



From the Wild to Farm and Back Again

A Strategy for Native Plant Material Development and Utilization

Kevin Gunnell, Danny Summers, Scott Jensen

National Native Seed Conference February 14, 2017



Overview

- Seed Development Strategies

- Where do we begin?

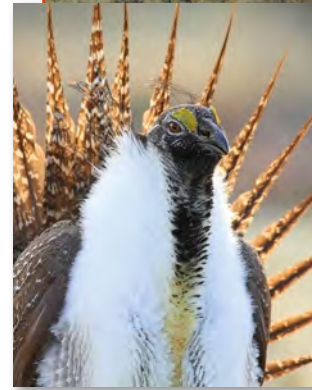
- Utah DWR Model

- Proactive landscape scale restoration initiative
 - Seed storage/mixing
 - Native plant materials development
 - Case studies
 - What works
 - What needs work



We Have a Need for Seed

- Numerous seed needs
 - Fire rehabilitation
 - Energy reclamation
 - Wildlife habitat restoration
 - Grazing improvement
- Both proactive and reactive restoration
- Scale ranges from few acres to 100,000+ acres



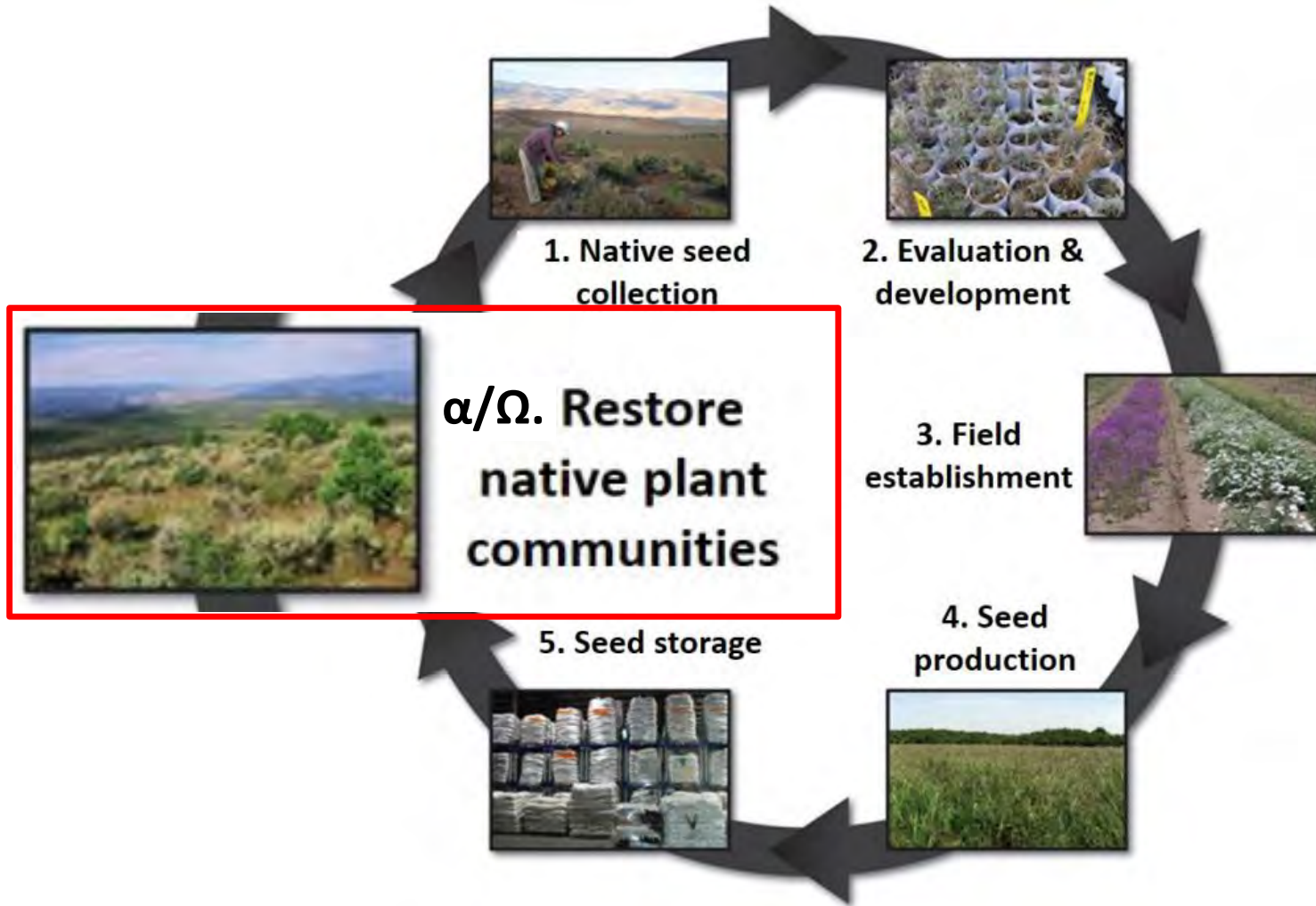
MCCOOK RIDGE CHAINING



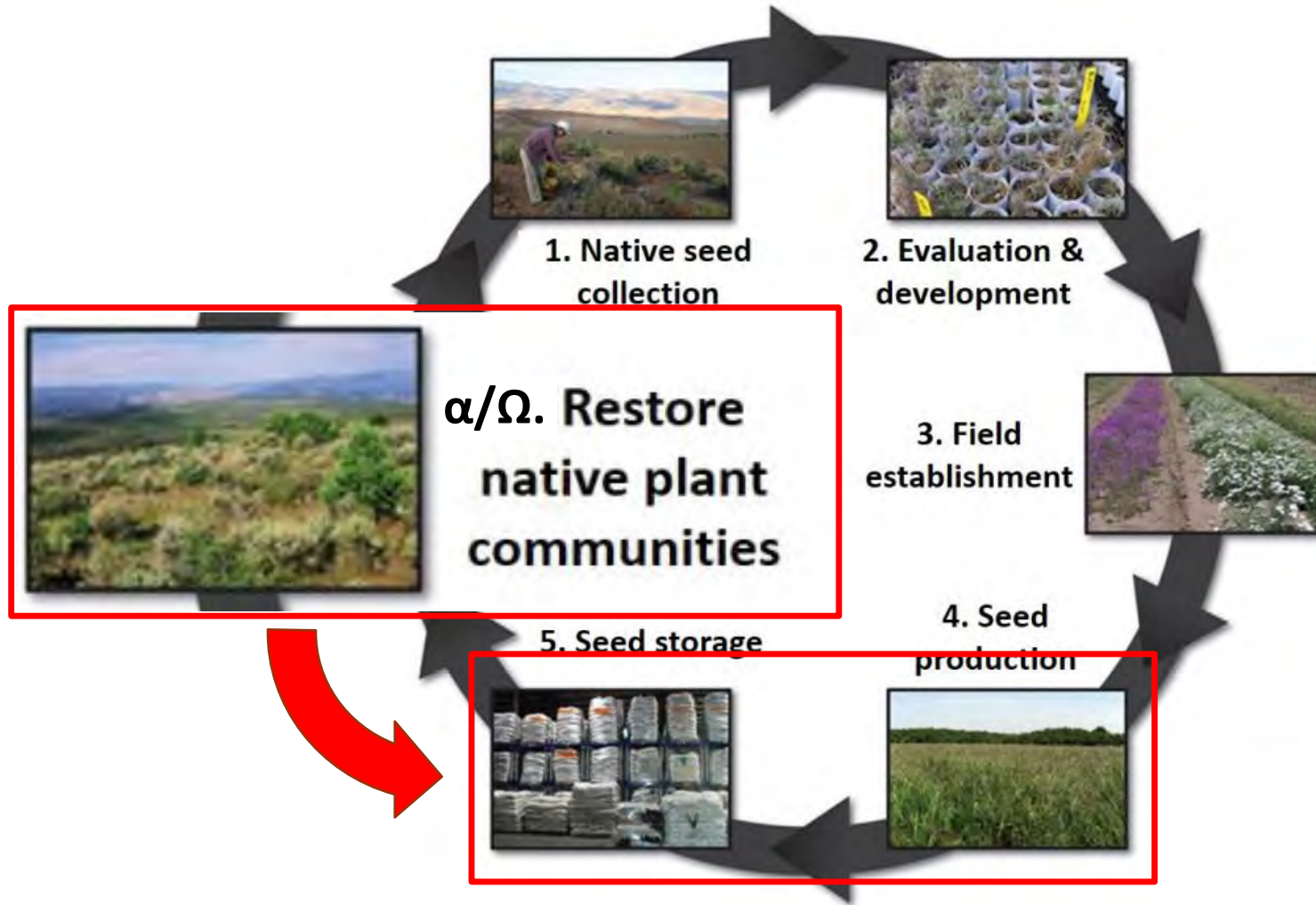
Seed Development Strategies



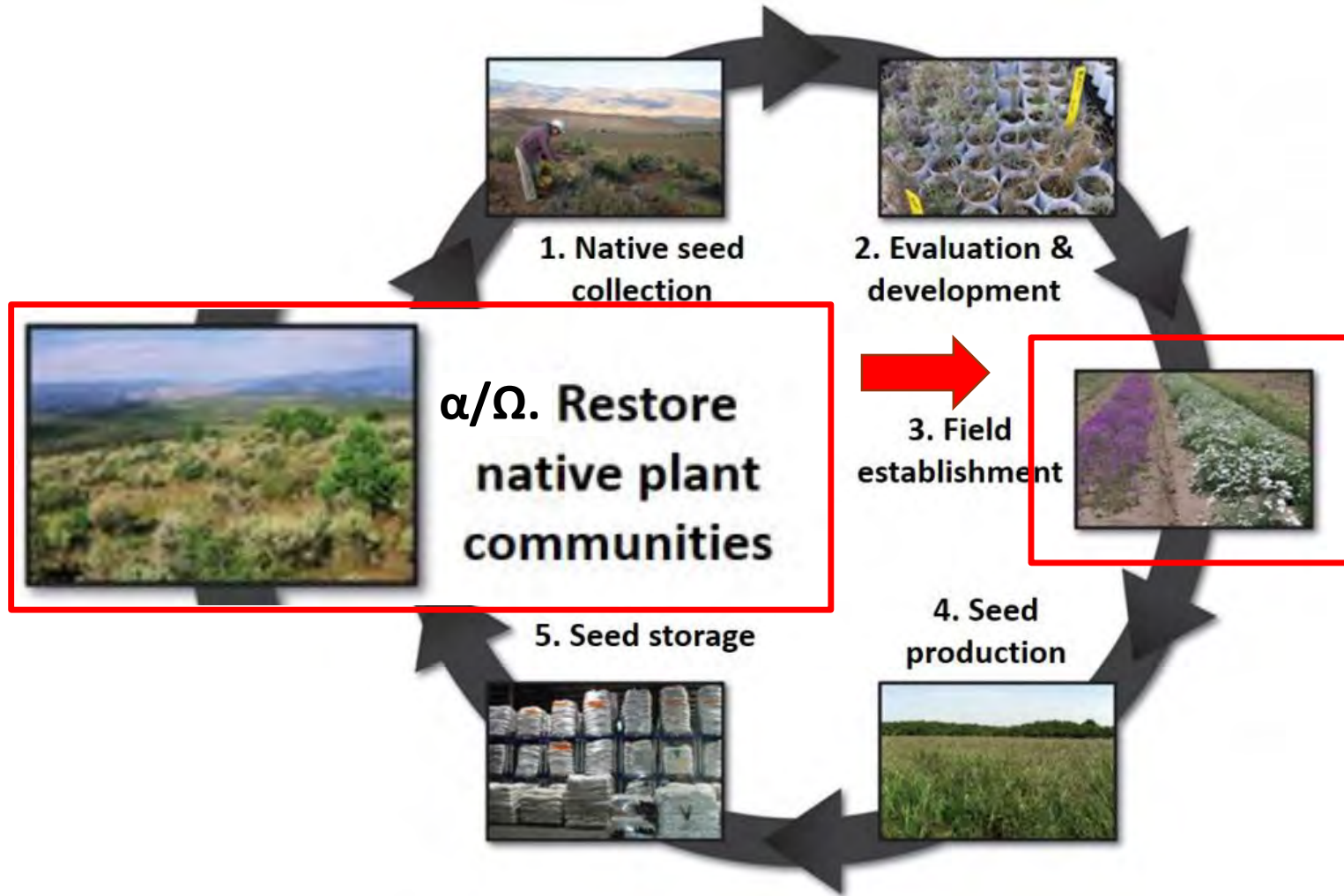
Seed Development Strategies



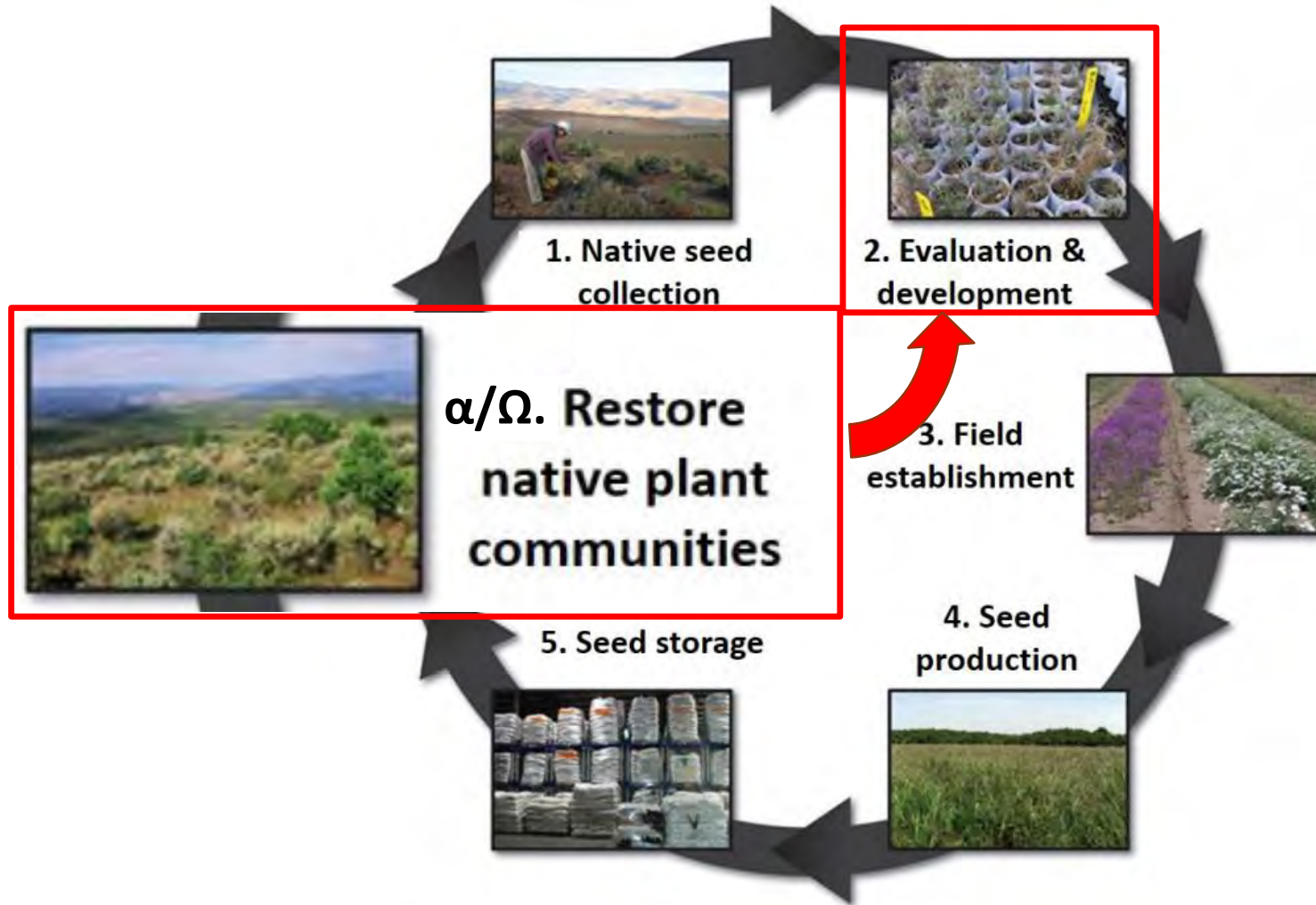
Seed Development Strategies



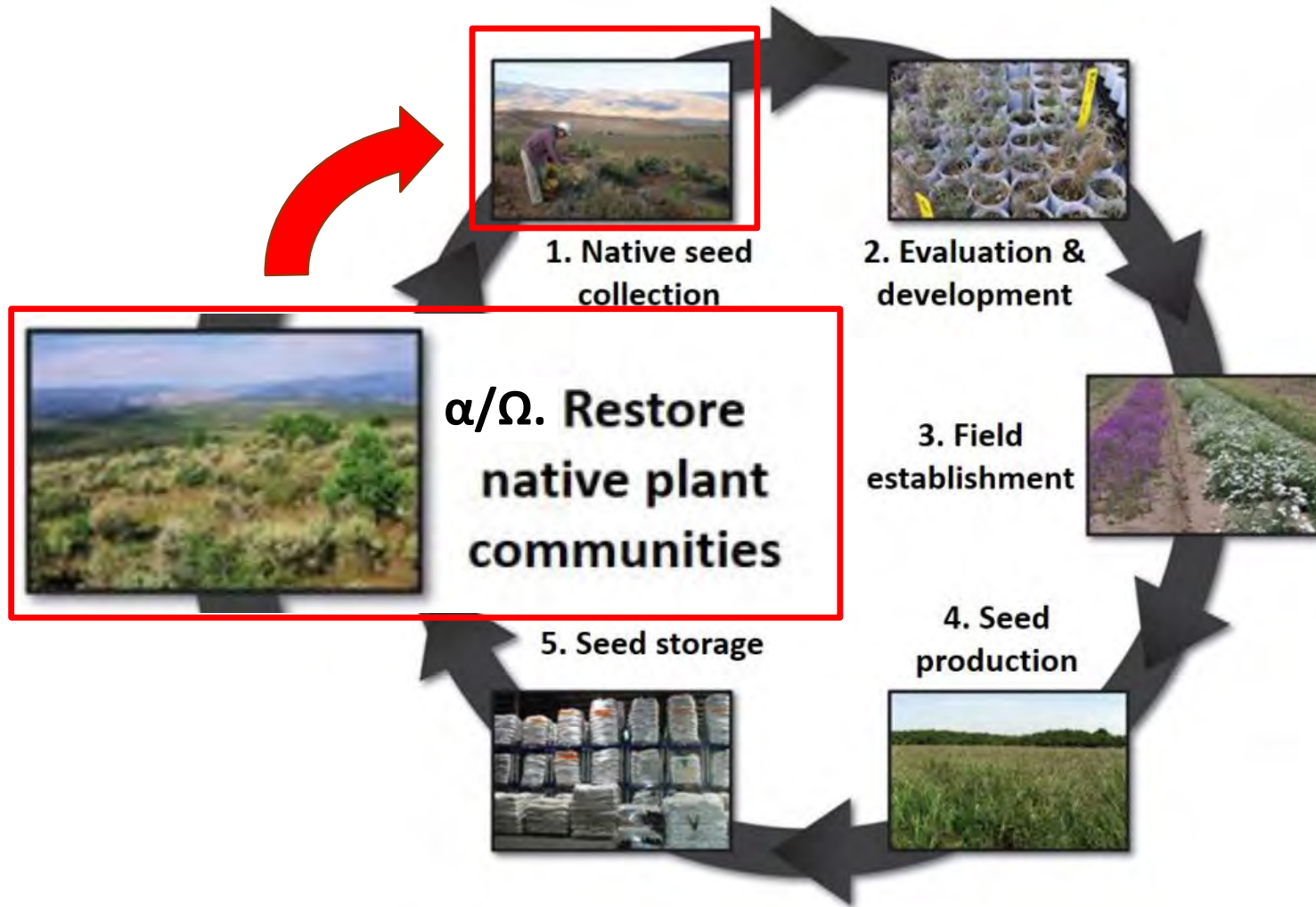
Seed Development Strategies



Seed Development Strategies



Seed Development Strategies

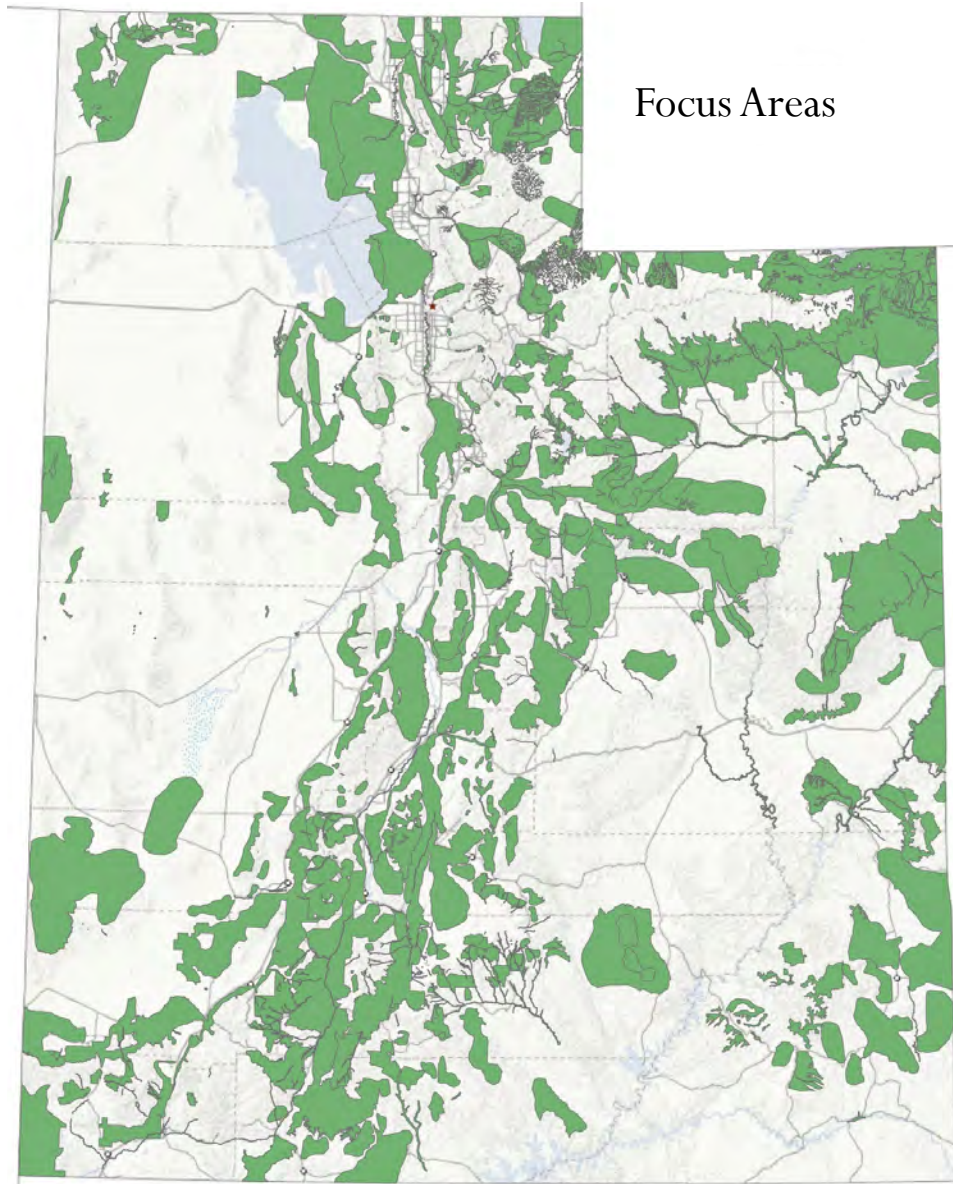


Utah Watershed Restoration Initiative

- A Watershed, Broad Landscape, Cross-Boundary, Solutions Oriented Partnership
- