

Porter Canyon Experimental Watershed Smith Creek Ranch

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Smith Creek Ranch

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USDA Natural Resource Conservation Service

US Fish and Wildlife Service

The Problem

- 18 million hectares in the Great Basin are Piñon and Juniper woodlands
- 2/3 -3/4 of these trees are in areas formerly dominated by sagebrush prior to 1860
- As these areas become dominated by trees and less dominated by native grasses, shrubs and forbs
- Risk of catastrophic fire increases
- Erosion increases
- Wildlife habitat decreases
- Invasion of weeds increases
- This has the potential to alter the hydrologic cycle in undesirable ways (water quantity and quality)

Porter Canyon Experimental Watershed

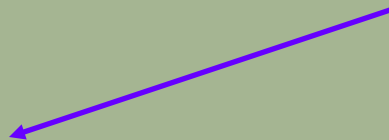
Objective

Quantify the vegetative and hydrologic response to piñon & juniper treatment at the watershed scale

Methods

Fully instrumented watershed
to measure all aspects of the water budget

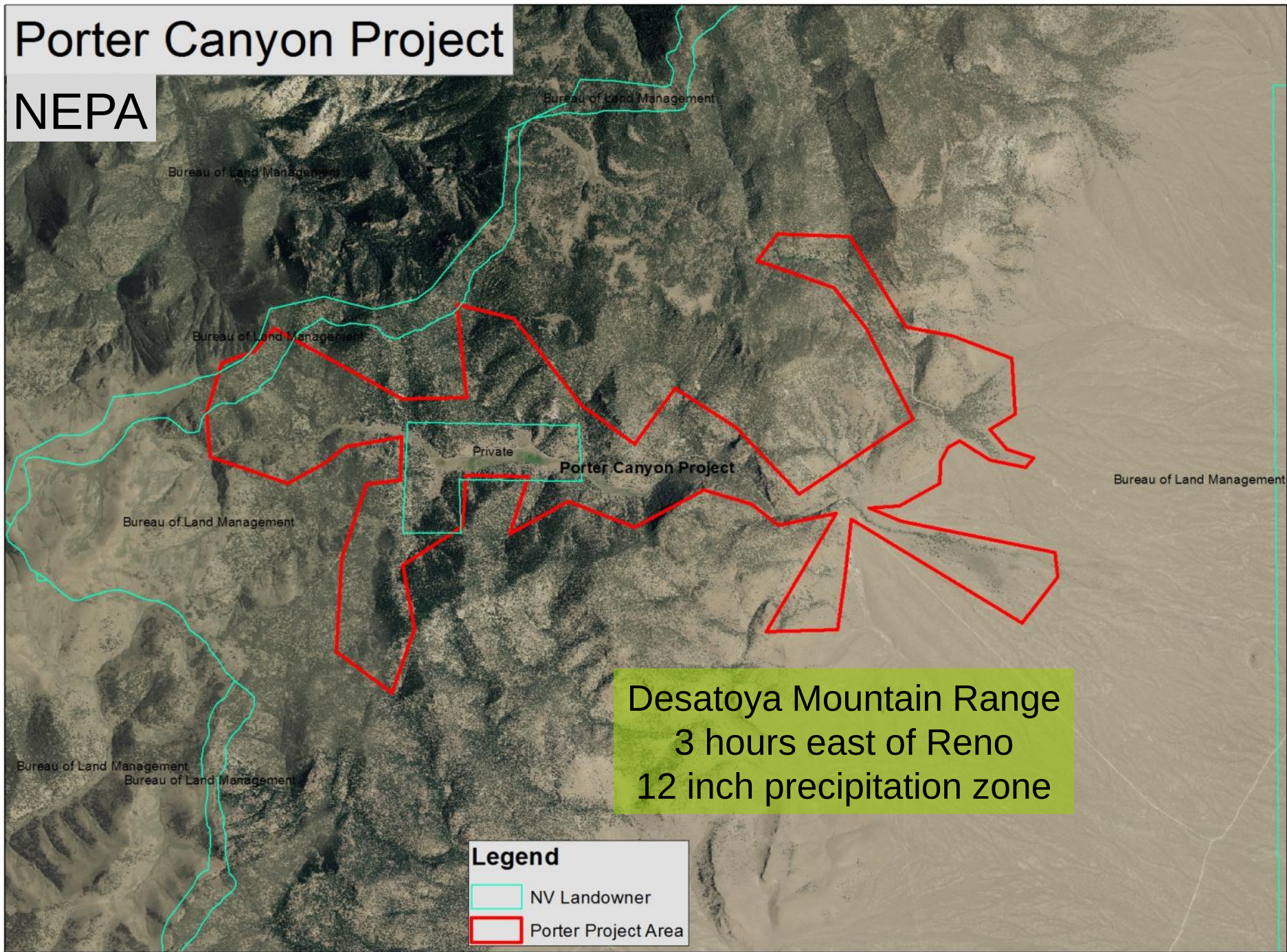
Precipitation = Evapotranspiration + Runoff + Recharge



