

# Skin Gulch Restoration (High Park Fire)



**John Giordanengo**

*Principal Restoration Economist / Ecologist*

*[www.EconomicRestoration.org](http://www.EconomicRestoration.org)*



# Skin Gulch Restoration (High Park Fire)

## Baseline Conditions (2014, Stove Prairie Rd)



### **Primary Revegetation Trts (2015-2016)**

- *Floodplain grading*
- *500 lbs/ac of 7-2-1 Biosol*
- *400 lbs/ac of humic acid*
- *Upland and riparian seeding (110 pls/sf)*
- *Willow staking*
- *Wood straw (70% cover)*
- *D-60 riparian shrub containers*
- *Soil-covered riprap*
- *Willow fascines*
- *Various channel restoration structures & realignment*
- *Gully erosion control structures (various)*

# Skin Gulch Restoration (High Park Fire)

110 PLS per sf

## Upland Seed Mix

Species (Common Name)	Life History	% Mix (desired)
<i>Achillea lanulosa</i> (Western yarrow)	NPF	5
<i>Achnatherum hymenoides</i> (indian ricegrass, RIMROCK)	NPG	10
<i>Artemisia frigida</i> (fringed sage)	NPF	8
<i>Bouteloua curtipendula</i> (sideoats grama)	NPG	7
<i>Bromopsis ciliatus</i> (fringed brome)	NPG	15
<i>Elymus albicans</i> (Griffith's/montana wheatgrass)	NPG	7
<i>Bromus marginatus</i> (mountain brome, UP)	NPG	10
<i>Chondrosum gracile</i> (blue grama, Bad River)	NPG	5
<i>Elymus canadensis</i> (Canada wildrye)	NPG	8
<i>Elymus trachycaulus</i> (Slender Wheatgrass, San Luis)	NPG	10
<i>Festuca arizonica</i> (Arizona fescue, REDONDO)	NPG	4
<i>Festuca idahoensis</i> (Idaho fescue)	NPG	5
<i>Koeleria macrantha</i> (prairie junegrass)	NPG	5
Regreen	n/a	1
<b>Subtotal</b>		<b>100</b>

Lack of forbs due to weed content of lots, and lack of commercial availability of desirable species at time of sourcing.

# Skin Gulch Restoration (High Park Fire)

> 95% Success Rate in Willow Cuttings, moderate willow diversity (2018).



Native plant cover in floodplain, low weed cover (20218)



# Skin Gulch Restoration (High Park Fire)

Riprap prior to soil cover  
(2015).



Native plant cover on  
soil-covered riprap  
(2017)



# Skin Gulch Restoration (High Park Fire)

## Challenges / Failures

- *Near 100% failure of shrub container plantings due to lack of root ball development and lack of irrigation.*
- *Low availability of native seeds at time of planting*
- *Lack of soil amendments in reach B contributed to low revegetation success in tributary above Stove Prairie Rd.*

## Successes

- *High Plant Community Diversity, relative to other High Park Fire restoration sites (CSU student study)*
- *High stream function and floodplain connectivity*
- *Diverse and high willow cover*
- *Low weed dominance*



# ***Plant Community Responses to Seeding Following High Park Fire (EWP program of NRCS)***

***John Giordanengo***


*Principal Restoration Economist / Ecologist*

*[www.EconomicRestoration.org](http://www.EconomicRestoration.org)*



**Economic  
Restoration**

# Wildfire Trends in CO



<b>YEAR</b>	<b>NAME</b>	<b>ACRES</b>
2020	Pine Gulch	139,007
2002	Hayman	137,760
2013	West Fork Complex	109,049
2018	Spring Creek	108,045
2020	Cameron Peak	102,596
2012	High Park	87,250
2002	Missionary Ridge	71,739
2018	416	52,778

The 20 largest CO wildfires on record occurred in the past 23 years.

14 of those erupted between 2008 and 2019.

The 3 largest wildfires occurred in 2020.



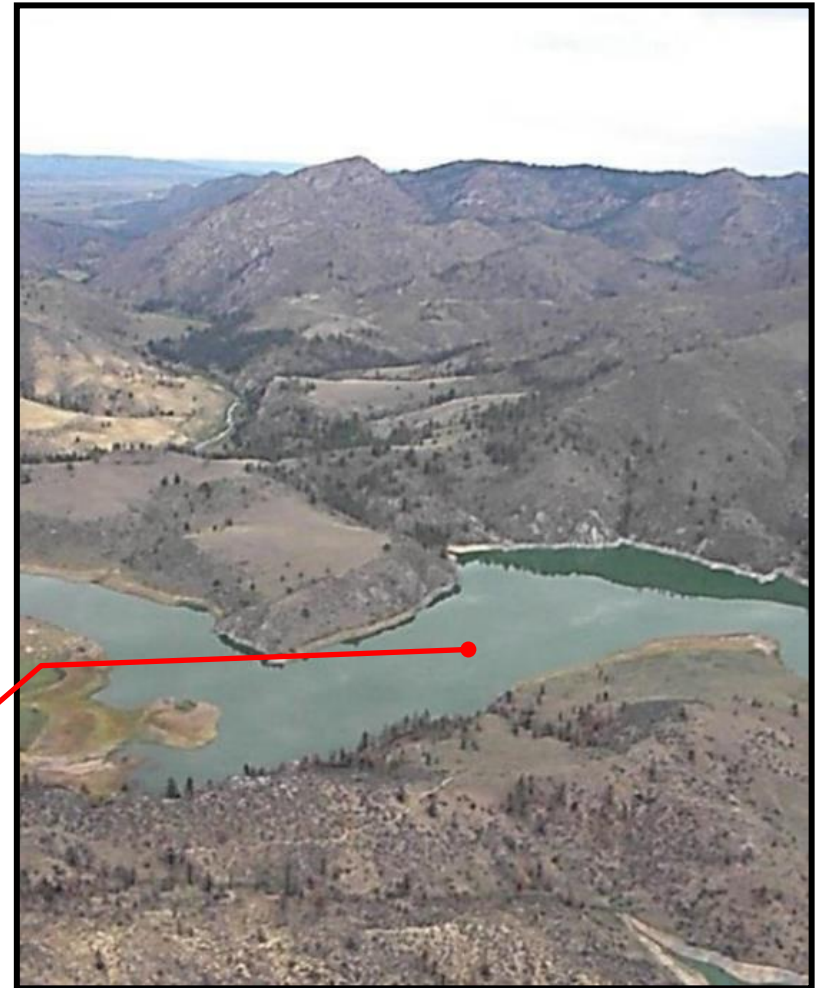
# Goals of Post-fire Emergency Watershed Protection

