SAND2009-3191P

Informal Session on Alternative Uses of Produced Water

Meeting at USBLM, Farmington

May 22, 2009

NMSU/USDA Goal in Pilot Project

In the present work, existing grasses on the San Juan 32-8 #237A well pad were treated in the following manner:

- **~1/3 were spot watered with treated/desalinated water**
- **~1/3 were be spot watered with untreated produced water**
  - **~0.5 in treated, untreated water (to be) applied 9/23, 10/16, 10/23, 11/13**
- **~1/3 received no additional watering**


Professor Rick Arnold
“EL SUPREMO”

Produced water tank and pump

Produced water being applied

WP Rosa 159A, Arriba Western Wheatgrass

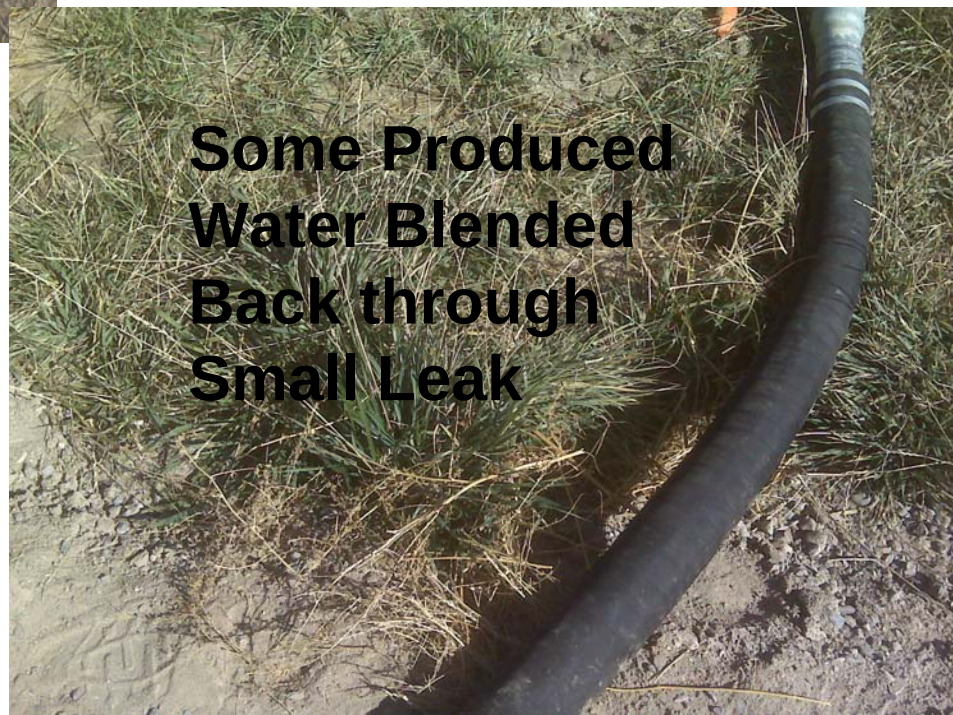
WP Rosa 159A, Hy-Crest Crested Wheatgrass