Recharge = changes in soil moisture, surface water, groundwater

Porter Canyon Project

NEPA



Week April 20, 2011



Wet meadow

Wet meadow

Channel

Channel

Wet meadow

Summer 2009: 140 acres treated



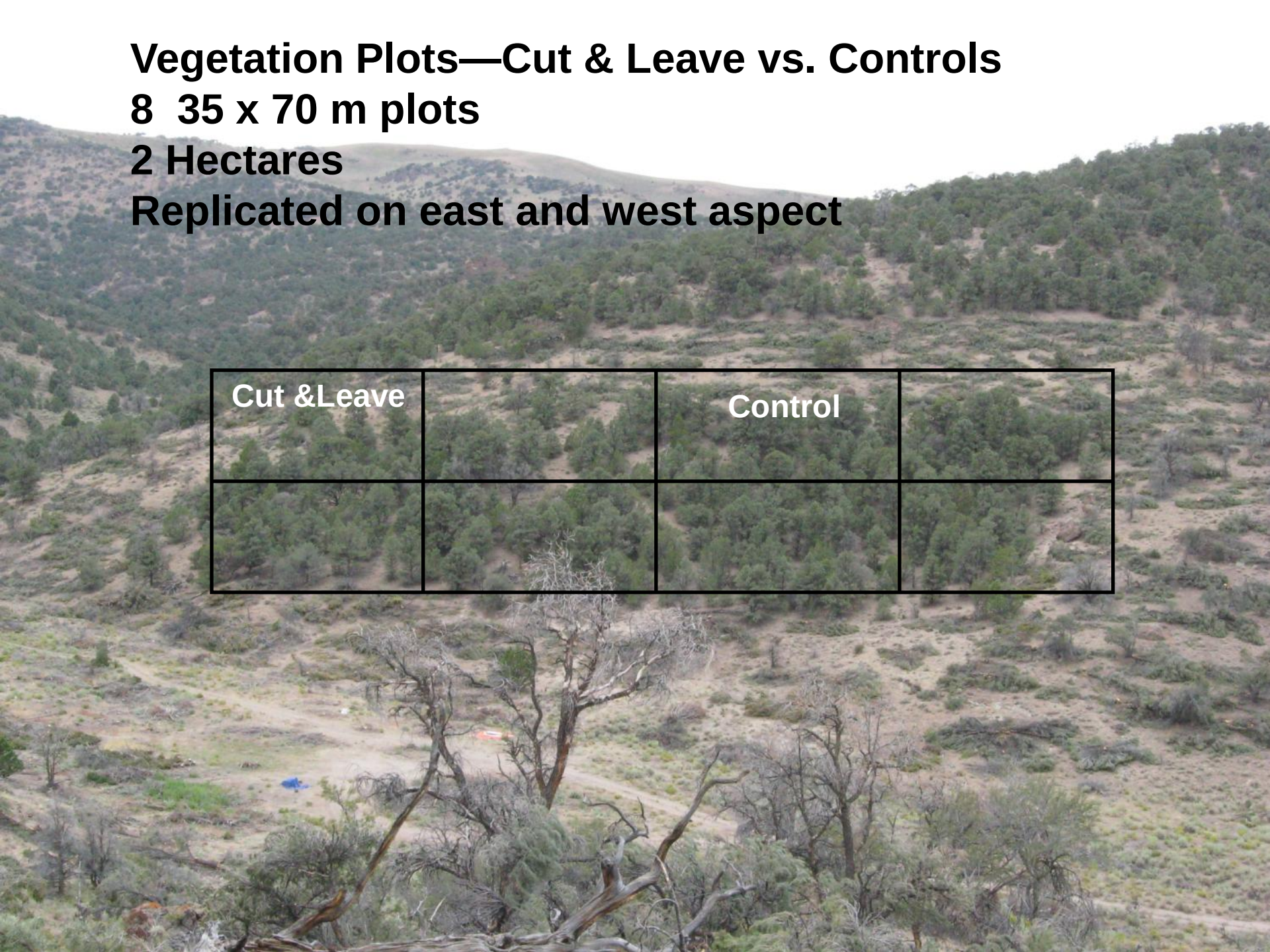
Smith Creek Ranch (Ray Hendrix and Duane
Coombs)
received the BLM National Conservation Award in
2010

Vegetation Plots—Cut & Leave vs. Controls

8 35 x 70 m plots

2 Hectares

Replicated on east and west aspect



Cut & Leave		Control	

Soil Water and Tree Water Use

- Soil moisture sensors
- Determine soil water change with treatment and time
- Sapflow probes that measure liters of water used by the tree
- Stable isotopes to determine the sources of water used by the trees



Upland Vegetation Data

- Composition
- Density
- Shrub cover
- Tree cover
- Gap
- Production
- Soil Stability



2009

Groundwater Wells



- 20 Wells in the meadow
- 4 Control Wells upstream
- Continuously recording pressure transducers

Meadow Vegetation Data

Five Transects

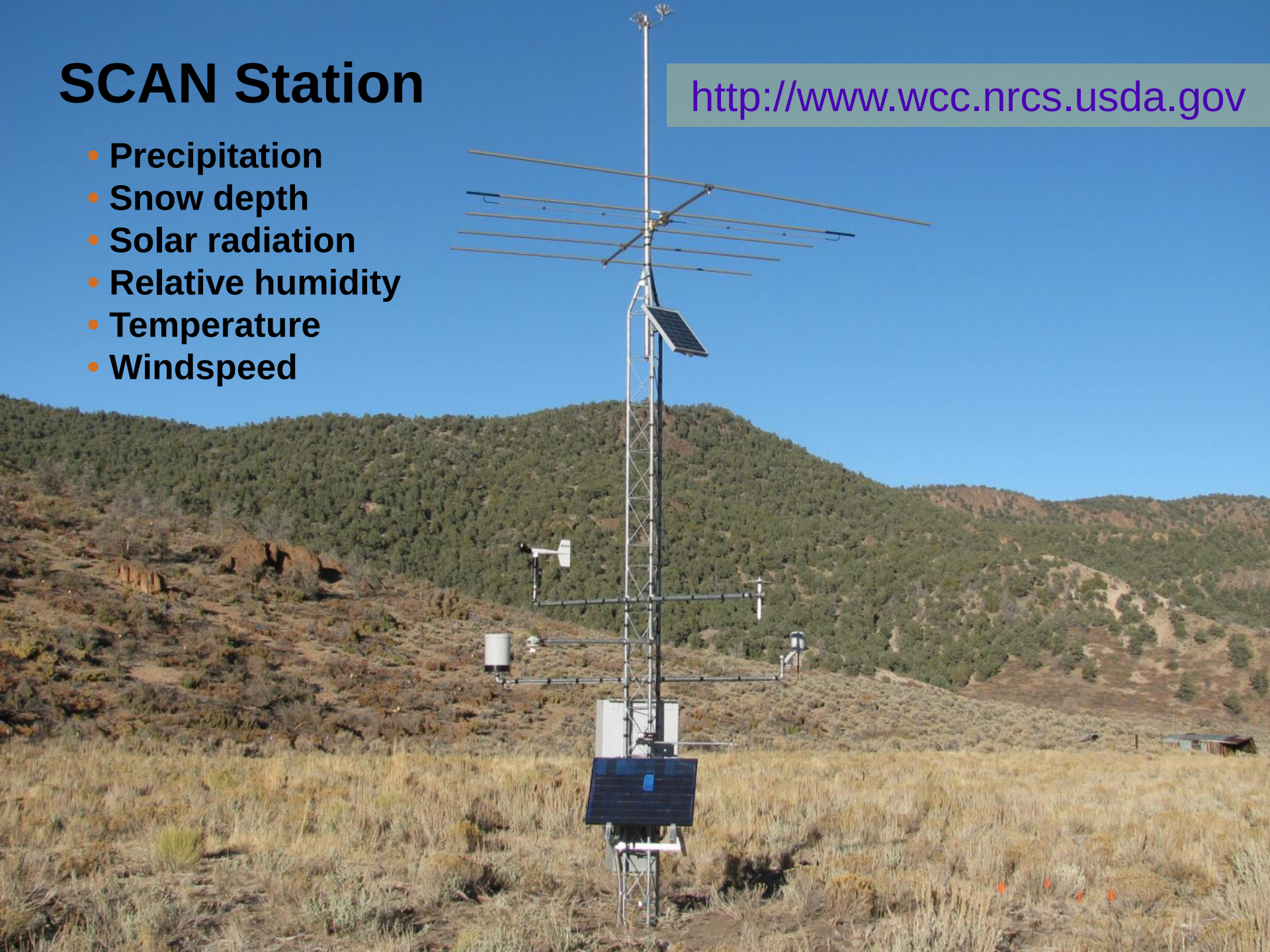
- Composition
- Shrub Cover
- Shrub Density



