USING LONG-TERM COMMUNITY SCIENCE MONITORING TO INFORM MIDDLE RIO GRANDE BOSQUE RESTORATION: LESSONS LEARNED

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BEMP Bosque Ecosystem Monitoring Program

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OVERVIEW

- Restoration Goals
- Restoration activities and methods
- History of Corps restoration projects
- Monitoring and adaptive management
- Lessons learned

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RESTORATION GOALS

Topographic
- Increase flood frequency and duration into bosque
- Increase wetted area in bosque

Vegetation
- Maintain bosque mosaic of native tree, native shrub, native herbaceous and/or wet habitat
- Maintain noxious weed cover at 30% or lower

Habitat
- Improve habitat quality and increase the amount of native vegetation
- Increase avian species diversity
- Increase potential southwestern willow flycatcher and yellow billed cuckoo habitat

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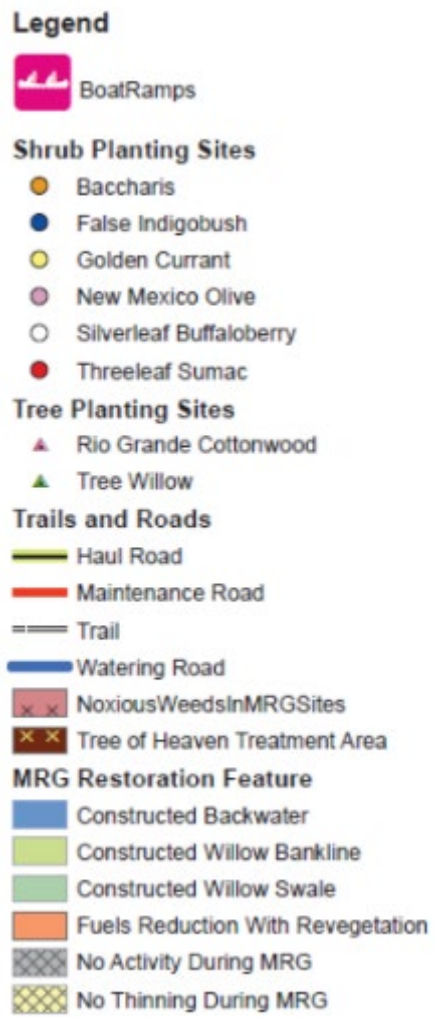
RESTORATION ACTIVITIES

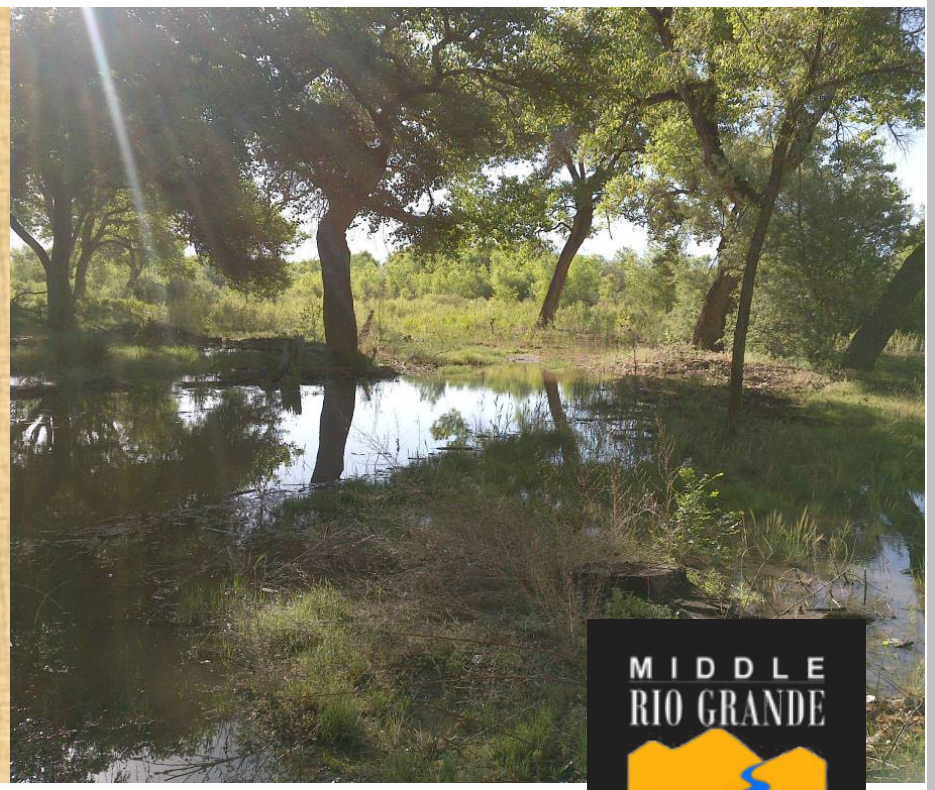
- Invasive vegetation removal/fuels reduction
- Revegetation with native species
- Willow swales
- High flow channels
- Constructed backwaters
- Bankline terrace lowering



