METHODS

Site selection:
1. Bear River Migratory Bird Refuge
   - Twenty 30x30m dominant vegetation plots
2. Farmington Bay Waterfowl Management Area
   - Six current restoration plots
   - Roll and crush (no reseeding)
   - Roll and crush + seeding

Invertebrate sampling:
Emergence traps:
- Emerging, aquatic invertebrates
- Four sampling periods (June-September)
Flight-intercept (windowpane) traps:
- Flying, terrestrial invertebrates
- Two sampling periods (June and August)

Additional site measurements:
- Water and litter depth
- Soil porewater salinity
- Vegetation cover

Processing and data analysis:
- Identify, dry, and weigh invertebrates
- Calculate species composition, diversity, and biomass
- Compare invertebrate assemblages across treatments: non-metric multidimensional scaling and ANOVA

HYPOTHESES

Invertebrate assemblages will shift with Phragmites invasion
- Biomass of aquatic invertebrates will be higher in Phragmites stands
- Terrestrial invertebrates will recover quickly, but aquatic invertebrates will respond more slowly
- Biomass and composition will be affected by seed/no seed treatments

MANAGEMENT IMPLICATIONS

- Invertebrates comprise a large portion of avian diets
- Invertebrate interactions with Phragmites and native vegetation may be critical components of understanding how to restore wetlands for bird use
- Comparing invertebrate recovery following restoration may help inform best restoration practices

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Figure 1. Map of Great Salt Lake, Utah
Figure 2. Map of selected management areas
Figure 3. Emergence trap (Mackenzie and Kaster (2004))
Figure 4. Flight-intercept (windowpane) trap (Gerber et al. (2017))
Figure 5. Hypothetical example of the results from a nonmetric multidimensional scaling ordination analysis