## Short Term

(3-5 yrs)

- Stabilize hillsides at high risk of erosion.
- Protect water quality.
- Protect roads and other infrastructure.

Algal Blooms in  
Seaman Res.  
(Hewlett Gulch Fire)



***It's Not All Bad***  
***(from an ecological standpoint)***



# Natural Colonization After Fire



2+ century dormancy

*Geranium bicknellii*, G5/S2



*Phacelia sericea* (foothills ecotype)



180-yr dormancy  
Germ. readily following fire

*Dracocephalum parviflorum*

*“The promotive effect of smoke derived from burnt native vegetation on seed germination of Western Australian plants.”*

~ Dixon et al (1995). *Oecologia*, 1995, 101: 185

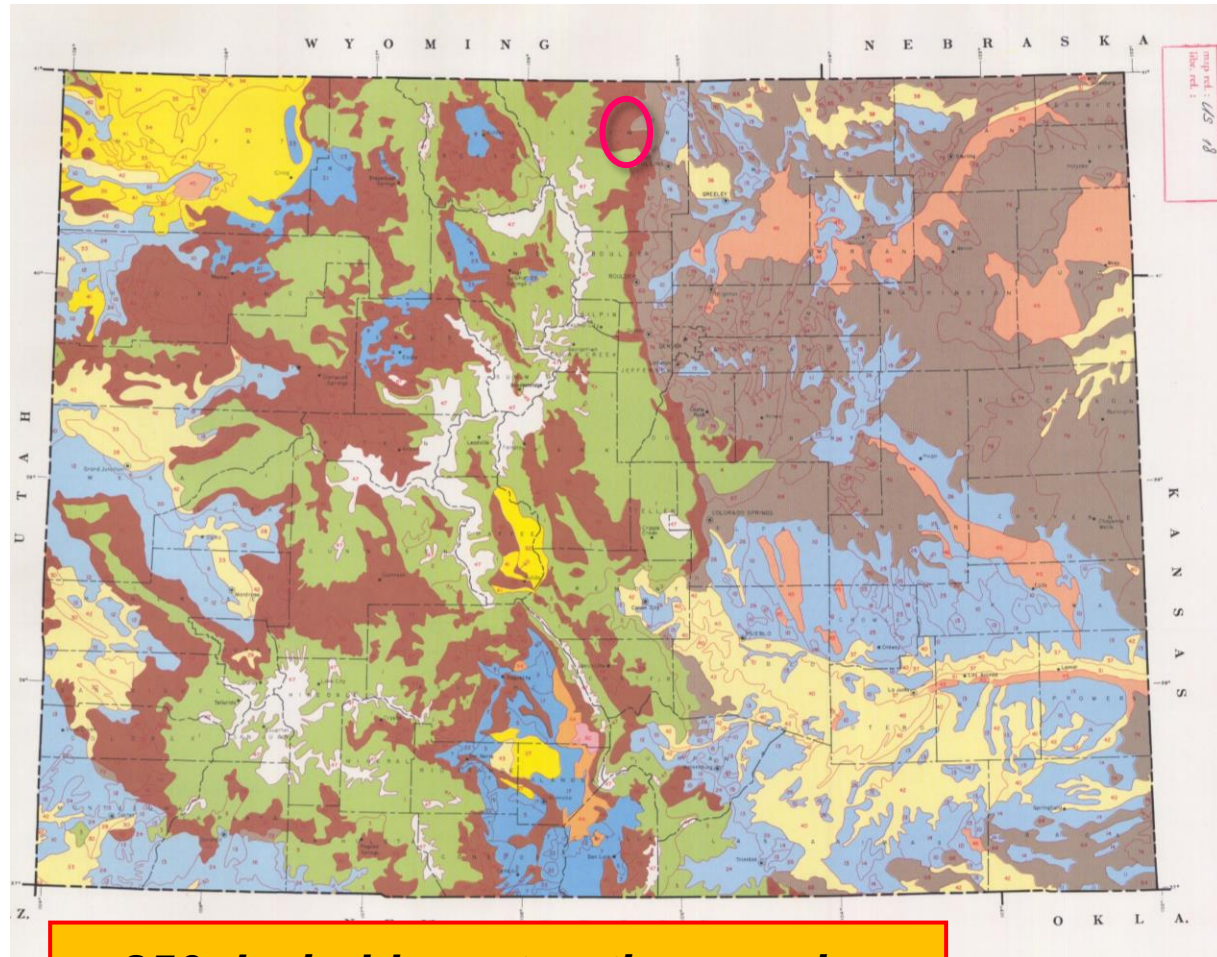
# *Natural Colonization After Fire*



*Shrubs re-sprout readily from  
perennating buds  
(root crown, rhizomes, etc.)*