HISTORY OF CORPS' RESTORATION PROJECTS ALONG THE MIDDLE RIO GRANDE

In the last two decades, the Corps has been involved in several restoration projects along the Middle Rio Grande.

- Bosque Wildfire Project (2004-2010)
- Albuquerque BioPark Project (2006)
- Rio Grande Nature Center Habitat Restoration Project (2007)
- Ecosystem Revitalization @ Rt 66 Project (2010)
- Middle Rio Grande Bosque Ecosystem Restoration Project, Phase I
- (2011-2014) and Phase II/ Albuquerque Oxbow (2014-2017)



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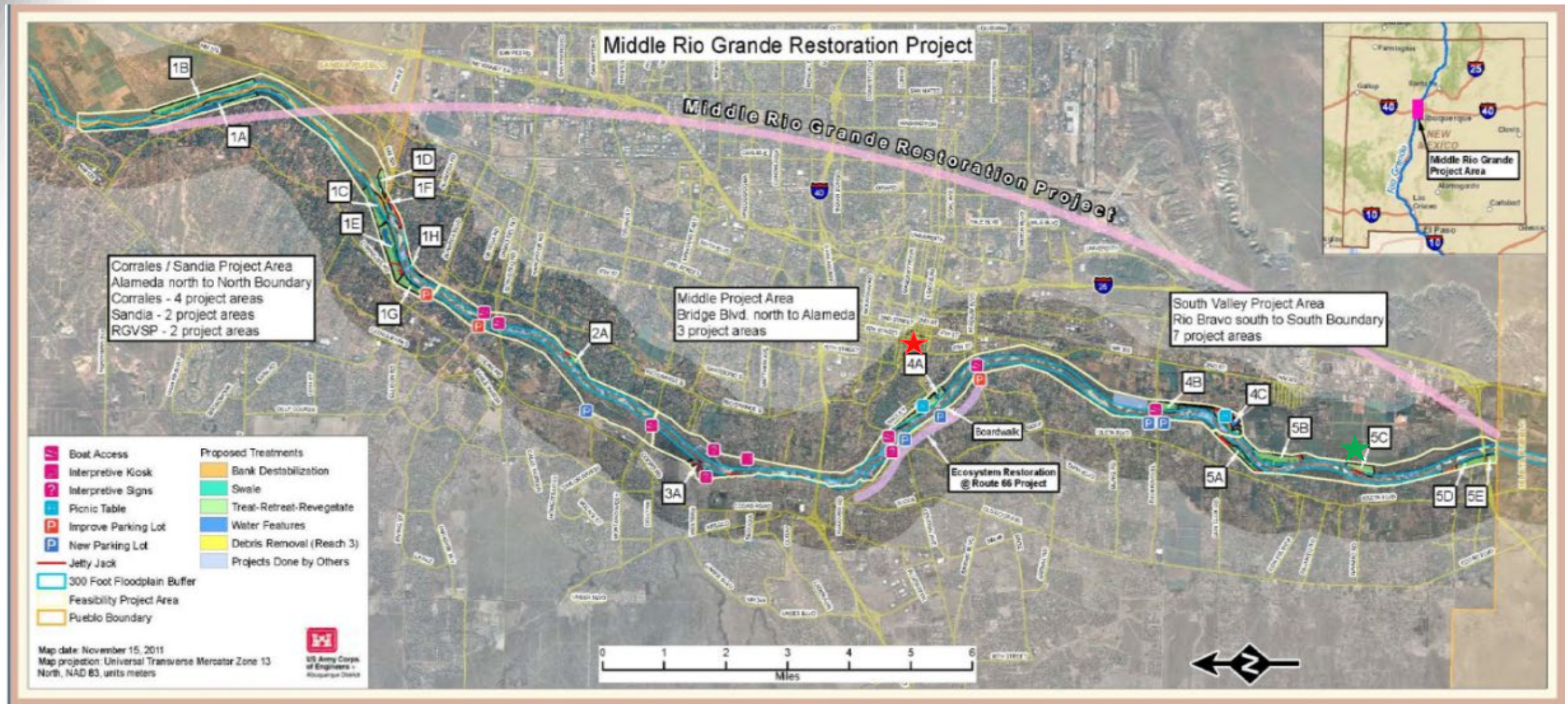
MIDDLE RIO GRANDE BOSQUE RESTORATION PROJECT LOCATION MAP



