

Colorado Plateau Native Plant Program (CPNPP) In Emergence of Seed Networks Session

Adrienne Pilmanis
4th National Native Seed
Conference
February 15, 2017
Washington DC

BLM
Colorado Plateau Native Plant Program



**Colorado Plateau
Native
Plant
Materials
Program
Est. 2009**



Figure 1. Colorado Plateau Ecoregion

Seed Network Talk Structure

- I. Impetus to formulate CPNPP
- II. History of CPNPP, Vision
- III. CPNPP Goals & Objectives, Projects & Research
- IV. Critical assessment - what would make CPNPP function better?



I. Why create CPNPP?

- **Similar ecological issues and needs as GBNPP:**
 - Fire, invasive species, drought, ecosystem services, development, habitat degradation, climate change
 - Greater reclamation needs, esp. oil & gas development
- **Scientific consensus on importance of genetic diversity for ecological function, provenance**
- **Build on success of Uncompahgre Partnership**
 - Steve Monson & Ron Bell of UPP, Colorado agencies, BLM, USFS, Steve Parr of UCEPC, other stakeholders in region
 - Collected, developed, tested and increased ~20 different germplasms. Some still in production and used in restoration & reclamation



2000's

ARS FRRL

**Upper Colorado
Environmental Plant Center**

BLM

RMRS
Shrub Lab



UT DWR
GBRC

Colorado
Plateaus

**Uncompahgre
Plateau Partnership**

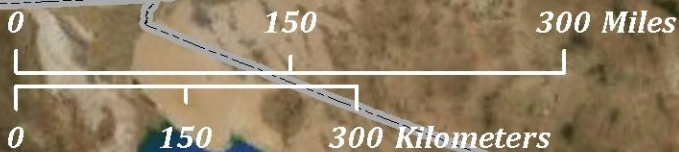


Arizona/New
Mexico Plateau



Arizona/New
Mexico Mountains

**Los Lunas Plant
Materials Center**



II. History: CPNPP est.~2009

- **Federal & state agency support and funding:**
 - BLM – Peggy Olwell
 - USFS – Prendusi, UCEPC, UP , USGS - Kitchell, NRCS LLPMC
- **Coordinator Wayne Padgett - BLM Utah 2009**
- **Science Lead Troy Wood - USGS Southwest Biological Research Station (SBRC) 2010**
- **More partners engaged due to common interests & missions, perceived needs**
- **Chicago Botanic Garden, Univ. of Utah Rio Mesa Research Center and Red Butte Botanic Garden , Northern Arizona University, Landsward institute, Northern AZ Native Seed Initiative, Mayberry Plant Propagation Center, Seed Growers and Distributors**



CPNPP Vision & Mission

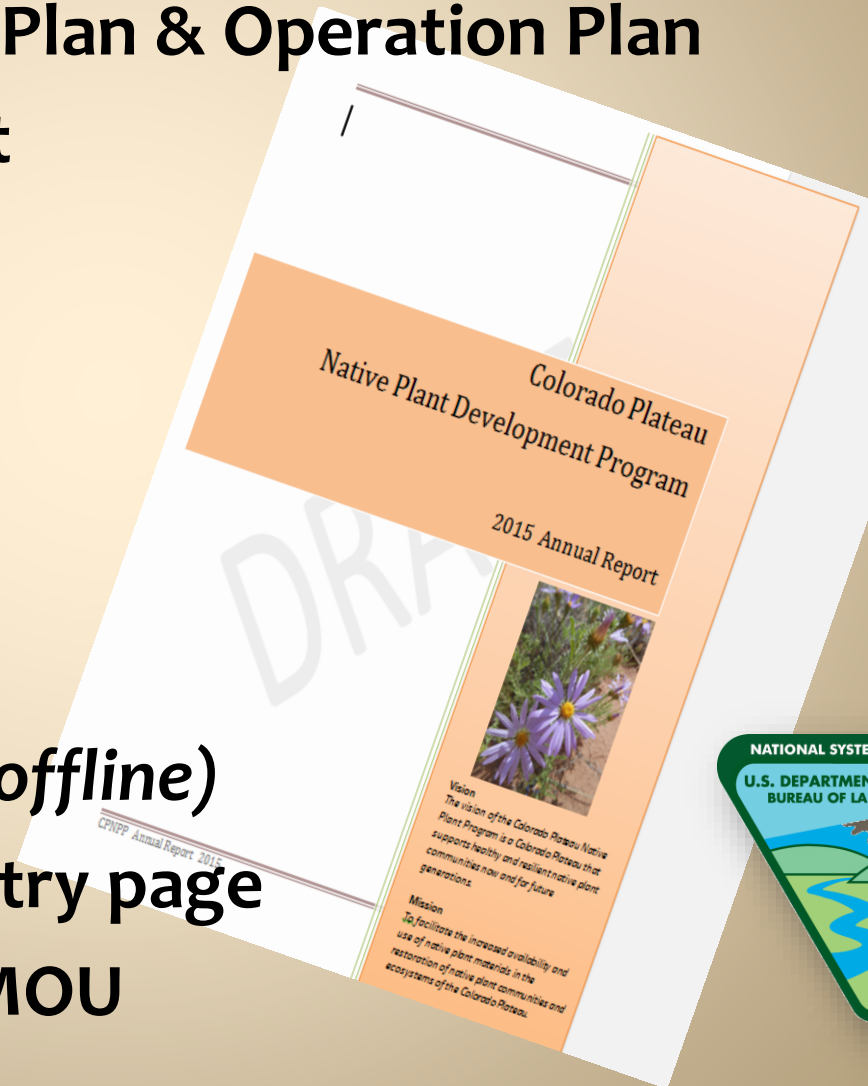
VISION - A Colorado Plateau region that supports healthy and resilient native plant communities now and for future generations.

MISSION - To facilitate the increased availability and use of native plant materials for use in restoring native plant communities and ecosystems of the Colorado Plateau region.



CPNPP Guidance, Products

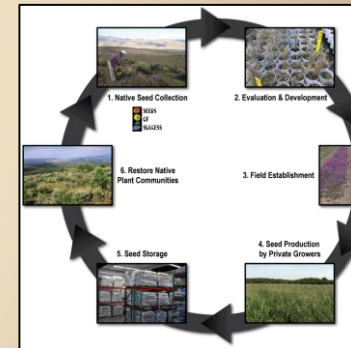
- Five-Year Strategic Plan & Operation Plan
- Priority Species List
- Research Strategy
- Annual Meeting
 - Science Retreat
- Annual Report
- Website (*currently offline*)
- Conservation Registry page
- Working Groups, MOU



III. CPNPP Strategic Goals & Objectives:

As per 2014 5-yr Strategic Plan

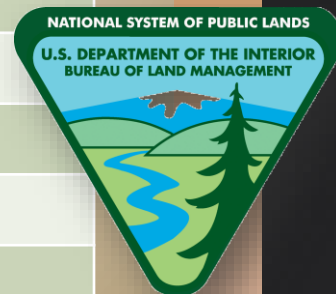
1. Collect Native Plant Materials
2. Evaluate, Research & Develop
3. Establish Foundation Fields, Increase
4. Commercial Production
5. Seed Storage
6. Restore Native Plant Communities
7. Monitor Restoration Effectiveness & Feedback
8. Communicate with Partners & Public



Germplasm available for Growers. Enough?

Grasses

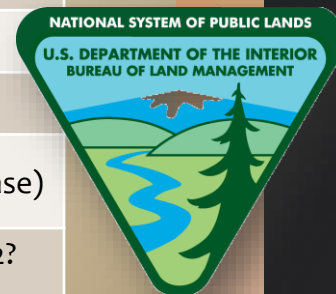
Scientific Name	Common Name	Colorado Plateau Germplasm Available
<i>Achnatherum hymenoides</i>	Indian ricegrass	Star Lake Germplasm (LLPMC 2004 release); White River (UP)
<i>Bouteloua curtipendula</i>	Sideoats Grama (not widely used)	Niner (LLPMC 1984 release)
<i>Bromus marginatus</i>	Mountain Brome	UP Cold Springs Mountain brome
<i>Elymus elymoides</i>	Squirreltail	Wapiti Germplasm (UCEPC 2007 release); UP Paradox
<i>Elymus trachycaulus</i>	Slender wheatgrass	San Luis (UCEPC 1984 release)
<i>Festuca arizonica</i>	Arizona fescue	Redondo (UCEPC 1973 release)
<i>Koeleria macrantha</i>	Junegrass	UP Sims Mesa
<i>Leymus cinerius</i>	Great Basin Wildrye	UP Cochetopa
<i>Muhlenbergia wrightii</i>	Spike muhly	El Vado (LLPMC 1973 release)
<i>Poa fendleriana</i>	Mutton grass	UP Ruin Canyon Muttongrass
<i>Poa secunda</i>	Sandberg's bluegrass	UP Colorado Plateau Sandberg bluegrass



Germplasm available for Growers. Enough?

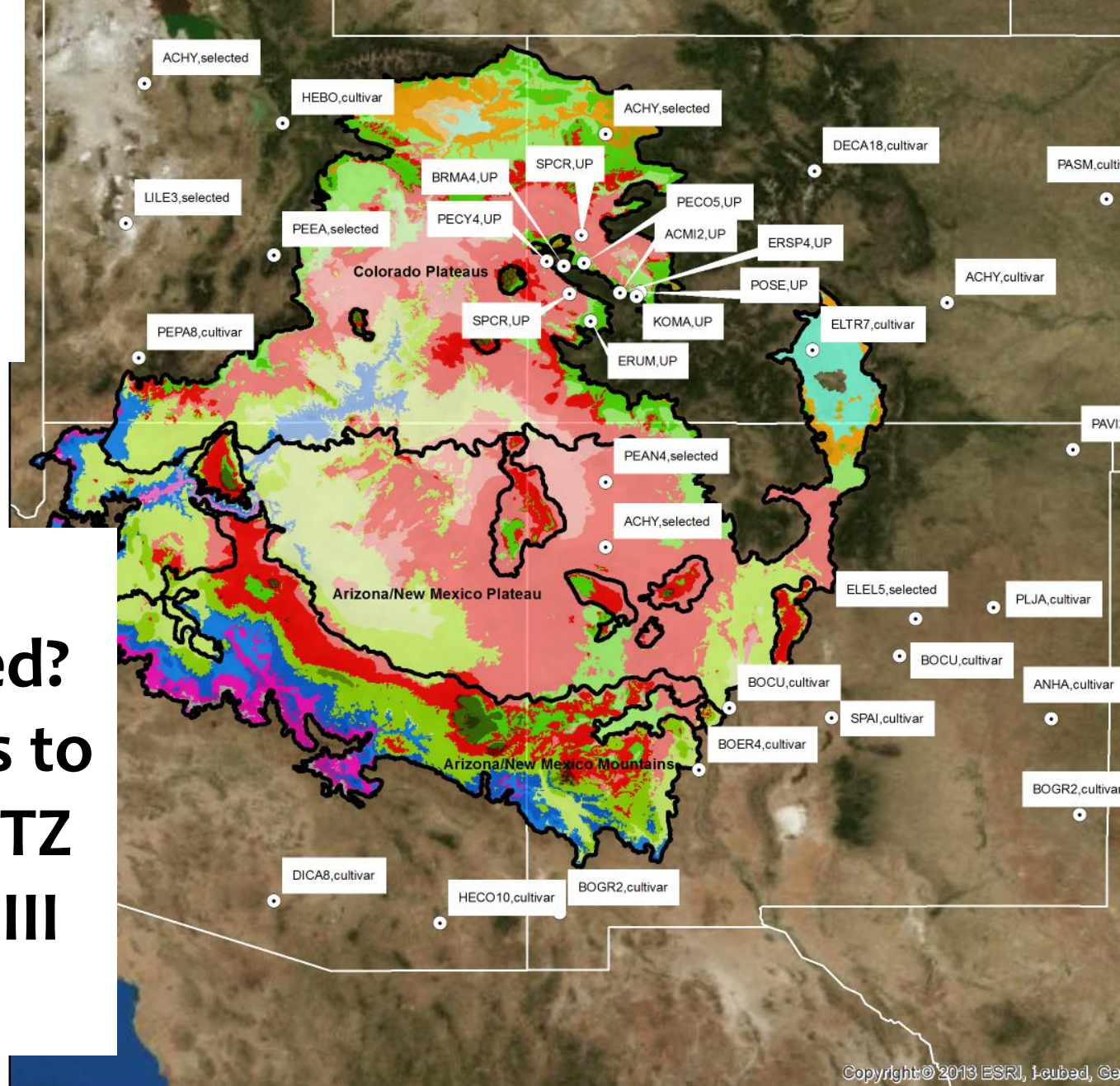
Forbs

Scientific Name	Common Name	Colorado Plateau Germplasm Available
<i>Achillea millefolium</i>	Western Yarrow	UP Dry Fork
<i>Aster glaucodes</i>	Blueleaf Aster	Cimarron (UP)
<i>Erigeron pumilis</i>	Low Fleabane	Log Hill (UP)
<i>Erigeron speciosus</i>	Aspen Fleabane	UP Dry Fork Hwy (Limited Quantities in 2011)
<i>Eriogonum umbellatum</i>	Sulfur Buckwheat	UP Burn Canyon (Limited Quantities in 2011)
<i>Hedysarum boreale</i>	N or UT Sweetvetch	in process ARS; UP Uncompahgre
<i>Lupinus sericeus</i>	Silky Lupine	UP
<i>Packera multilobata</i>	Multi-lobed groundsel	UP Montrose
<i>Penstemon angustifolius</i>	Narrow Leaf Penstemon	San Juan Germplasm (LLPMC 2000 release)
<i>Penstemon comarrhenus</i>	Dusty Penstemon	UP Delta
<i>Penstemon cyanocaulis</i>	Bluestem Penstemon	UP San Miguel
<i>Penstemon eatonii</i>	Firecracker Penstemon	Richfield Selection (Aberdeen PMC 1994 release)
<i>Penstemon strictus</i>	Rocky Mountain Penstemon	Bandera Rocky Mt Penstemon (LLPMC 1982? Release, just southeast of Albuquerque)
<i>Sphaeralcea coccinea</i>	Globemallow	UP Paradox Valley



The CPNPP Region & Releases:

Do we have
what we need?
NOT if goal is to
source by PSTZ
within Level III
Ecoregion



Maps:
Rachel Hosna

PSTZs Bower
et al 2014

1:6,999,188



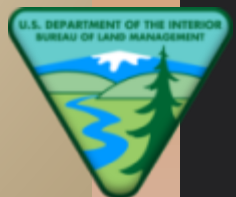
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CPNPP Criteria for Native Plant Materials Development:

1. Restoring Ecosystem Resilience & Function
2. Restoring Habitat (e.g. sage grouse)
3. Competing with non-native invasives
4. Attracting/ Supporting Pollinators
5. Preventing of Soil Erosion

Took Qualitative Survey of Partners to determine
Priority Species of Interest --



CPNPP Priority

Group Rank	Scientific Name	Common Name
Forbs		
20	<i>Astragalus lonchocarpus</i>	rushy milkvetch
27	<i>Heterotheca villosa</i>	hairy false goldenaster
27	<i>Machaeranthera canescens</i>	hoary tansyaster
22	<i>Heliomeris multiflora</i>	showy goldeneye
20	<i>Sphaeralcea parvifolia</i>	smallflower globemallow
18	<i>Plantago patagonica</i>	wooly plantain
17	<i>Crepis occidentalis</i>	largeflower hawkbeard
16	<i>Eriogonum racemosum</i>	red root buckwheat
15	<i>Cleome serrulata</i> (& <i>C. lutea</i>)	Rocky Mountain beeplant
13	<i>Helianthus annuus</i>	annual sunflower
12	<i>Sphaeralcea coccinea</i>	scarlet globemallow
11	<i>Cymopterus bulbosus</i>	bulbous spring parsley
10	<i>Penstemon eatonii</i>	firecracker penstemon
10	<i>Penstemon comarrhenus</i>	dusty beardtongue
10	<i>Penstemon cyanocaulis</i>	bluestem beardtongue
Grasses		
29	<i>Sporobolus cryptandrus</i>	sand dropseed
28	<i>Plueuraphis jamesii</i>	James' galleta
24	<i>Sporobolus airoides</i>	alkalai sacaton
23	<i>Aristida purpurea</i>	purple three-awn
21	<i>Bouteloua gracilis</i>	black grama
19	<i>Vulpia octoflora</i>	six-weeks fescue
17	<i>Elymus elymoides</i>	squirreltail
17	<i>Koeleria macrantha</i>	prairie junegrass
13	<i>Hesperostipa comata</i>	needle-and-thread
10	<i>Achnatherum hymenoides</i>	Indian ricegrass

Species
<i>Machaeranthera canescens</i>
<i>Heliomeris multiflora</i>
<i>Sphaeralcea parvifolia</i>
<i>Astragalus lonchocarpus</i>
<i>Cleome serrulata</i>
<i>Pleuraphis jamesii</i>
<i>Achnatherum hymenoides</i>
<i>Bouteloua gracilis</i>
<i>Elymus elymoides</i>
<i>Koeleria macrantha</i>
<i>Sporobolus cryptandrus</i>

What have partners done with Priority species?

- Wildland Collections/ Seeds of Success**
- Grass Common Garden – USFS**
- Forb Common Garden - CBG**
- Initial field establishment for high performer increase –Upper Colorado Environ. Plant Center**
- Initial evaluation of new material -- UCEPC, LLPMC, Southwest Seed, BFI**
- Development of new harvest technology for forbs -- LLPMC**

USFS 2009-2013

Native Grass Comparative study

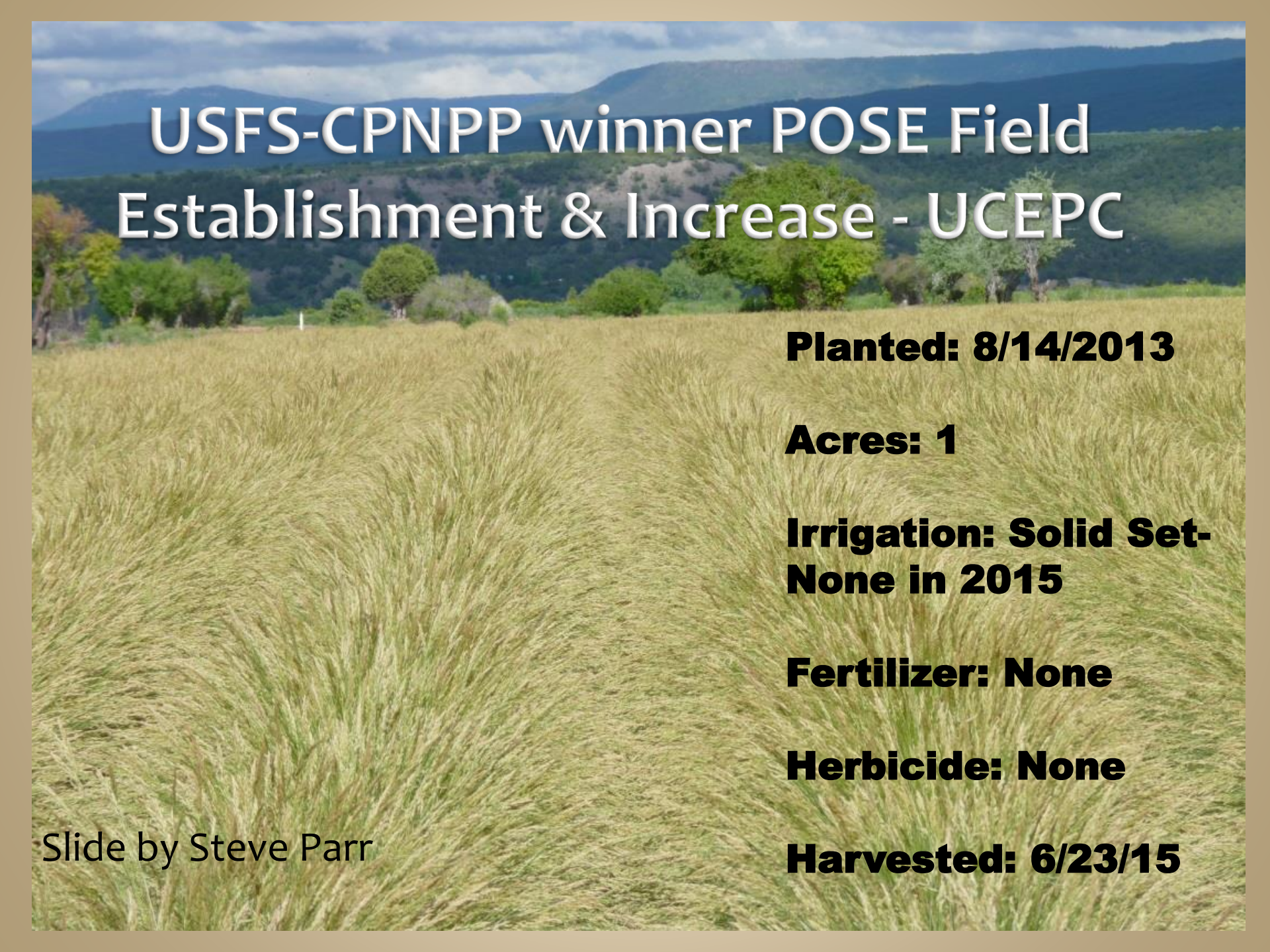
- **Six species, Five Common Gardens**
 - **Bottlebrush squirreltail**
 - **Indian ricegrass**
 - **Muttongrass**
 - **Needle and threadgrass**
 - **Prairie junegrass**
 - **Sandberg bluegrass**

Collected from four forests in US Forest Service Region Four, Escalante Grand Staircase, and the UP's best adaptive collections. Co-funded by USFS and BLM

Evaluated for Traits

- Survival
- Height
- Crown
- Biomass
- Seed Production





USFS-CPNPP winner POSE Field Establishment & Increase - UCEPC

Planted: 8/14/2013

Acres: 1

**Irrigation: Solid Set-
None in 2015**

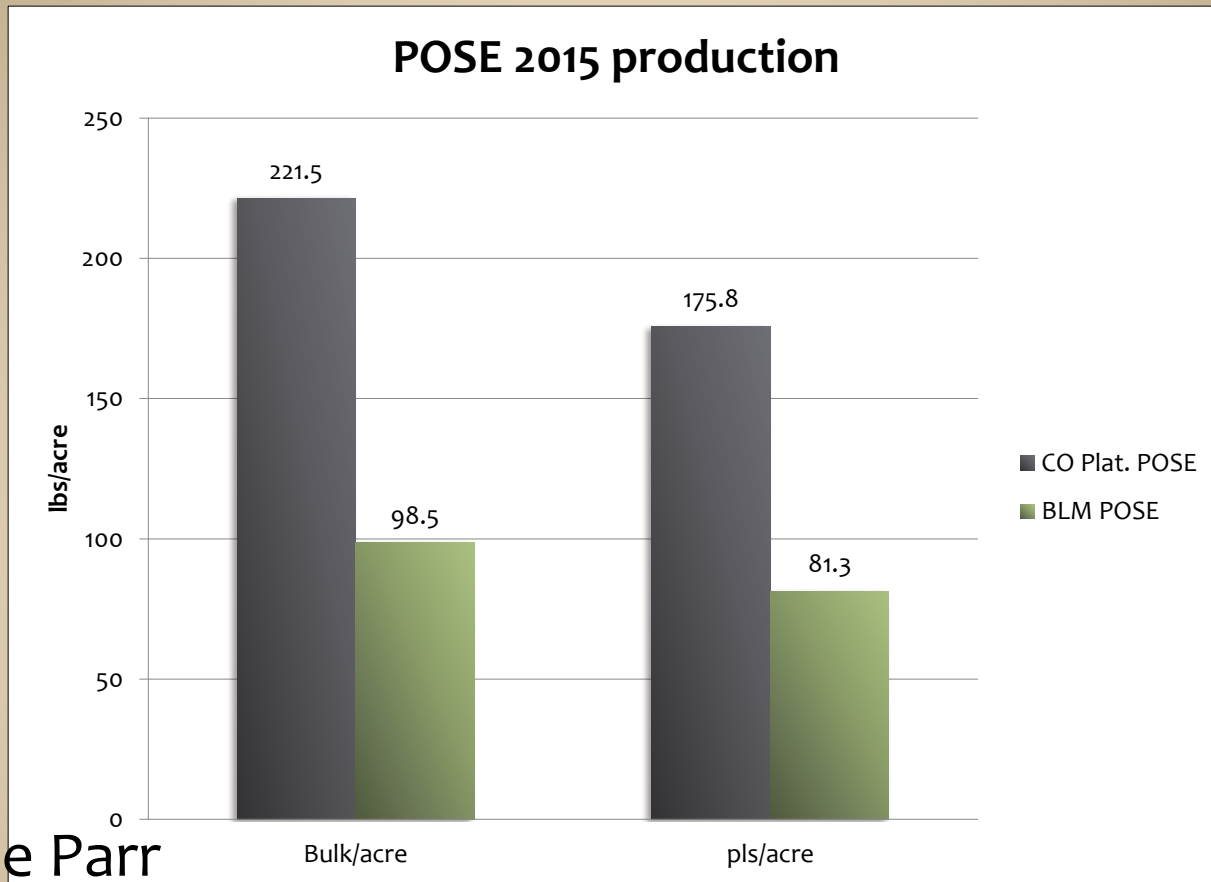
Fertilizer: None

Herbicide: None

Harvested: 6/23/15

Slide by Steve Parr

Compare BLM & Co Plateau POSE



Slide by Steve Parr

Material	Bulk/acre	PLS/acre
2009 BLM POSE	89.0	73.26
2015 CO Plat. POSE	221.5	175.8

Seed Increase: Field Establishment with Commercial Growers



Harvest Technology - LLPMC



Other CPNPP Partner activities?

Container stock / cuttings / inocula

Storage

Restoration

Monitoring

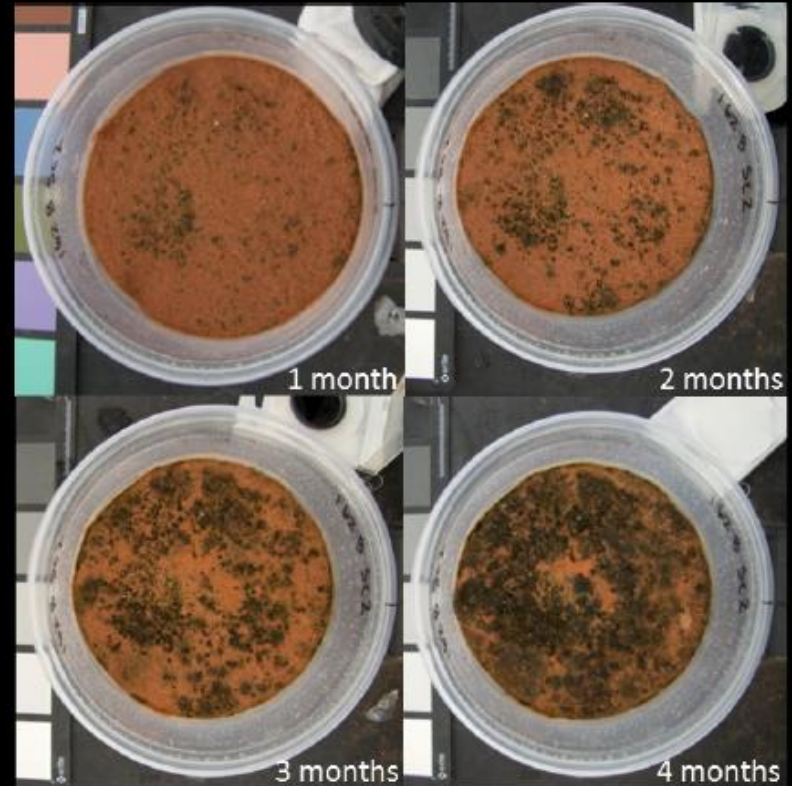
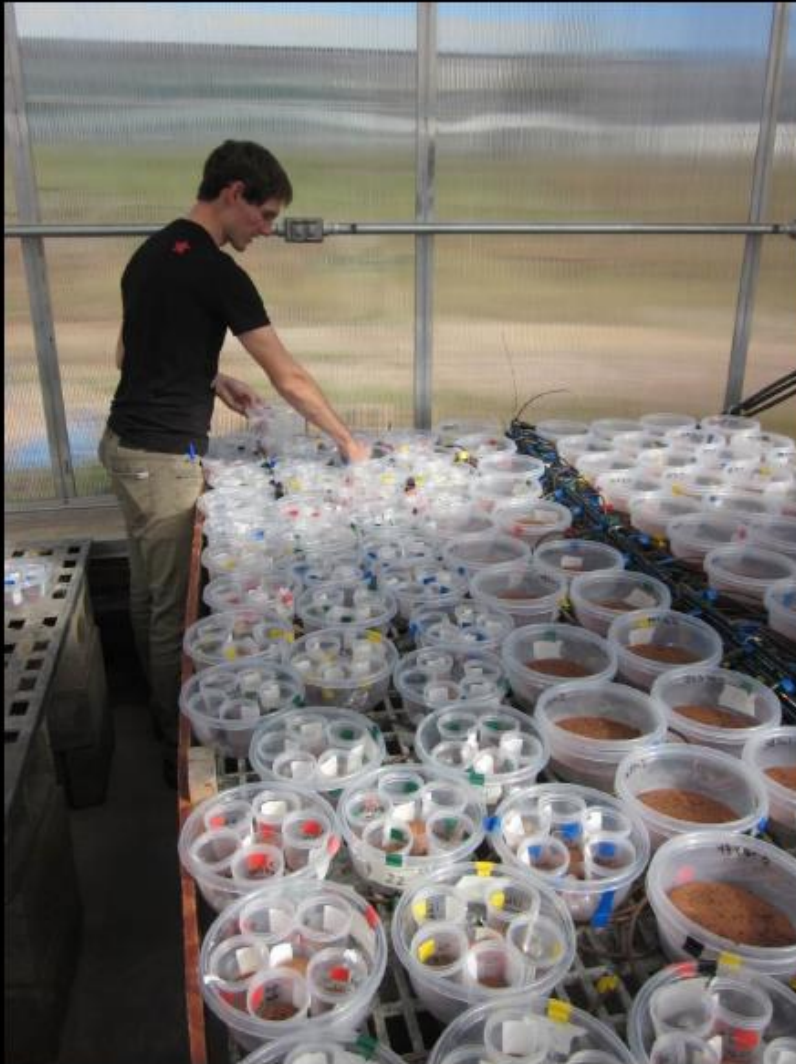
Outreach / Communications

Production – Woody, Riparian, Container – LLPMC, High Mtn. Nursery



The "bryotron"

our system for learning about growing mosses (and lichens)



Doherty et al. 2015

Seed Storage – BLM, CO Parks & Wildlife Delta, Great Basin Restoration Center, Ephraim



Restore Native Plant Communities & Monitor



Large-Scale Habitat Restoration by WRI Partnership in Utah



Communication with Partners & Public



2014 CPNPP Seed inventory – what do we have? What do we need?

- 1. What accessions have already been collected?**
- 2. How much seed was collected?**
- 3. Is it viable?**
- 4. Where is it?**
- 5. Has any been used?**
- 6. What were the results?**
- 7. Has any been released?**

This information was not available in any one place or format, so we made a relational database.

Tracking seed accessions with CPNPP Database

1. Native seed collection



1a. Cleaning and processing



1b. Initial storage



2. Evaluation & Development (including research)

other
research
applications*



germplasm
increase*

Restoration use

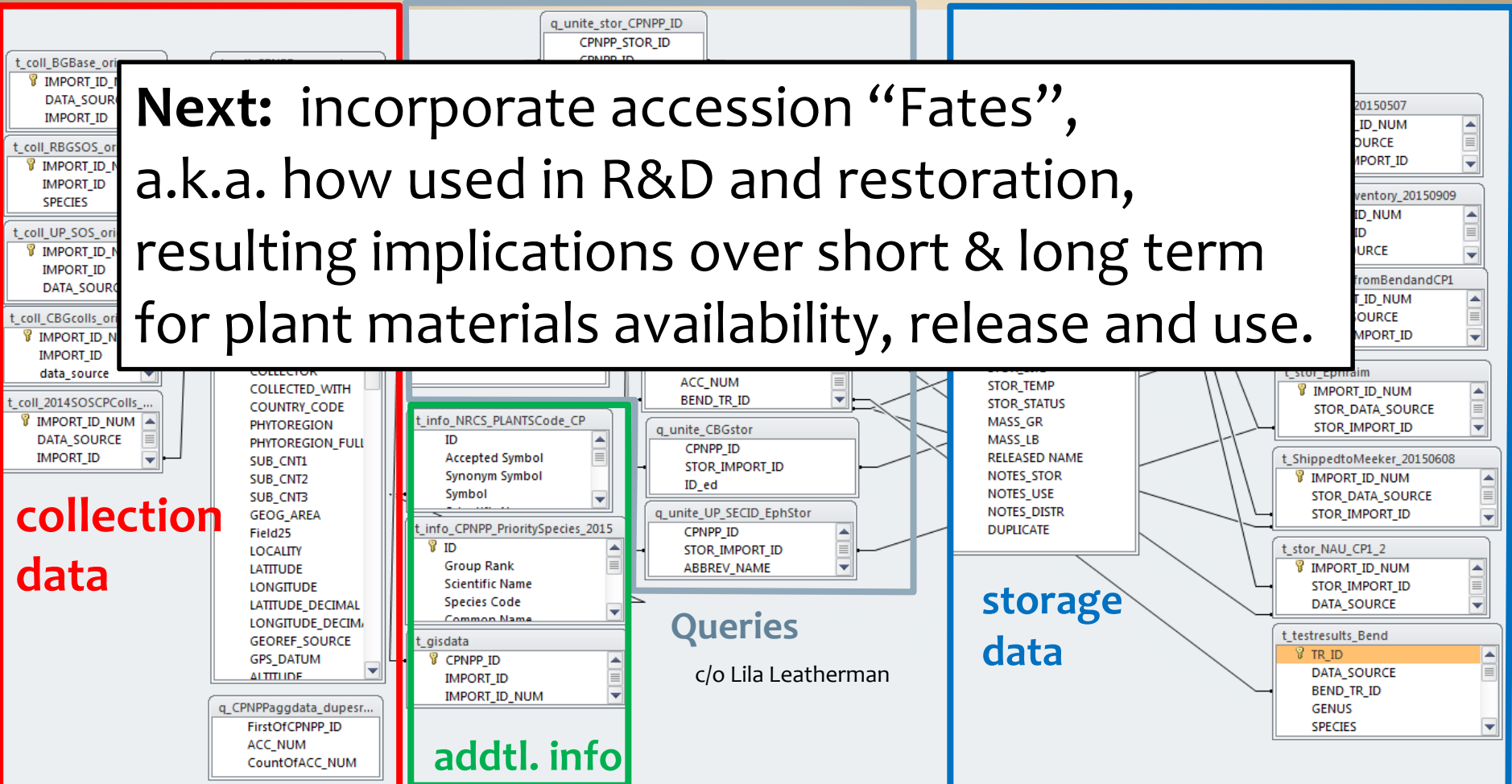
Slide by Lila Leatherman &
Rachel Hosna

CPNPP Database Schema

As of March 2016:

3192 unique collection records
5,000 + unique storage records

Next: incorporate accession “Fates”,
a.k.a. how used in R&D and restoration,
resulting implications over short & long term
for plant materials availability, release and use.



CPNPP database answers:

- What were the test results of a collection?
- Where is the seed for a particular collection?
- How many collections are readily available? Have over 5,000 PLS? over 0.5 lb of seed?
- Makes data calls for inquiries and reports easy
- Quality control on partner data
- Guidance for new collections
- Data can be mapped, analyzed geospatially, and used in tools (e.g. mobile or online “apps”) that inform collection, seed use, and research priorities.
- E.g. Have we collected from all Seed Transfer Zones? All Climate Similarity Zones? (*Doherty & Wood analyses, app. & paper*)

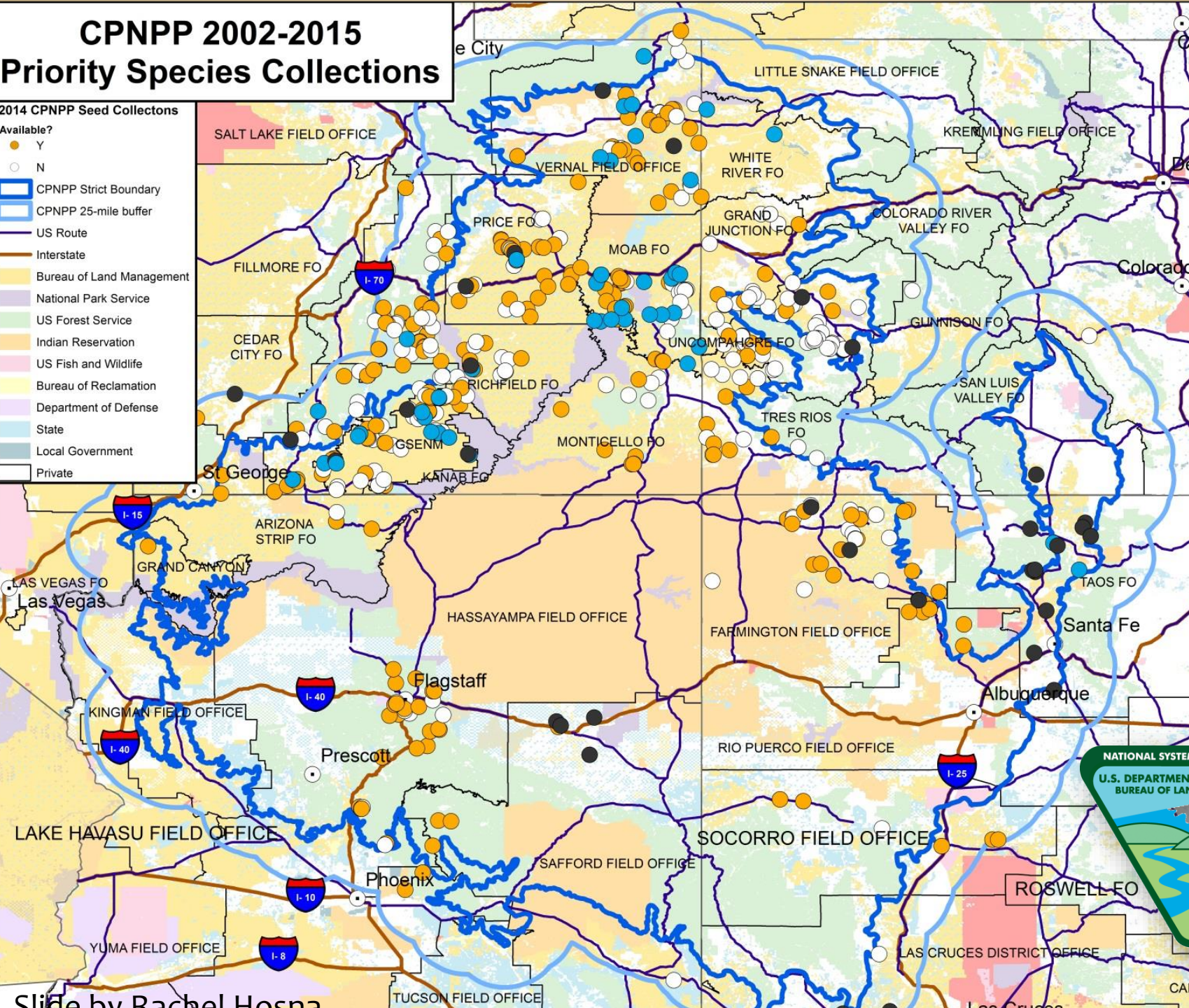


CPNPP 2002-2015 Priority Species Collections

2014 CPNPP Seed Collectors

Available?

- Y
- N
- CPNPP Strict Boundary
- CPNPP 25-mile buffer
- US Route
- Interstate
- Bureau of Land Management
- National Park Service
- US Forest Service
- Indian Reservation
- US Fish and Wildlife
- Bureau of Reclamation
- Department of Defense
- State
- Local Government
- Private

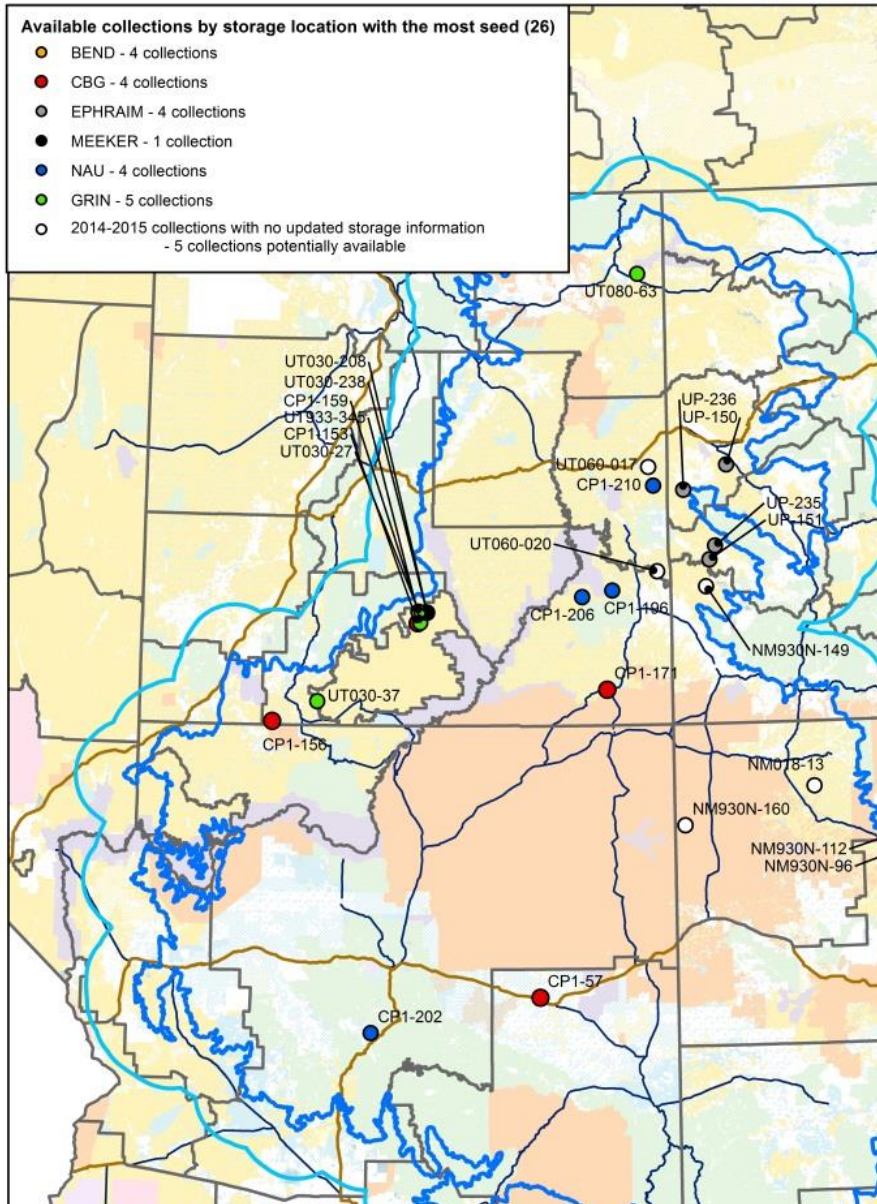


BLM
Colorado Plateau Native Plant Program

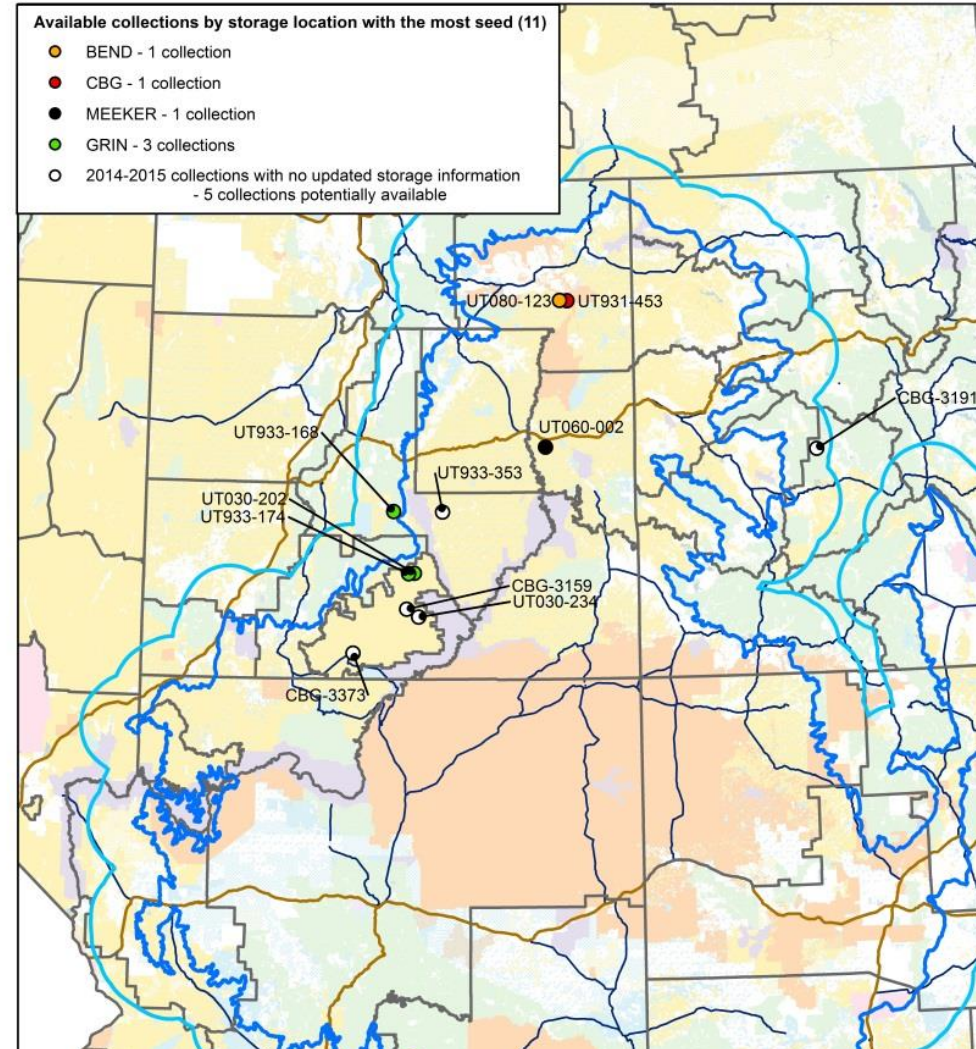


Species specific maps by storage location

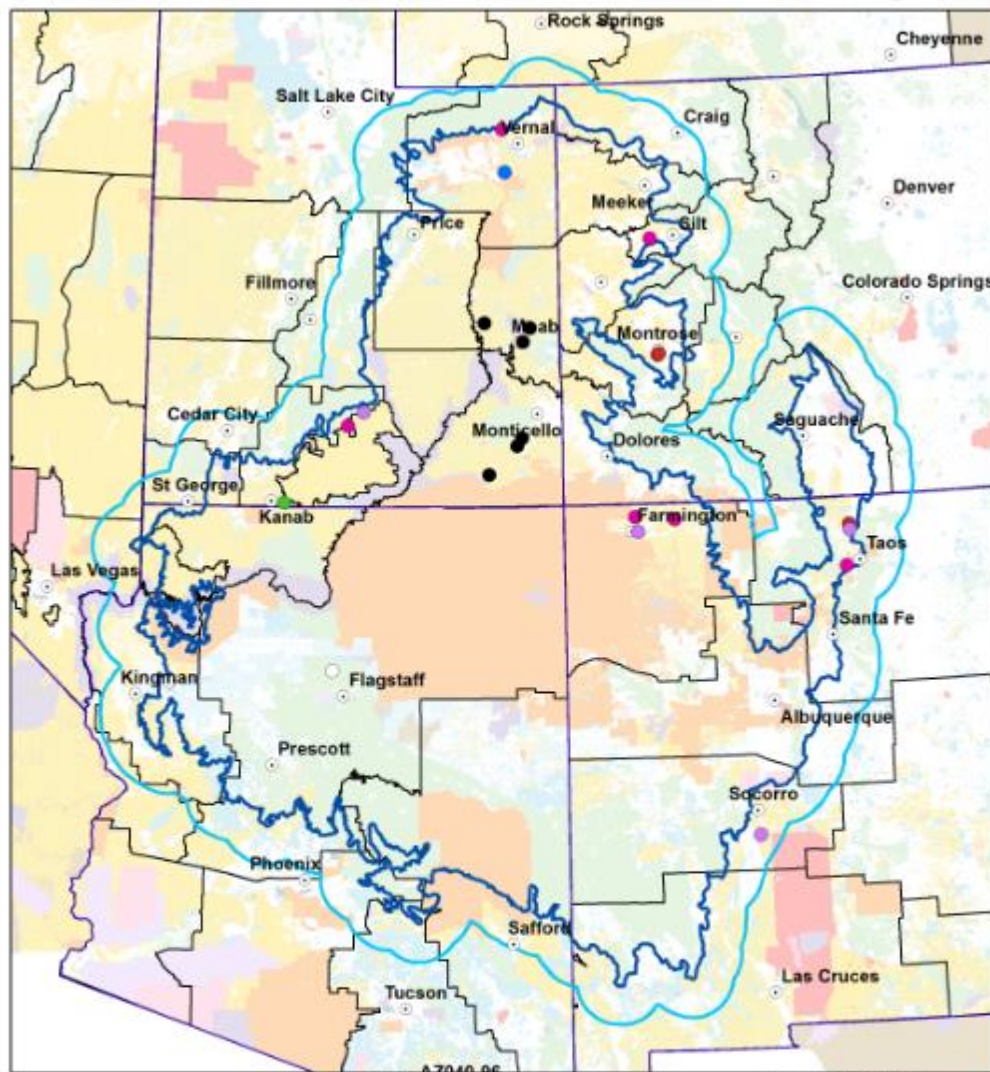
Colorado Plateau Native Plant Program - SPCR



Colorado Plateau Native Plant Program - CLLU2



Recent query from IAE for milkweed seed for germination study



- Bureau of Land Management (BLM)
- Bureau of Reclamation
- Indian Reservation (IR)
- National Park Service (NPS)
- Private
- State
- US Forest Service (USFS)
- not available
- "unavail", 2015 colls, could be at local FO
- "unavail", 2016 collections, could be avail now or soon
- only available at GRIN
- available @ Bend
- available at the Moab FO
- available @ Meeker

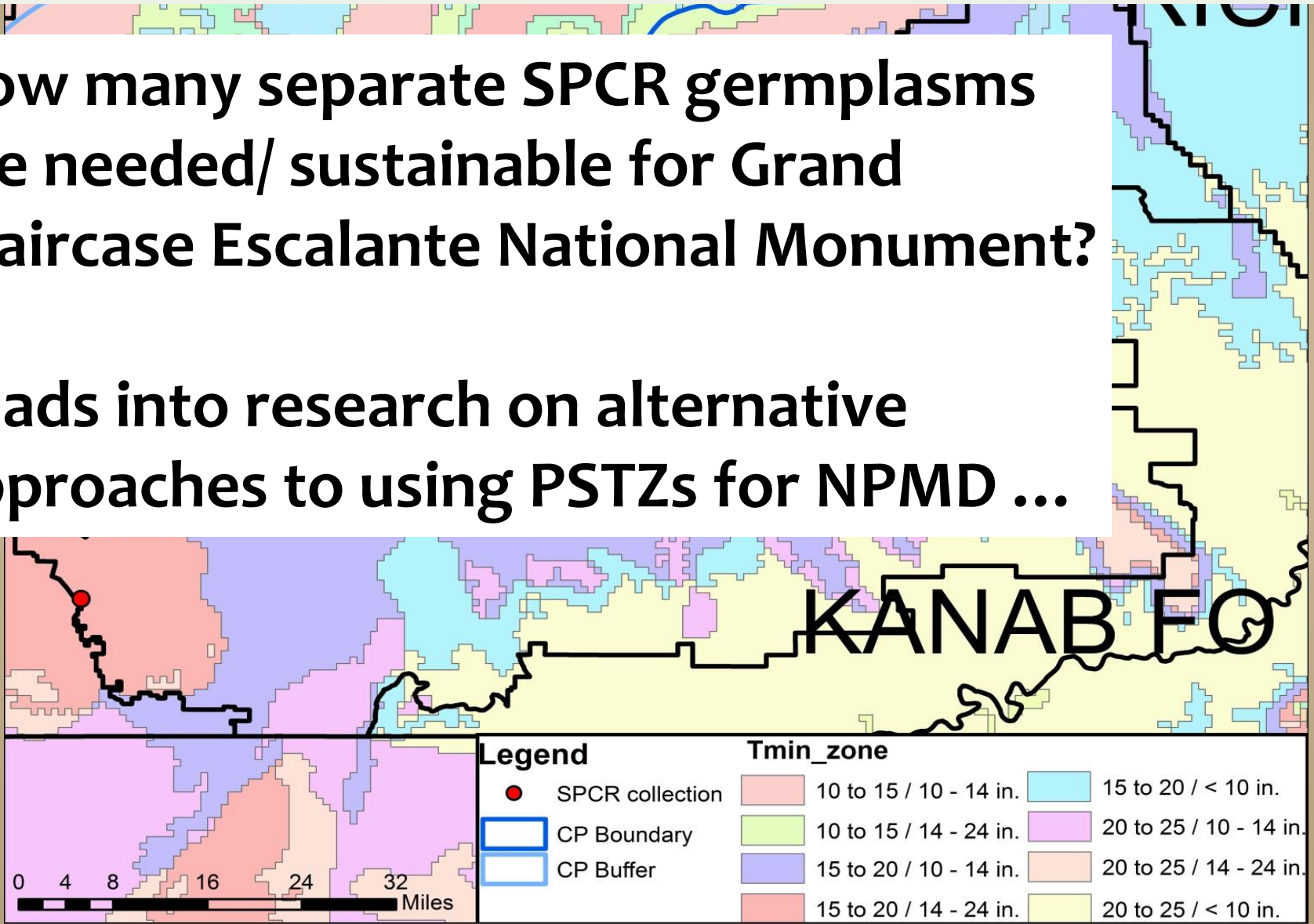
No warranty is made by the Bureau of Land Management as to the accuracy, availability, or completeness of these data for individual use or aggregate use with other data.



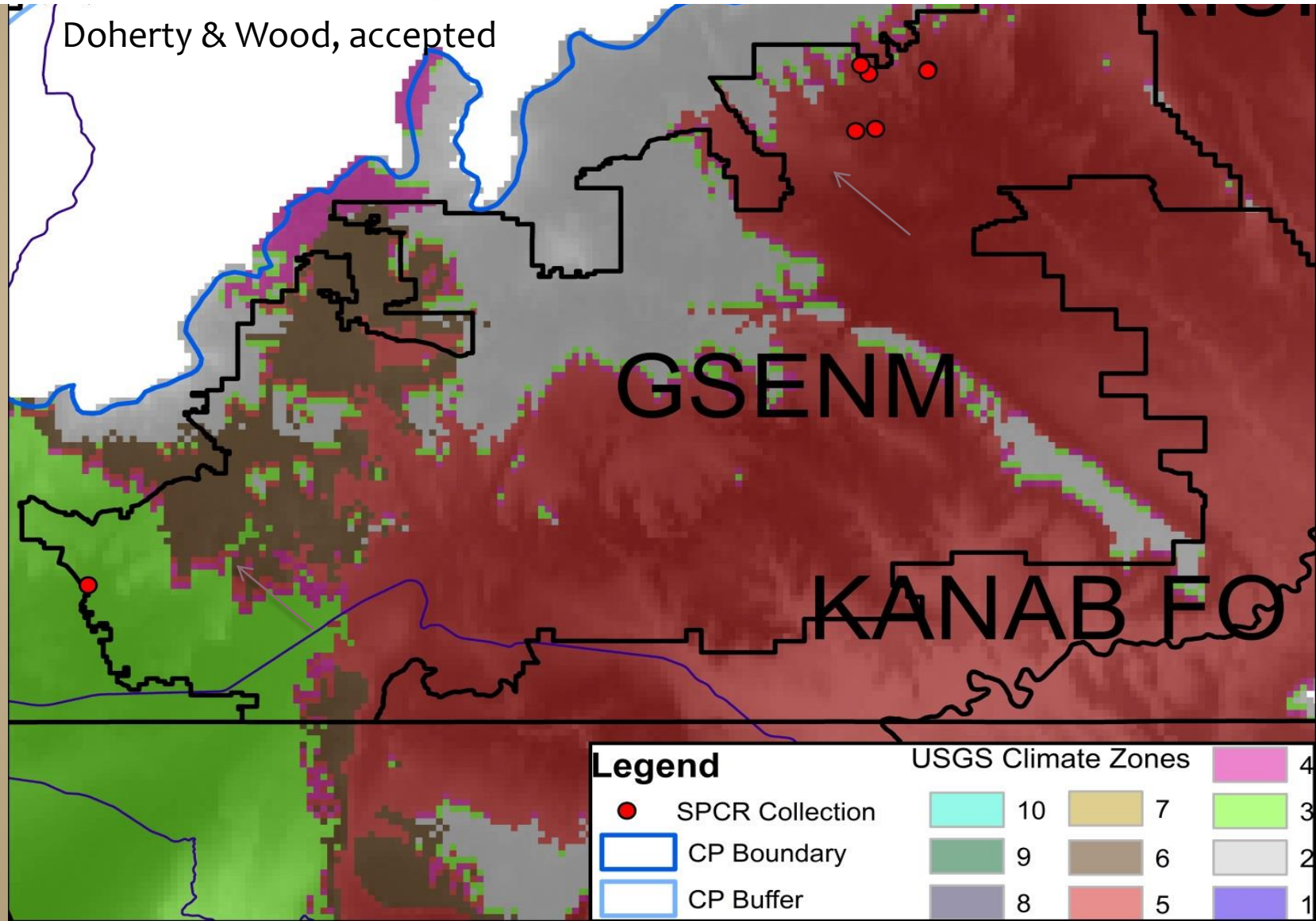
Provisional Seed Transfer Zones & Sand Dropseed (SPCR) collections

How many separate SPCR germplasms are needed/ sustainable for Grand Staircase Escalante National Monument?

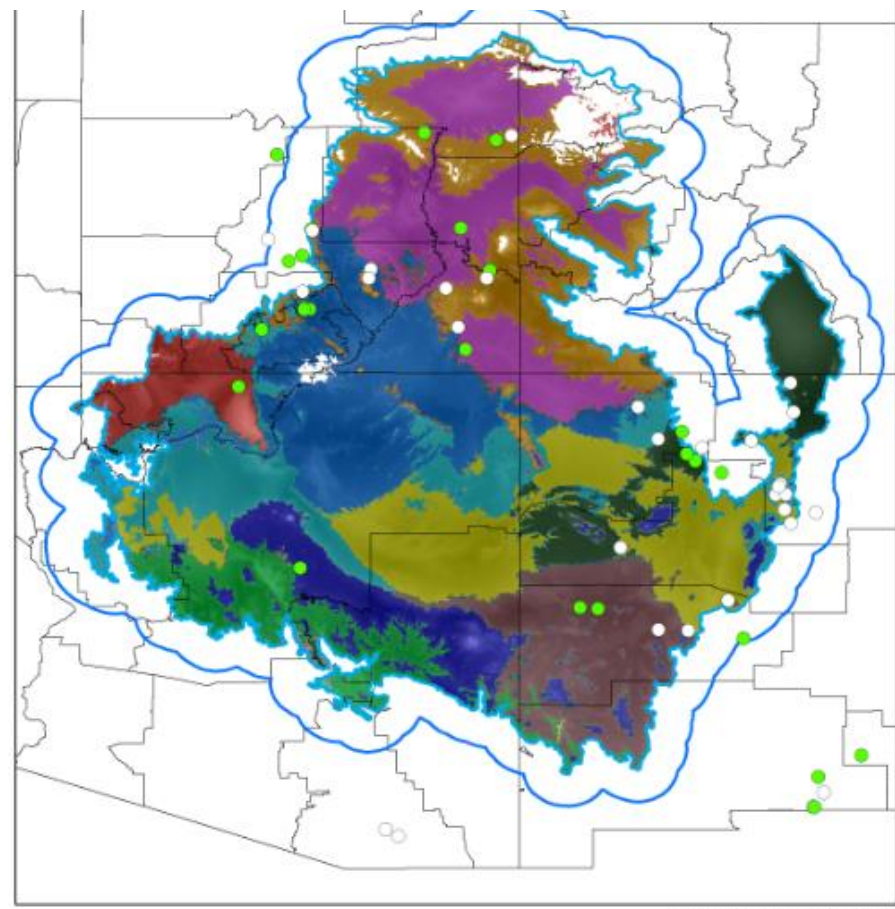
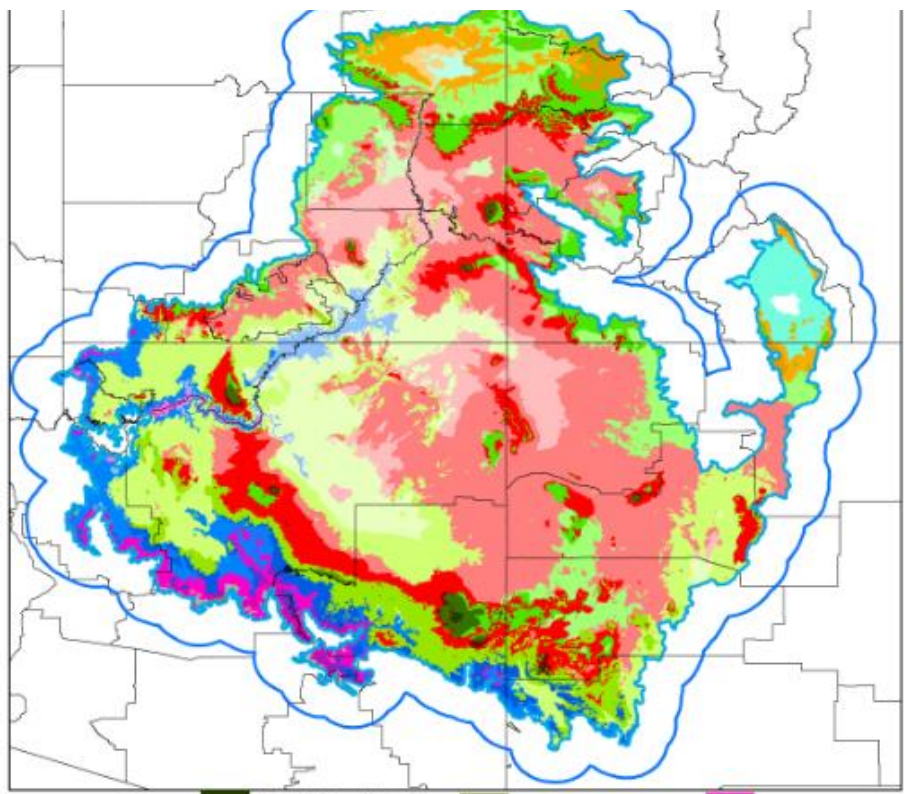
Leads into research on alternative approaches to using PSTZs for NPMD ...



USGS CPNPP Climate Similarity (BioClim) + SEINet species locations ~ = STZ

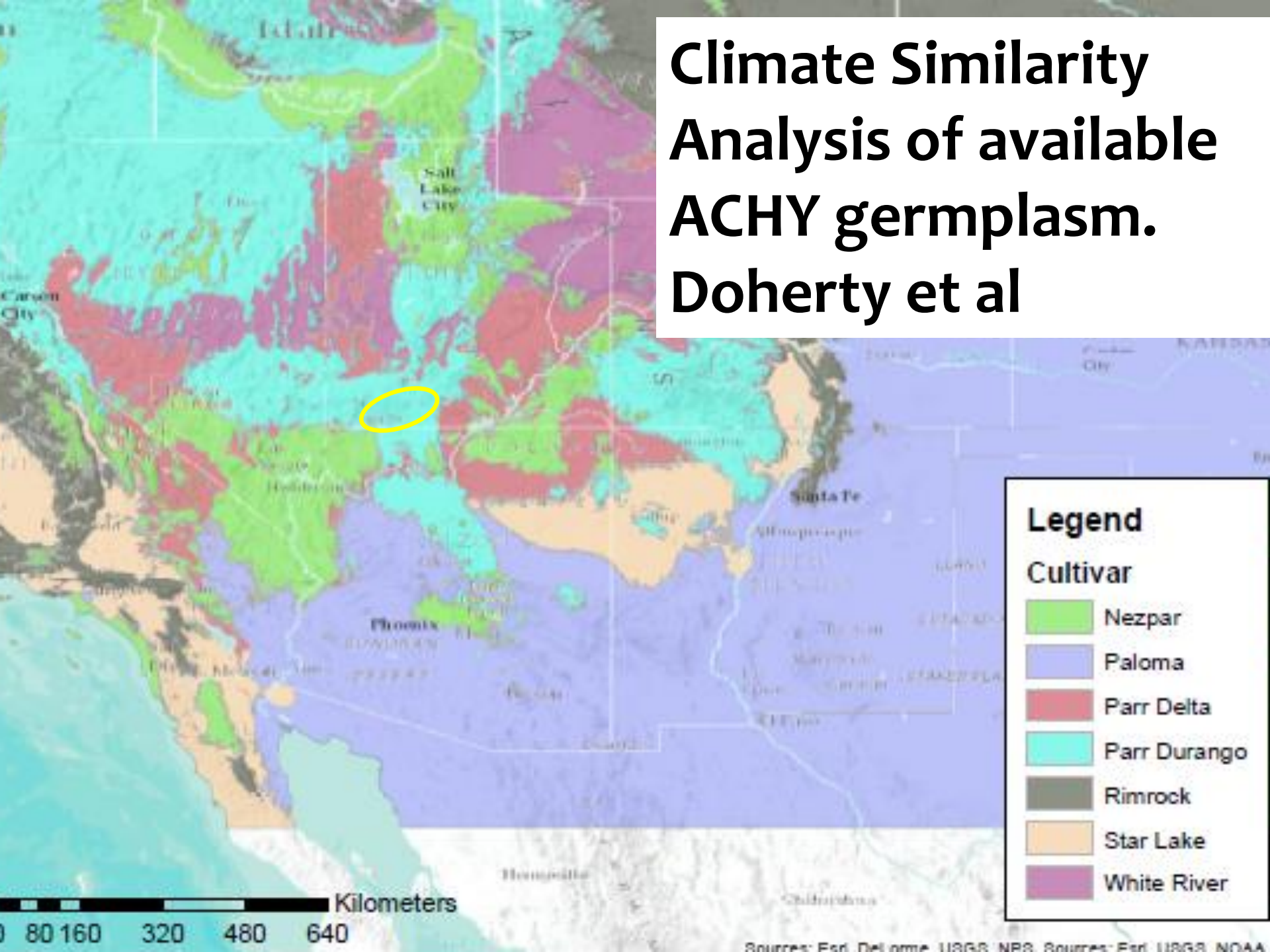


Provisional vs Climate Similarity Seed transfer Zones



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

Climate Similarity Analysis of available ACHY germplasm. Doherty et al



CPNPP Research Projects include:

- Meta-analysis of restoration seeding success
 - Talkington et al, compiled database of seeding locations with mixes and results. Can feed into RAMPs.
- Genetic variability among pops. & NPMD implics.
 - Kramer et al, *Cleome lutea* (CLLU)
- Variability in cultivar and wild species traits
 - Wood et al, Blue grama (BOGR)
- Monsoon influence on species traits
 - Hoover et al, *Galleta* grass (PLJA)
- Species Distribution Models; “Prestoration” for climate change adaptation
 - Butterfield et al, Priority species
- Species Restoration Probability
 - Leatherman et al, SDMs X Disturbance layers
- Economics of the Colorado Plateau Seed Market:
 - Camhi et al

**2017 CPNPP
Annual
Meeting
Feb 28 – Mar 2**

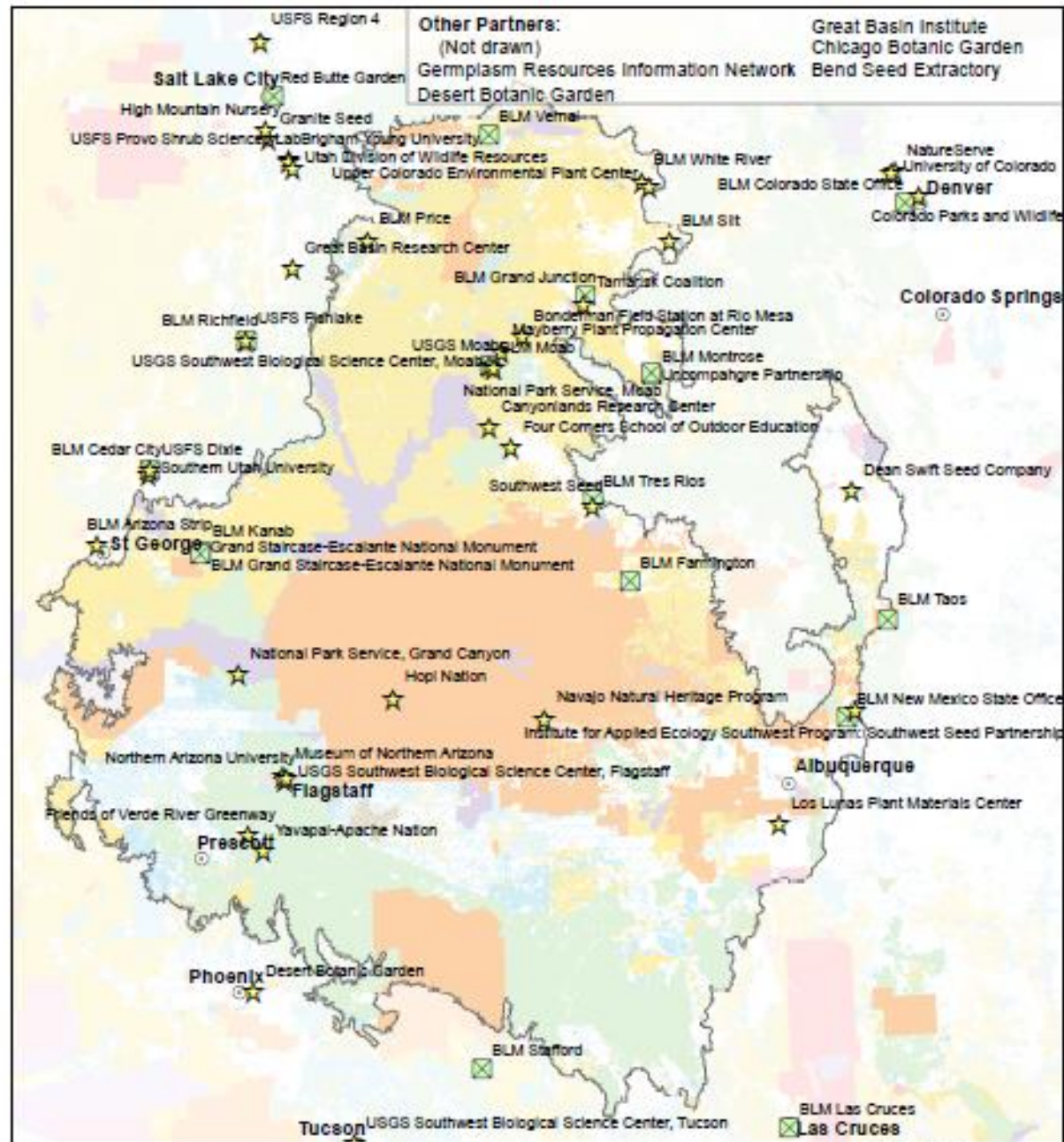
**Monticello, UT
Four Corners
School &
Canyon Country
Discovery Center
fourcornersschool.org**



**Colorado Plateau Native Plants Program
2017 Annual Meeting**

Feb 28, 2017 - March 02, 2017

2017 CPNPP SOS Teams, Partners, other Plant Materials Programs



IV. Critical assessment - what would make CPNPP function better?

- **Quantitative Seed Needs Assessment Forecast**
 - ID immediate vs. mid- and long-range materials needs
- **Seed Menu Development for Users**
- **Information Synthesis and Translation**
 - All plant materials chars. – biology, cultural practices, use
 - Improved/ automated tracking of materials & projects – facilitate assessment of progress, minimize duplication of work
- **Greater Communication – Educ/ Outreach, Train.**
- **Additional Resources – Staff and Funding**





The preceding presentation was delivered at the

2017 National Native Seed Conference

Washington, D.C. February 13-16, 2017

This and additional presentations available at <http://nativeseed.info>