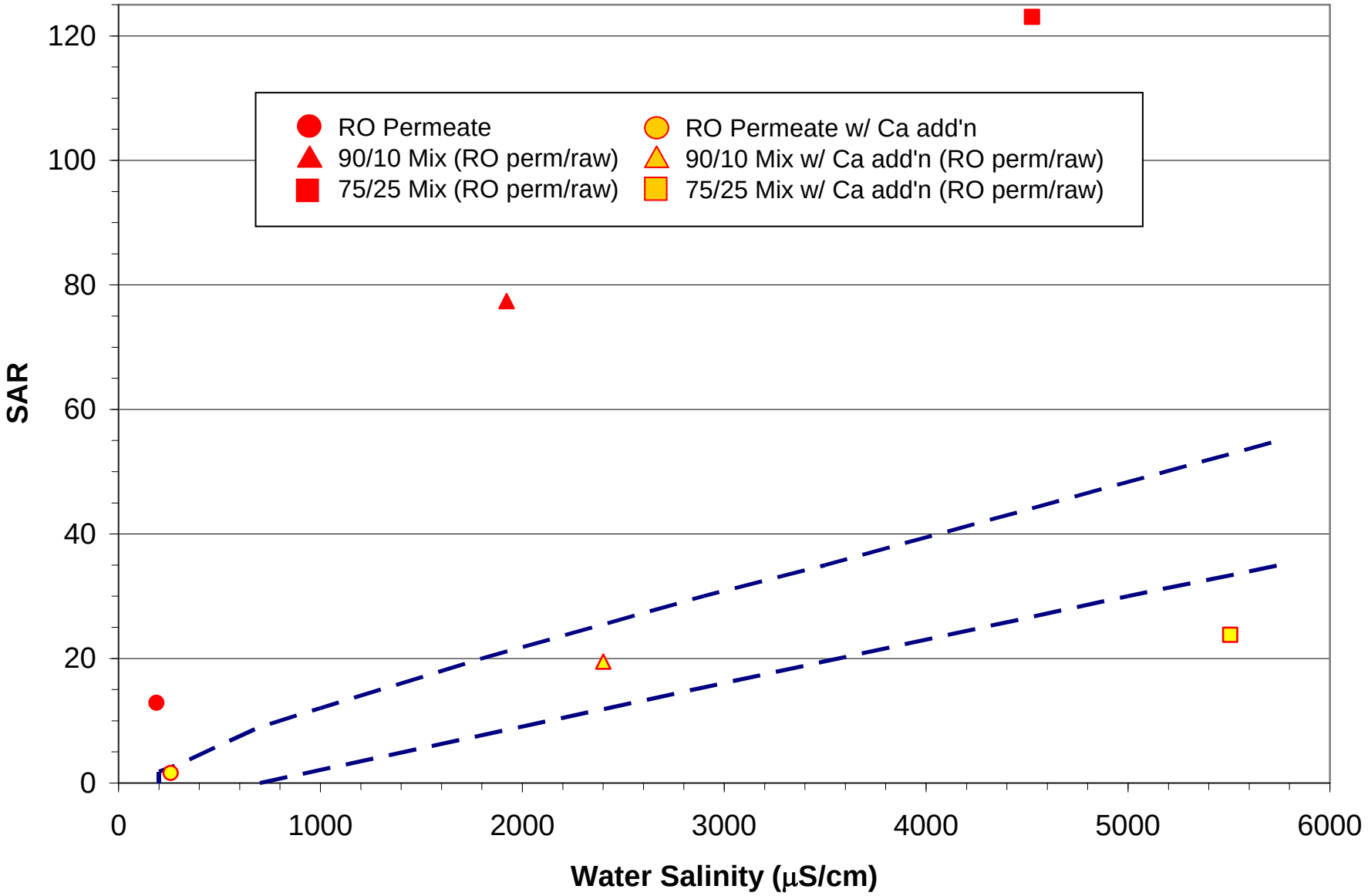
Primary Project Goal

- **Desalinate produced water from a ConocoPhillips coal bed natural gas well in the San Juan Basin, using optimum technology, and, at the same time provide desalinated water for beneficial use meant for:**
  - **Riparian improvement (Joel Brown/USDA, Jornada Experimental Range, Las Cruces)**
  - **Rangeland improvement/Revegetation of Disturbed Land (Rick Arnold, Agricultural Science Center, Farmington)**
- **Produced water from the Coal Bed Methane Natural Gas will be desalinated by reverse osmosis in a pilot operation.**