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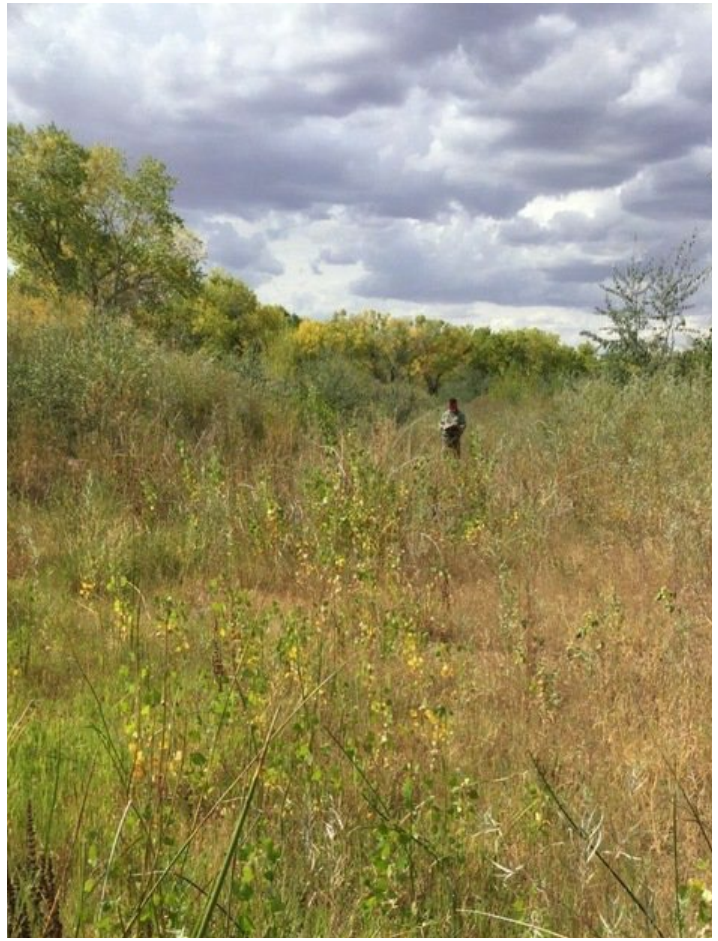
POST CONSTRUCTION MONITORING

- GeoSystems Analysis (GSA)- Monitoring and Adaptive Management Plan and monitoring reports
- Tetra Tech- 2021 monitoring report; avian monitoring reports
- BEMP- community science monitoring of groundwater levels, air and soil temperature; arthropods and leaf litter
- Hawks Aloft- avian songbird surveys; protocol southwestern willow flycatcher and yellow-billed cuckoo surveys
- Corps- hydrologic and sediment monitoring



