Introduction
How do we effectively rehabilitate land degraded by biological invasions?
Many riparian areas on the Yellowstone River have converted to dense Russian olive stands, reducing agricultural and ecological value of these lands.

Methods
Four replicate 0.5 ha blocks
5 treatments:
1. C - no revegetation
2. H - seeded herbaceous layer
3. S - herbaceous layer with planted shrubs
4. T - herbaceous layer with planted trees
5. TS - herbaceous layer with trees and shrubs

Basal and Canopy cover:
• 2010: pre-removal Russian olive

Woody species planted:
• Trees: boxelder, green ash, narrowleaf cottonwood, plains cottonwood
• Shrubs: silver buffaloberry, chokecherries, golden currant, Woods' rose

Results
Non-native forbs cover was 0% lower in 2010 (32±3%); lowest in 2013 (10±3%); and similar in years 2013-2015 (avg. 23±3%).

• Annual brome cover in highest 2010 (32±3%), lowest in 2013 (10±3%) and similar in years 2013-2015 (avg. 23±3%).

Species Diversity:
Every species that germinated in each plot was recorded in 2012-2015.

• The 13 seeded species germinated in over 70% of the plots (prairie cordgrass, slender wheatgrass, western wheatgrass, blue flax, Canadian milkvetch, Maximilian sunflower, yellow prairie coneflower, Rocky Mountain beeplant, and yarrow)

• Some species were slow to establish, switchgrass was first observed in one plot in 2014, in 2015 it was present in 50% of the plots

Implications
• After four years since active restoration, the herbaceous seeding with planted shrubs had the lowest cover of annual bromes (14±5%) and highest cover of seeded herbaceous species (33±2%).

• New native species are continuing to establish at the site.

• The site is monitored yearly as Russian olive seedlings are still germinating.

• Seeded herbaceous species cover is continuing to increase over time but it is too early to make a definitive conclusion on the impact in reducing non-native species invasions.

• This site will continue to be monitored yearly for an indefinite number of years and used as a long-term research and demonstration area.

Block 1 shrub seeding 8-8-2012
Block 1 shrub seeding 8-20-2013

Block 1 shrub seeding 5-28-14
Block 1 shrub seeding 5-29-15

Block 1 Tree seeding 5-28-14

Block 1 shrub seeding 7-30-15

Block 1 shrub seeding 1-19-16

Vegetation change from 2012-2015

Russian olive trees cut with tree shear to ground level and immediately sprayed with 3:1 basal bark oil, triclopyr mix.

Objective
To determine if restoration is necessary after Russian olive removal and then to establish the effectiveness of four restoration strategies.