# *Species Availability for Post-fire Restoration in High Park & Cameron Pk Burn Areas*



**250 desirable restoration species**  
(adapted to elevation & geography & soils)

# Refining Species Selection

## Soils, Geology, Hydrology, Ecology, and Environmental

### Soils

pH  
Electrical Conductivity/Salinity  
Texture  
Trace metals  
Macronutrients  
Micronutrients  
Organic Matter

### Ecology/Biology

Reference Community  
- % Cover  
- Diversity/richness  
- Composition  
- Structural Diversity  
- Wildlife Needs

### Abiotic

Hillslope angle  
Elevation/Frost-free Season  
Aridity  
- Precipitation  
- Geography  
- Topography  
Hydrology

## Regulatory, Land Use, and Resource Constraints

### Post-restoration Land Use & Goals

Recreation  
Grazing  
Wildlife  
Ecological Uplift  
Protection of Infrastructure

### Resource Constraints

Plant Materials Availability  
Budget Limitations  
Funding Schedules

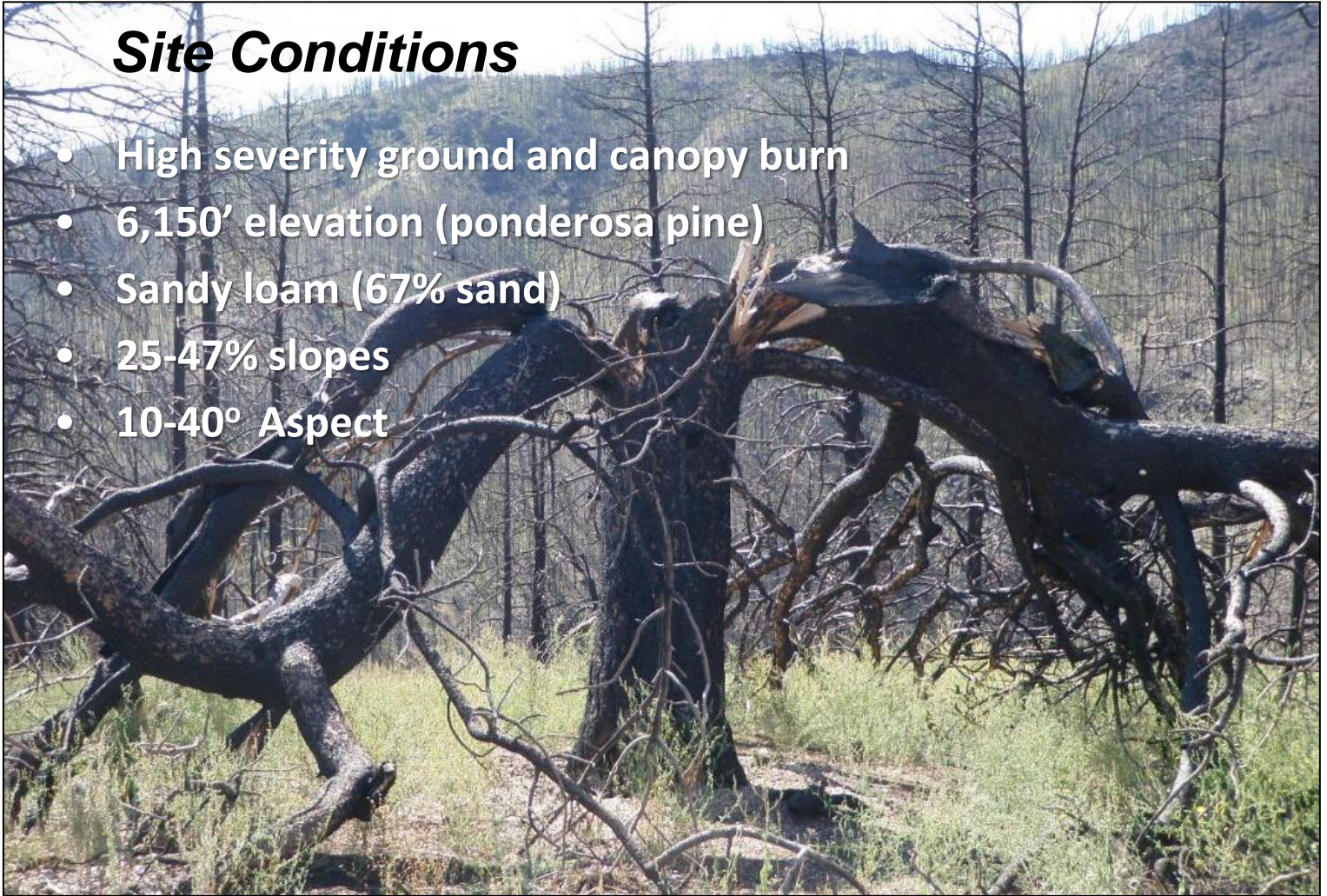
### Regulatory

Bond Release  
Weeds  