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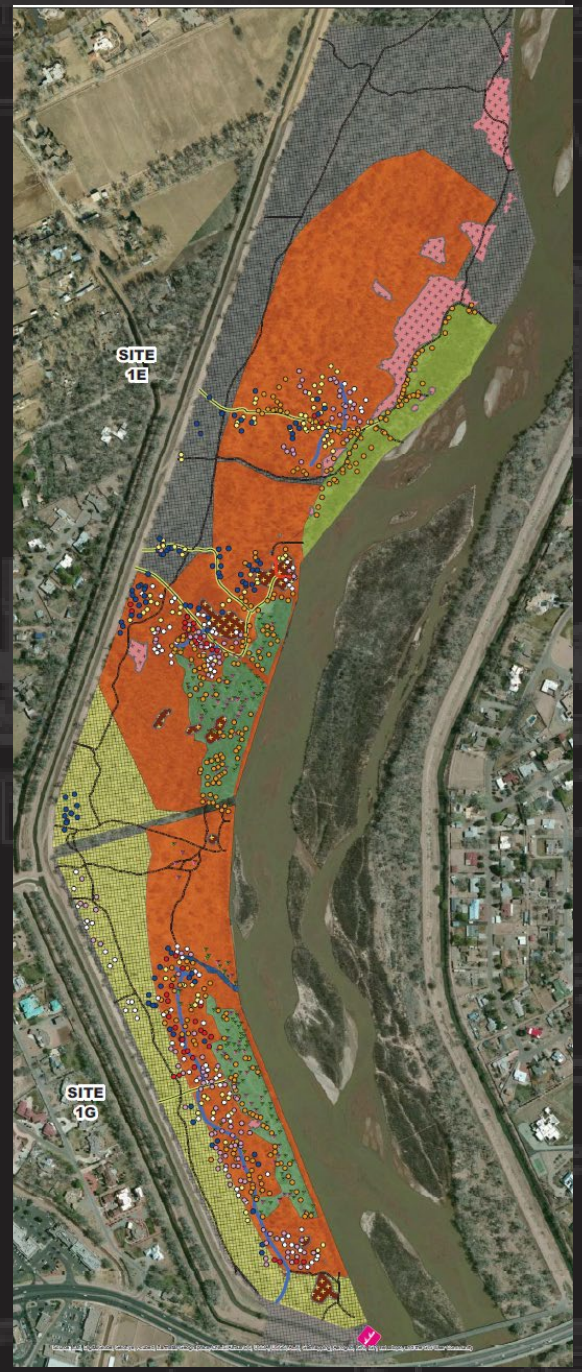
MIDDLE RIO GRANDE ENDANGERED SPECIES COLLABORATIVE PROGRAM

BEMP Bosque Ecosystem Monitoring Program

Hawks Aloft, Inc.
Conservation Education, Avian Research, Raptor Rescue & Collaboration with Others

WILLOW SWALES

- Floodplain surface lowered with heavy equipment to achieve a maximum depth to groundwater of ~2 to 3 feet (at flows of approximately 500 cfs)
- Cuttings of coyote willow, potted *Baccharis,* tree poles (Rio Grande cottonwood and Goodding's willow) installed after excavation
- Coyote willow cuttings are installed in trenches, tree poles and *Baccharis* planted between trenches
- Quantity and distribution of plantings intended to achieve 25-30% overstory tree canopy cover and >75% shrub canopy cover within 5-10 growing seasons after planting



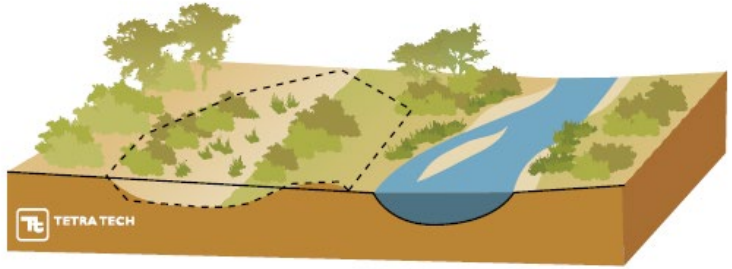


Figure 3. Swale feature

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WILLOW SWALES

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WILLOW SWALES: LESSONS LEARNED

- Willow plantings are most successful at sites with shallow groundwater (<3 feet)
- Willow growth is better in fine textured soils
- Designing swales to enable surface water inundation and fine sediment deposition improves willow growth
- Planting in coarse soils should be located where groundwater is close to the surface
- Excavating swales prior to digging trenches for planting helps remove roots of invasive plants

*Todd R. Caplan, Kristin Cothern, Cliff Landers, and Ondrea C. Hummel. 2013. Growth Response of Coyote Willow (*Salix exigua*) Cuttings in Relation to Alluvial Soil Texture and Water Availability. Restoration Ecology

HIGH FLOW CHANNELS

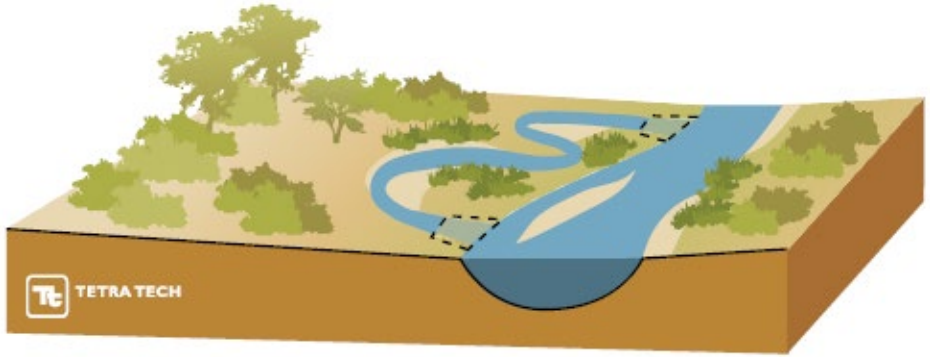

Figure 4. High-flow Channel feature

- Re-establish connections between river and bosque by creating channels that inundate at flows between 1,500 – 3,500 cfs
- Inlets and outlets include a wide “bay” that inundates at lower flows (500 to 1,000 cfs) to create still-water habitat at the upstream and downstream ends
- Can include slack-water embayment/s to promote fish spawning

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HIGH-FLOW CHANNELS

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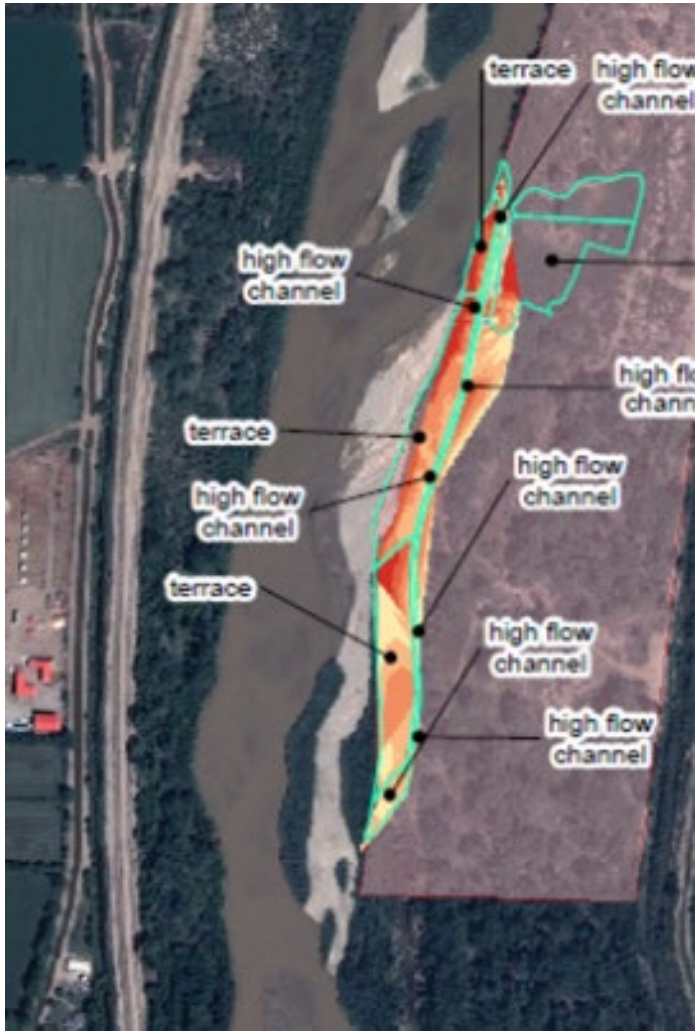
HIGH-FLOW CHANNELS: LESSONS LEARNED