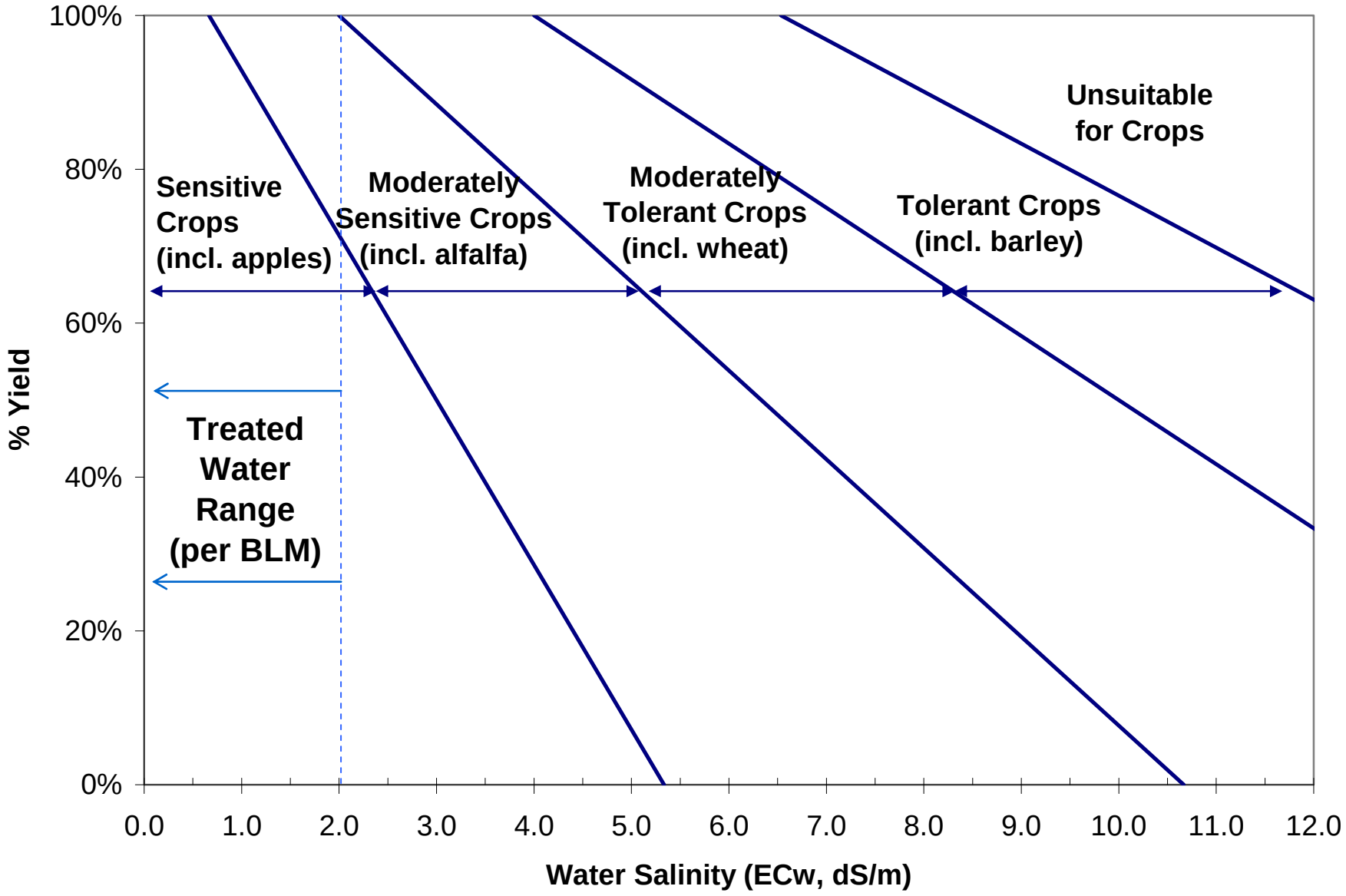
Watering With Treated Water
Thriving Antelope Bitter Bush in Front


Treated Grasses


Some Produced
Water Blended
Back through
Small Leak


120
100
80
60
40
20
0
SAR
0
1000
2000
3000
4000
5000
6000
Water Salinity (µS/cm)
RO Permeate
90/10 Mix (RO perm/raw)
75/25 Mix (RO perm/raw)
RO Permeate w/ Ca add'n
90/10 Mix w/ Ca add'n (RO perm/raw)
75/25 Mix w/ Ca add'n (RO perm/raw)

Salinity Tolerance of Crops



Modified from: Ayers and Westcott 1994, "Water Quality for Agriculture"

Next Steps??????????

- **Work on Larger Scale at SWD**
- **Riparian Improvement**

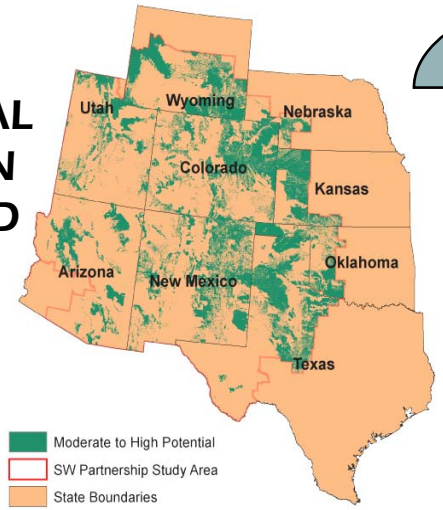
CHALLENGES TO MANAGING SOIL CARBON IN THE SOUTHWEST REGION

THE HIGHLY VARIABLE CLIMATE, TOPOGRAPHY, SOILS AND MANAGEMENT SYSTEMS OF THE REGION MAKE IT DIFFICULT TO PREDICT HOW CHANGES IN CLIMATE AND LAND MANAGEMENT WILL AFFECT GREENHOUSE GAS LEVELS. PUBLIC AND PRIVATE INVESTMENT IN PROGRAMS AND PROJECTS IS BASED ON A GOOD UNDERSTANDING OF RISK:BENEFIT.

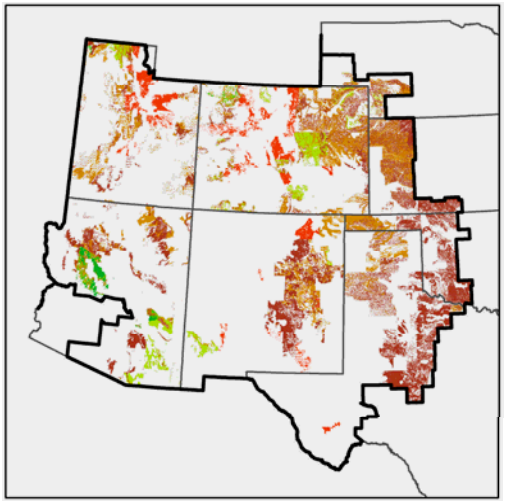
HISTORICAL DEGRADATION CAUSED BY INAPPROPRIATE HUMAN ACTIVITIES (LIVESTOCK GRAZING, ROAD BUILDING, ENERGY EXPLORATION, DEVELOPMENT) HAS DEPLETED SOIL AND VEGETATION RESOURCES AND RESTORATION IS AN ACTIVE, NOT PASSIVE, PROCESS

MAKING CREDIBLE ESTIMATES OF CARBON SEQUESTRATION POTENTIAL

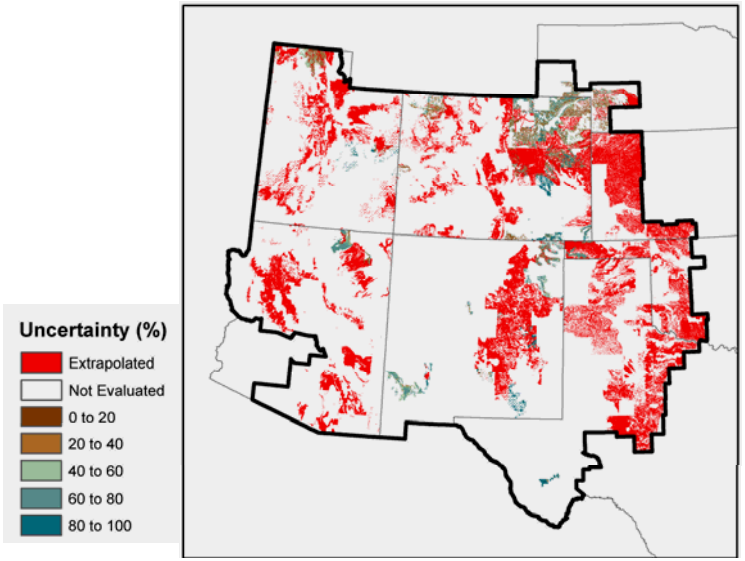
STEP 1. IDENTIFY POTENTIAL BASED ON SOILS AND CLIMATE



STEP 2. IDENTIFY POTENTIAL OF SPECIFIC PRACTICES

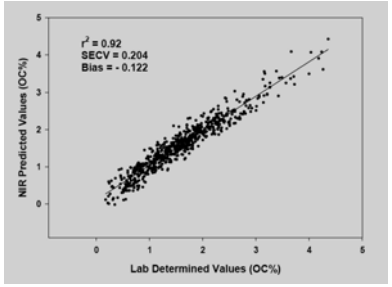


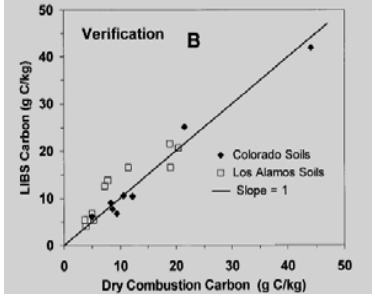
STEP 3. IDENTIFY UNCERTAINTY OF ESTIMATES



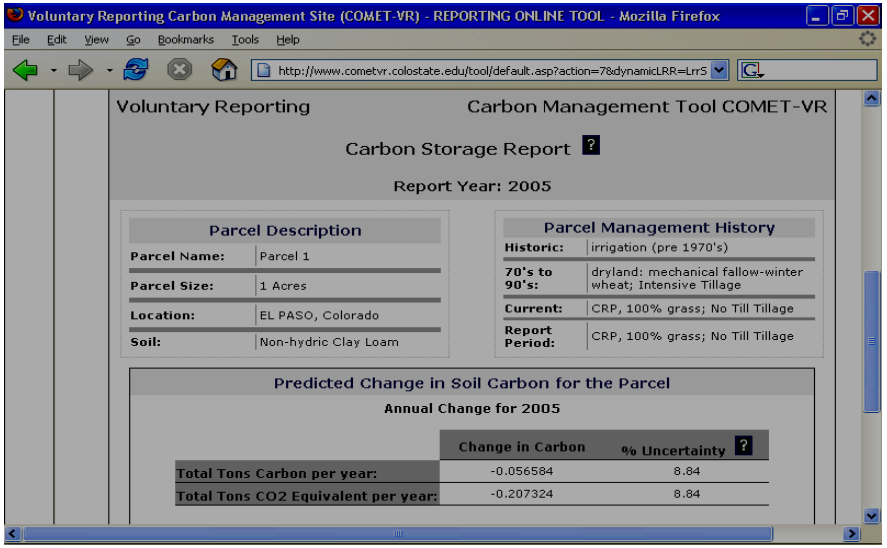
RESOLVING UNCERTAINTY

Step 4. Collect soils from areas with high uncertainty with known land use histories, known climate histories



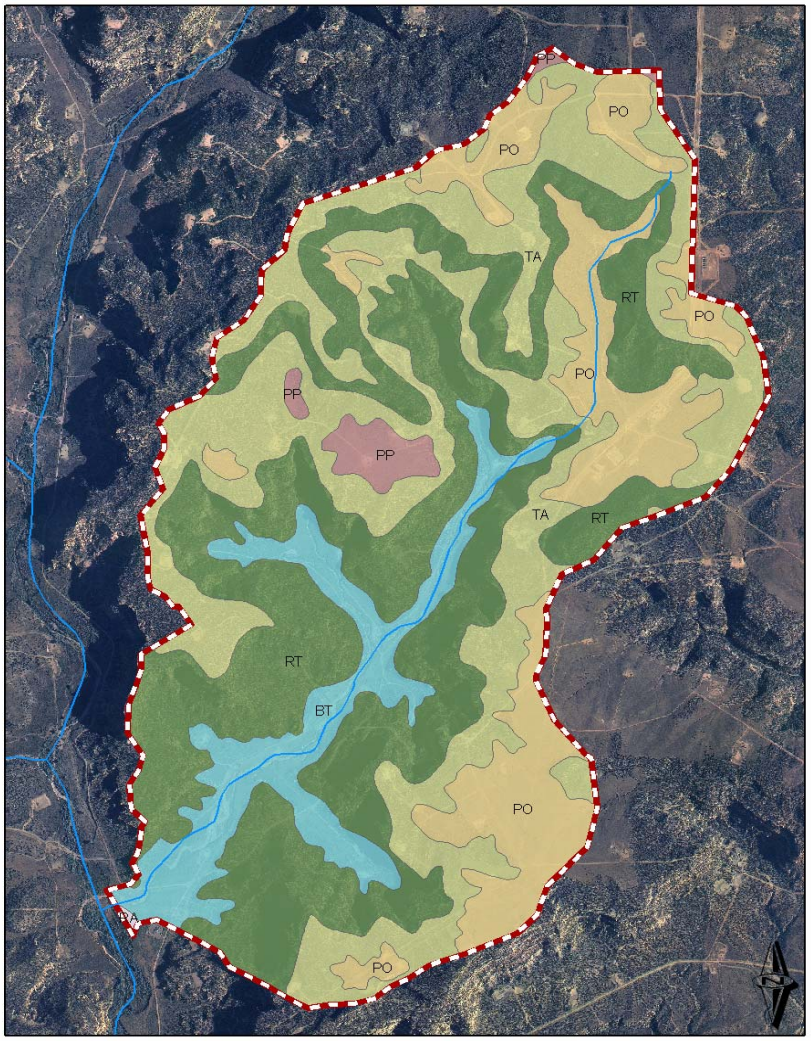


Step 5. Use results to refine model outputs and decrease uncertainty estimates



ANALYSIS AND RESTORATION OF DEGRADED LANDSCAPES

LaManga Canyon



Symbol	Soil	Name	Percent of Area
	BT	Blancot-Notal association	10.2
	PO	Penistaja loam	17.0
	PP	Penistaja-Buckle association	1.8
	RA	River Wash	0.1
	RT	Rock-Travessilla-Weska cmplx	40.3
	TA	Travessilla-Weska-Rock cmplx	30.6

La Manga Canyon Watershed

- Soil carbon analysis of San Juan Basin landscapes affected by grazing and energy exploration
  - Increased pinon-juniper, decreased sagebrush, invasive cheatgrass, downcut drainages
- Use of produced water for restoration
  - New filtration technologies for cleaning water
  - Distribution technologies to enhance survival of planted species
  - Selection of appropriate species for reseeding
  - Landscape scale restoration

Southwest Regional Partnership for Carbon Sequestration

Coal Bed-Methane Produced Water for Vegetation Establishment

- **Objectives:**
  1. Selected cultivars that are salt tolerant.
  2. What is the breaking point for TDS (total dissolved salts) affecting plant growth.

This is not agronomy and we are not growing forage we are seeking plants that can survive with a minimum of added water and can tolerate drought and herbivory