Cover  
Composition  
Species-specific

# High Park Fire Research

## Site Conditions

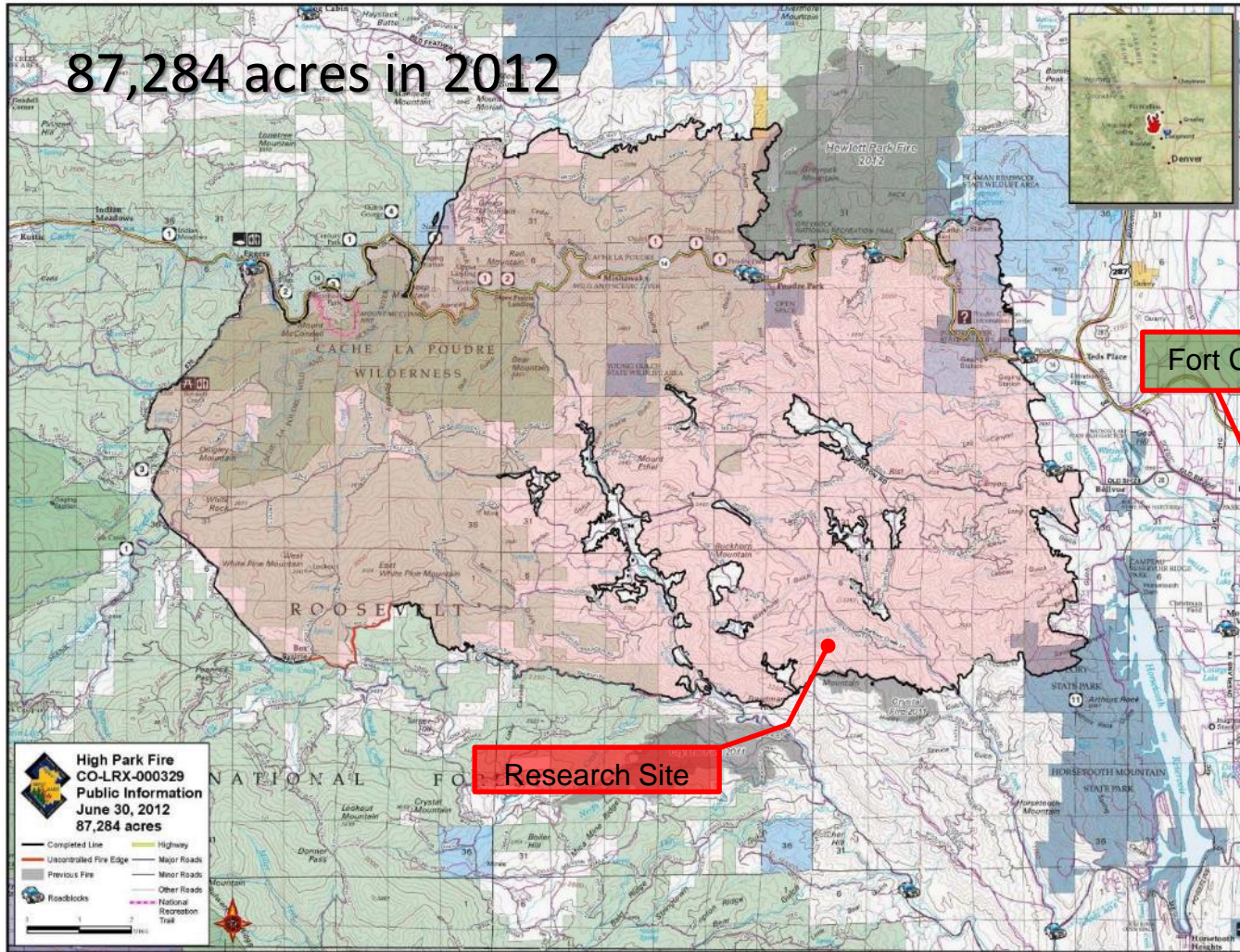
- High severity ground and canopy burn
- 6,150' elevation (ponderosa pine)
- Sandy loam (67% sand)
- 25-47% slopes
- 10-40° Aspect



**Thanks To:** WRV volunteers, CNHP volunteers, CPRW staff/volunteers, NRCS, Bob & Peggy Reichert (landowners), AloTerra Restoration Services staff and volunteers, Pat Murphy of Cedar Creek Associates.

# High Park Fire

87,284 acres in 2012





# Experimental Design



## Three treatments (fall 2012)

*Rake* (seed/mulch)

*No Rake* (seed/mulch)

*Control*

## Four blocks / treatment

50 x 150 feet

## Ten transects per block

68 points per transect

## 6-foot wide belt transect

For presence/absence

# ***NRCS Watershed Protection Seed Mix***



- *Bromus marginatus*  
(Bromar, MT)
- *Elymus trachycaulus*  
(Pryor, MT)
- *Pascopyrum smithii*  
(Rosana, MT - unselected)
- *Poa secunda*  
(Mtn. home, Everywhere but...)
- Quickgaurd