- Design with aggradation and sedimentation in mind
- Design with wide inlets and outlets (embayments)- flows will right-size
- Determine maintenance needs and plan for them
- Think about where to move sediment- don't place next to channel
- Design to inundate at lower flows



NON-NATIVE INVASIVE SPECIES

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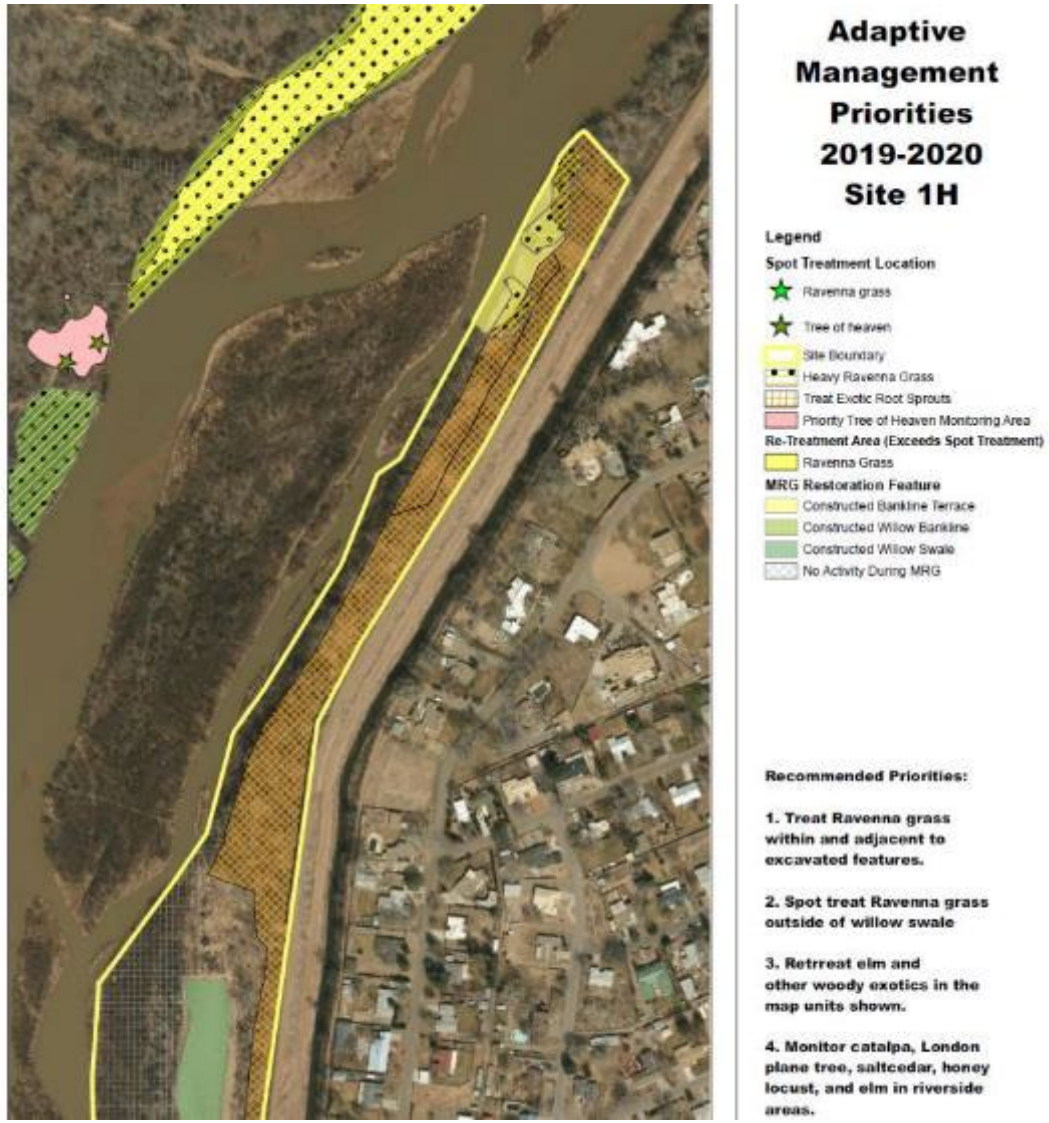
NON-NATIVE INVASIVE SPECIES: LESSONS LEARNED



Adaptive Management Priorities 2019-2020 Site 1H

Legend

Spot Treatment Location

- Ravenna grass
- Tree of heaven
- Site Boundary
- Heavy Ravenna Grass
- Treat Exotic Root Sprouts
- Priority Tree of Heaven Monitoring Area

Re-Treatment Area (Exceeds Spot Treatment)

- Ravenna Grass

MRG Restoration Feature

- Constructed Bankline Terrace
- Constructed Willow Bankline
- Constructed Willow Swale
- No Activity During MRG

Recommended Priorities:

1. Treat Ravenna grass within and adjacent to excavated features.

2. Spot treat Ravenna grass outside of willow swale

3. Retrreat elm and other woody exotics in the map units shown.

4. Monitor catalpa, London plane tree, saltcedar, honey locust, and elm in riverside areas.

VEGETATION REMOVAL: MULCH STUDY

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MULCH PILOT STUDY RESULTS

- Mulch depth influenced plant establishment. No quadrants with mulch depths >2 inches supported more than one native grass or forb species, whereas many plots with lower mulch depths had at least four native grasses or forbs.

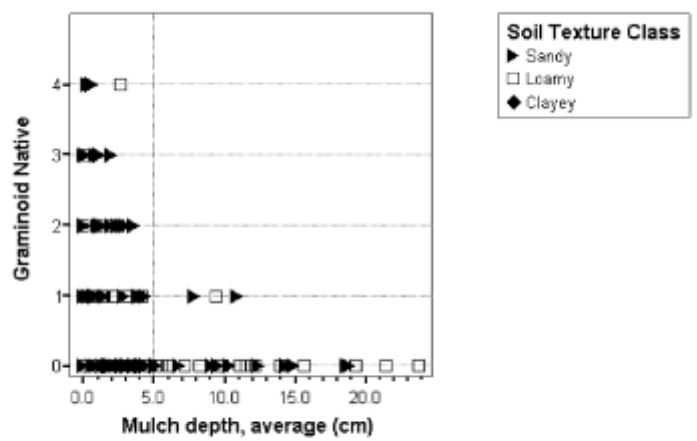

Figure 7. Native grass species richness vs. mulch depth. These data are from 1 m² quadrats.

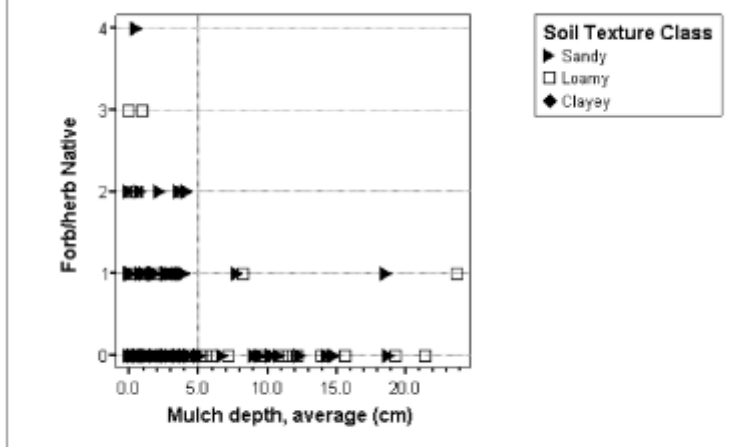

Figure 8. Native forb species richness vs. mulch depth. These data are from 1 m² quadrats.

CONCLUSIONS

- Lessons learned directly impact design of subsequent projects
- Monitoring and Adaptive Management = Best Management Practices
- We are still learning- habitat restoration takes time and continued monitoring is important!

FUTURE RESTORATION PROJECTS

- Espanola Ecosystem Restoration Project
- Sandia Pueblo to Isleta Pueblo Ecosystem Restoration Project
- Restoration as mitigation for Bernalillo to Belen Levee Project

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