SCAN Station

<http://www.wcc.nrcs.usda.gov>

- Precipitation
- Snow depth
- Solar radiation
- Relative humidity
- Temperature
- Windspeed

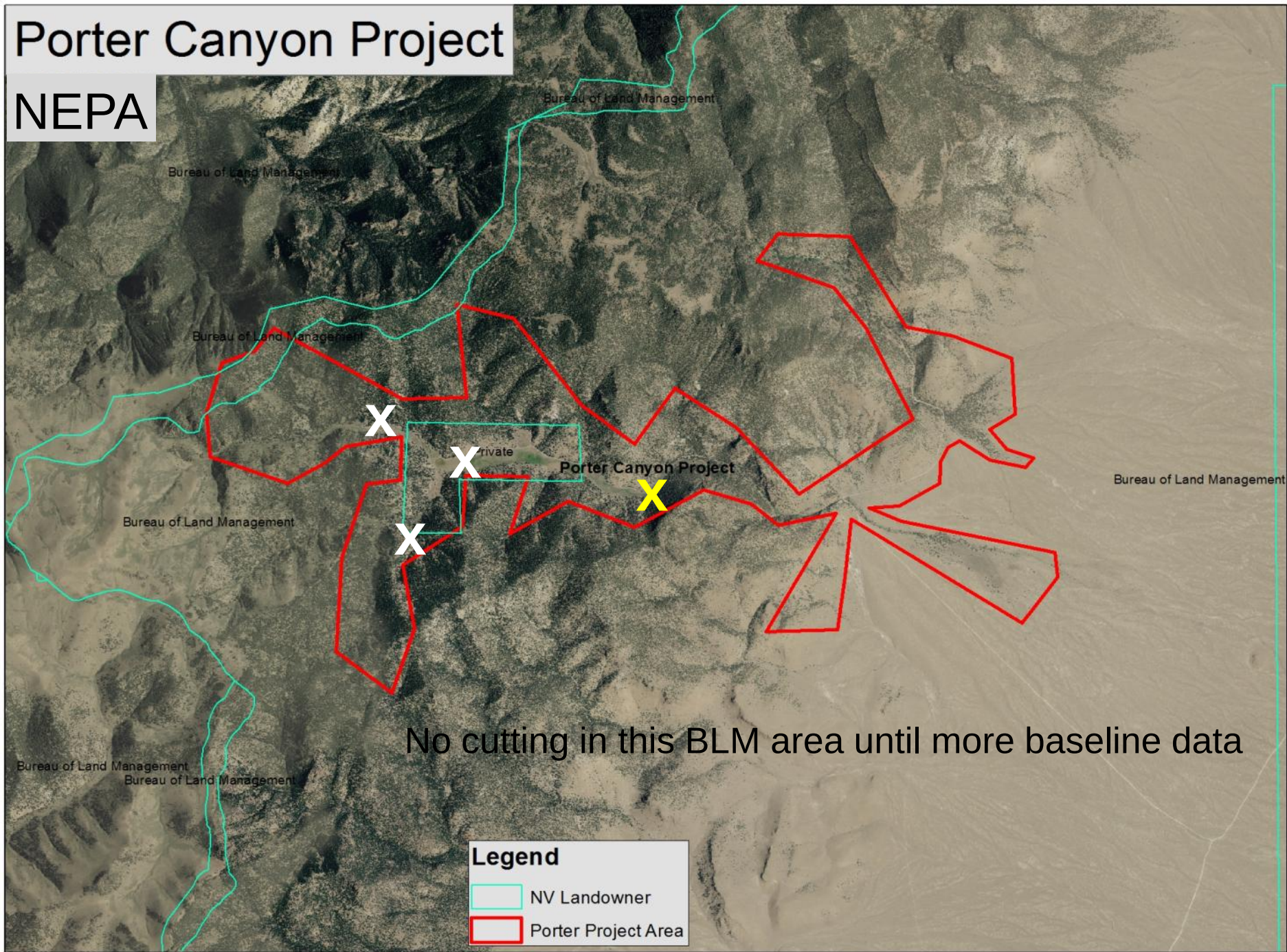


Spring Flow Instrumentation



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Effect of tree canopies on rainfall partitioning (Sam Lossing-Univ. of Idaho)

- 4 Storm sizes
- Tree species
 - Piñon
 - Juniper



Preliminary Results

For both species and all storm sizes

- 23-80% intercepted by canopy
- 20-75% falls to ground (throughfall)
- 1-5% funneled to base of tree (stemflow)
- Interception reduces rainfall for understory plants

The Fate of Stemflow Water (Amira Dittrich-Univ of Nevada)

- Does stemflow benefit the tree?
- Reapplied stemflow with a stable isotope label
- Track labeled water in the ecosystem



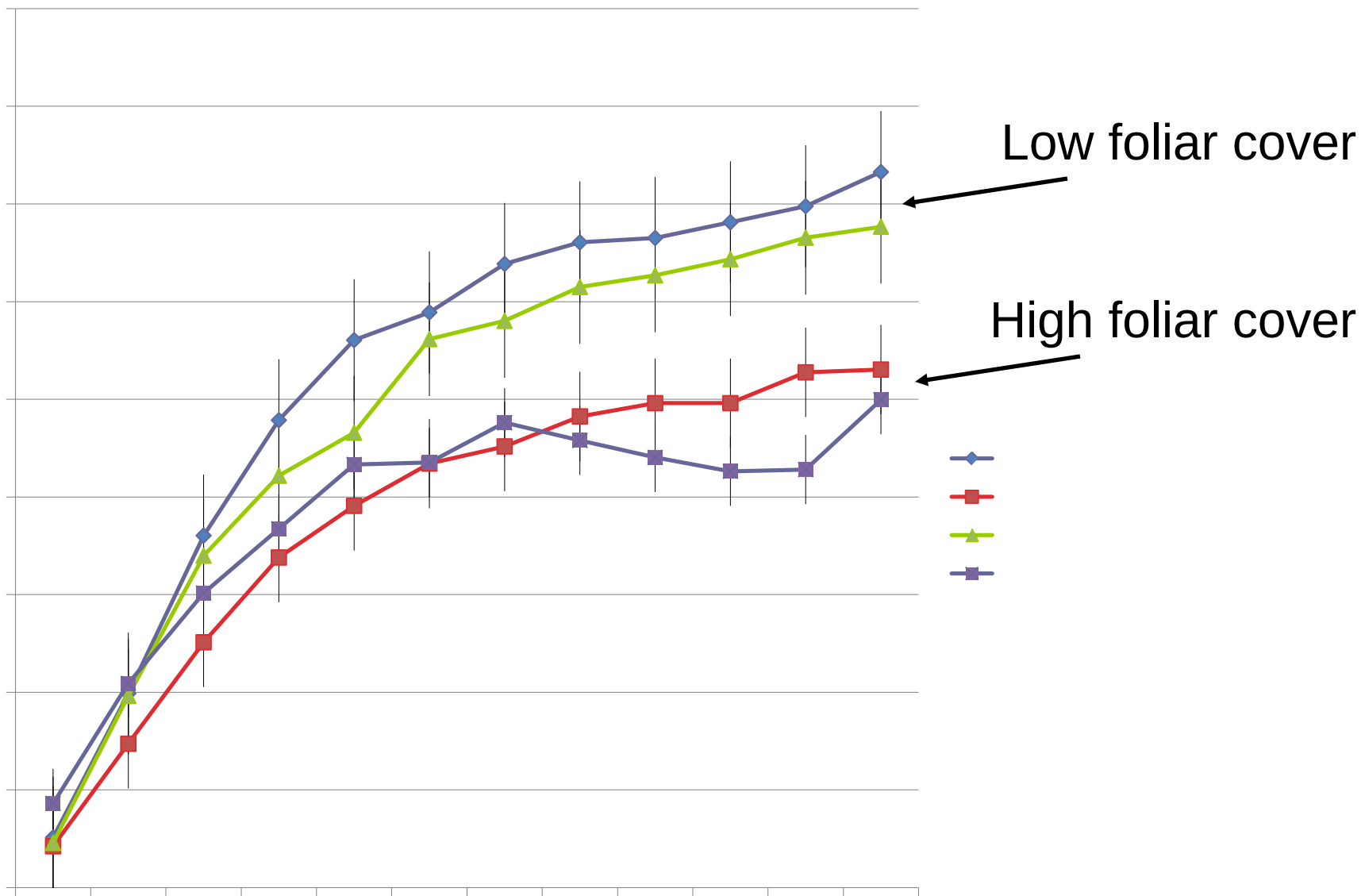
Effects of harvesting on runoff and sediment production (Sarah Noelle—Univ. of Arizona)

- Small plot rainfall simulation on a treated hillslope

Four vegetative conditions

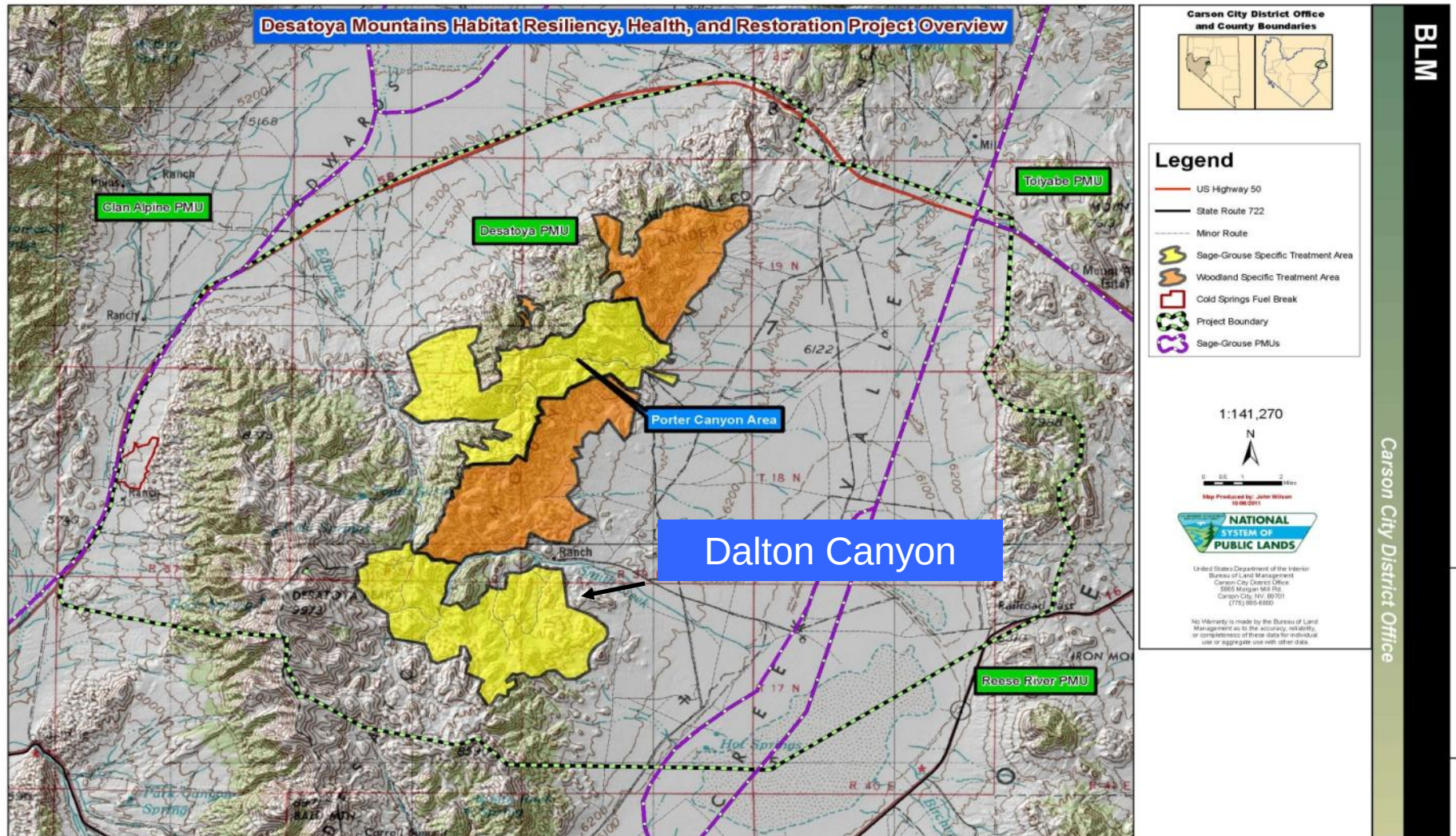
- High Live Foliar Cover with and without slash
- Low Live Foliar Cover with and without slash





BLM's Desatoya Mountains Habitat Resiliency, Health, and Restoration Project

- Multi-Year, Multi-Discipline Integrated Landscape Project (≈32,000 acres of direct treatment within ≈230,000 acres of influence)



Goals and Objectives

- Enhance sagebrush and degraded wet meadow habitat for sage-grouse and other sagebrush dependent species
- Enhance P/J woodland habitat for declining P/J dependent bird species and mule deer
- Enhance riparian habitat that supports diversity of bird and mammal species
- Reduce fuel loads and catastrophic fire risk

Treatments

*Phased implementation over 10 years with
baseline data*

- Up to 100% P/J removal on up to $\approx 18,000$ acres
- 20 to 75% P/J removal on up to $\approx 14,000$ acres
- 8 miles of meadow/riparian fencing
- Pipelines to water supplies for animals
- Mowing/herbicide treatment of decadent rabbitbrush/sagebrush
- Hydrological assessment in Porter and Dalton Canyons.

Additional Partnerships

- USGS (sage-grouse monitoring)
- NDOW (vegetation, sage-grouse, and mule deer monitoring; additional funding, sagebrush seedlings)
- Great Basin Bird Observatory (multiple bird species monitoring)
- USDA NRCS (ecological site verification)

Thanks! Looking forward
to the future...



Experiments on Processes:

- Effects of trees on rainfall redistribution
- Effects of tree harvesting on water runoff and soil erosion