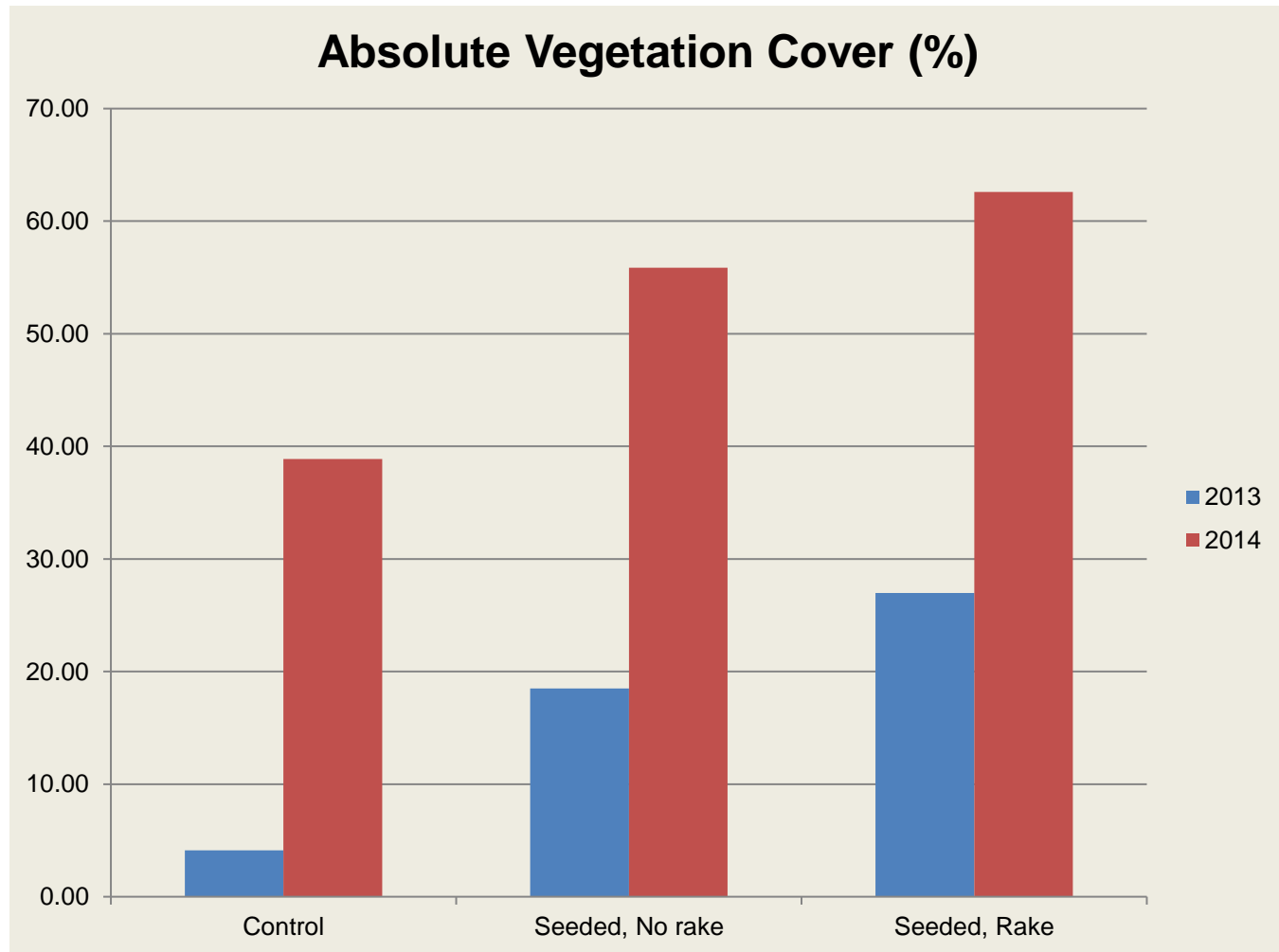
# *First Growing Season (June 2013)*



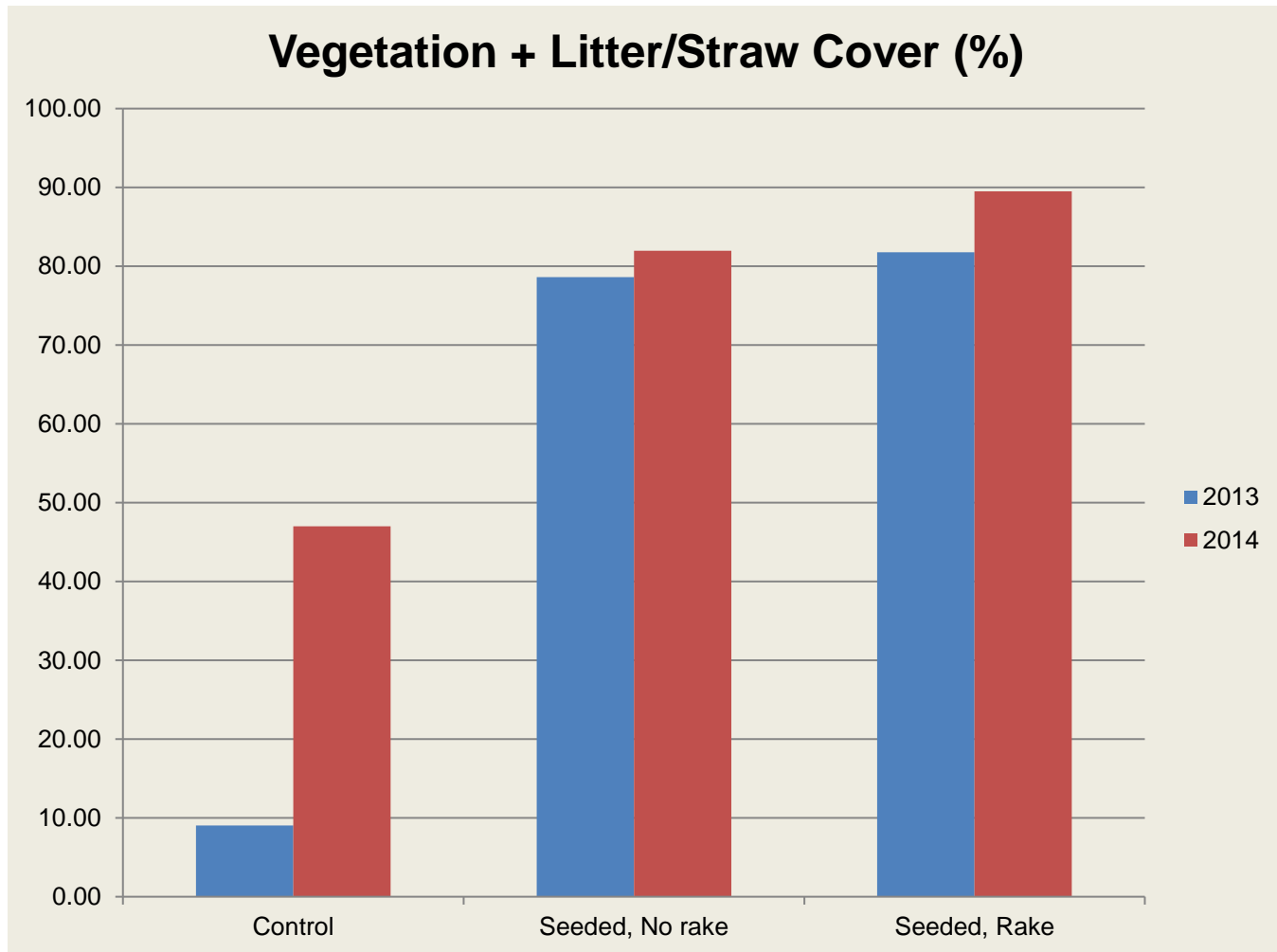
Treated

Untreated

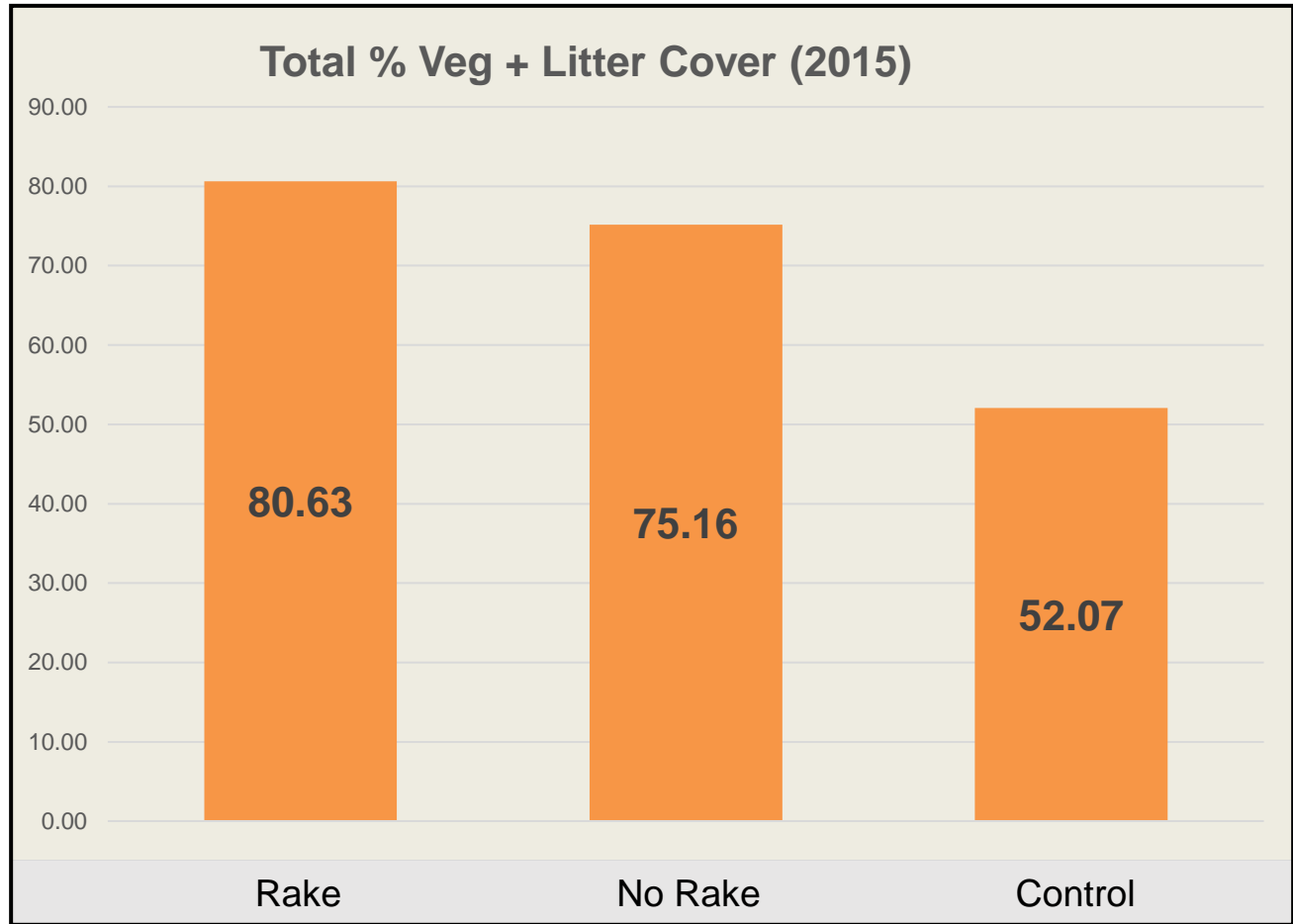
# Vegetation Cover



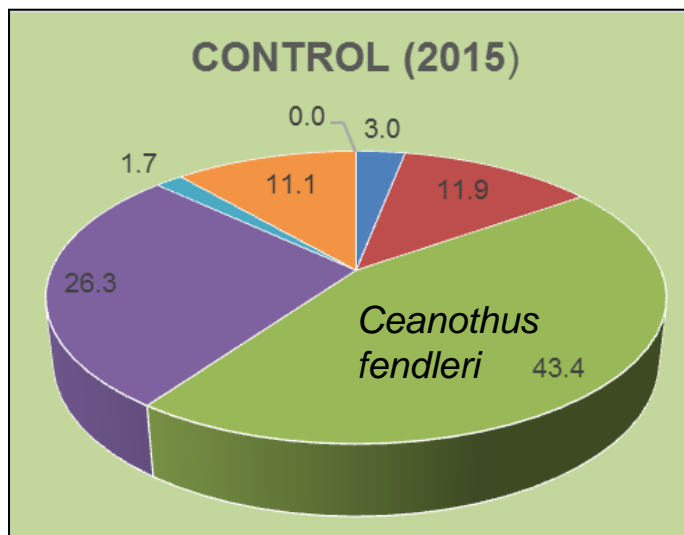
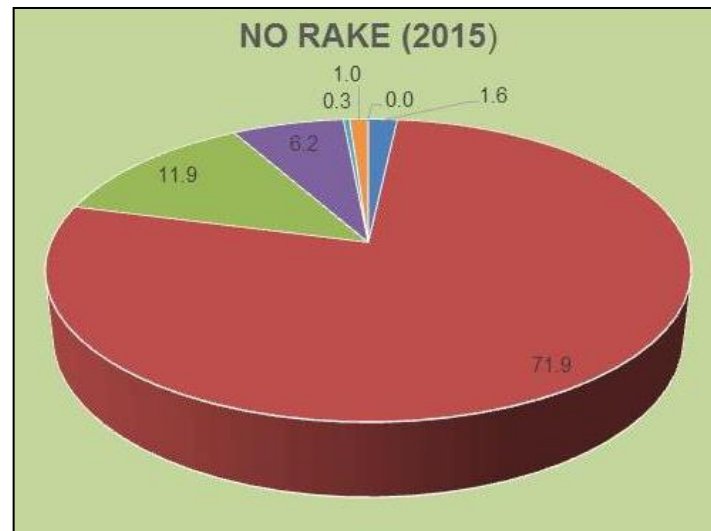
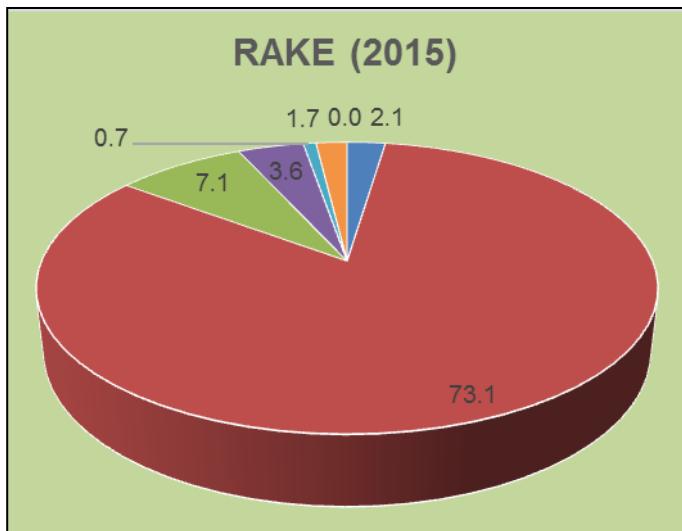
# Vegetation & Litter Cover



# *Vegetation & Litter Cover*



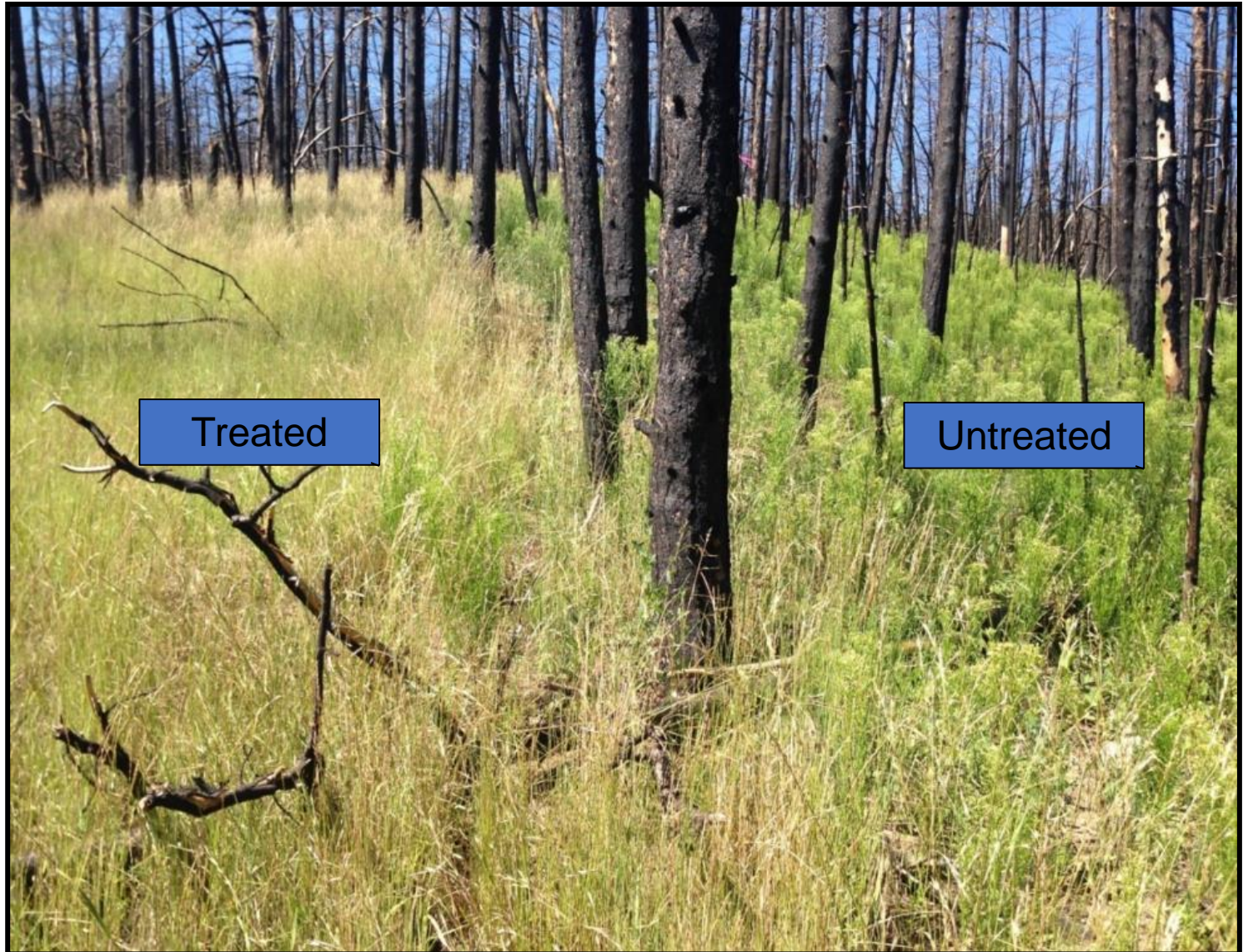
# Relative Vegetation Cover (2015)



- Native Perennial Forbs
- Native Perennial Grasses
- Native Shrubs
- Native Early Seral Forbs
- Introduced Perennial Forbs
- Introduced Early Seral Forbs/Grasses
- Triticale Cover Crop

**\* *Conyza canadensis* included in native cover**

# *Natives vs. Weeds (2015)*



Treated

Untreated



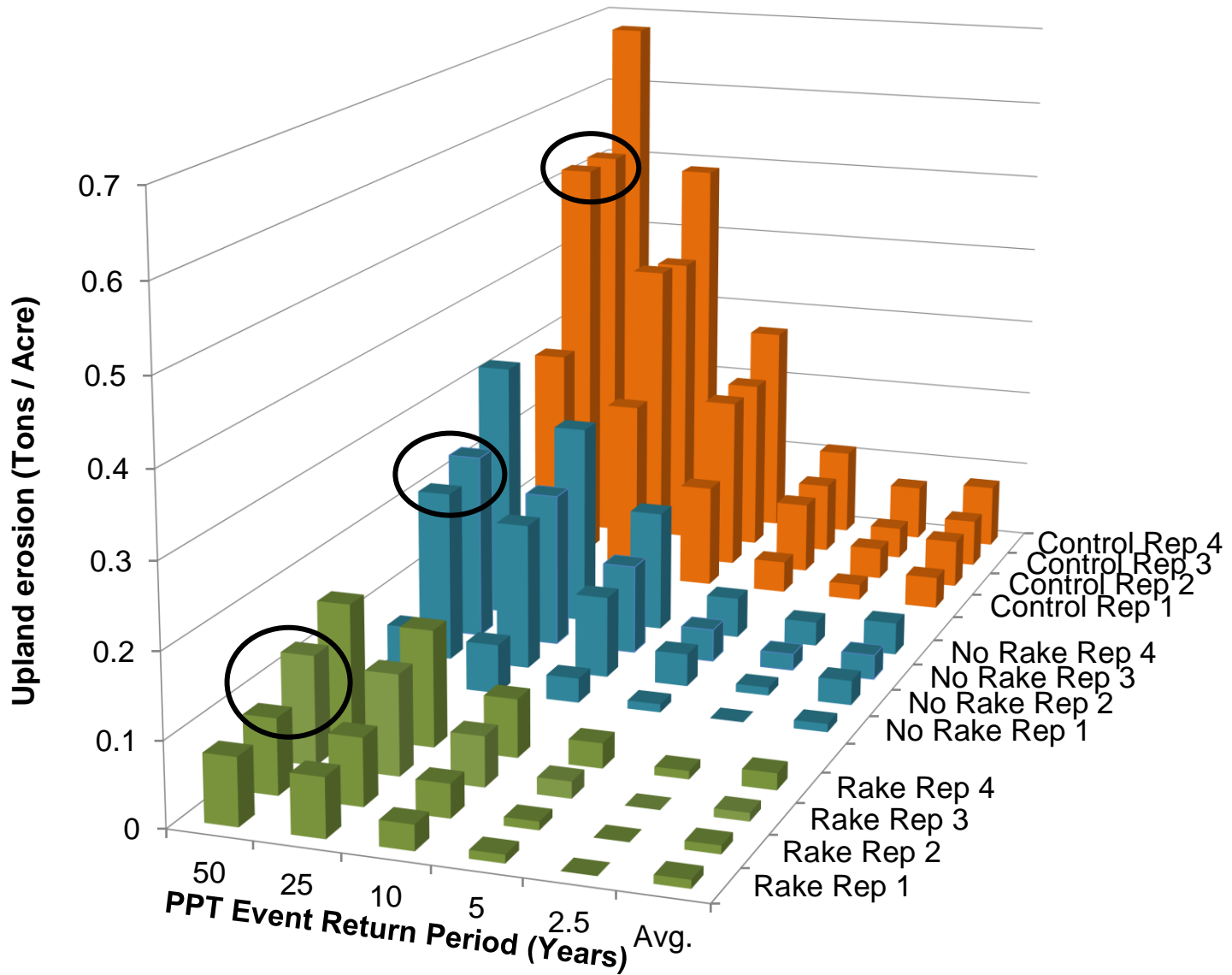
# Species Richness & Diversity

(Shannon Diversity Index)

VARIABLE	2013			2014			2015		
	Rake	No Rake	Control	Rake	No Rake	Control	Rake	No Rake	Control
Number of Species	57	61	62	60	55	80	63	58	94
Evenness	0.96	0.86	0.87	0.87	0.86	0.89	0.89	0.88	0.9
Diversity (H')	3.9	3.6	3.5	3.57	3.48	3.91	3.68	3.59	4.08

# Water Erosion Prediction Project

~ Patrick Murphy of Cedar Creek Associates



# Questions, Data, and Comments

***John Giordanengo***

*Principal Restoration Economist / Ecologist*

[www.EconomicRestoration.org](http://www.EconomicRestoration.org)

[john@EconomicRestoration.org](mailto:john@EconomicRestoration.org)

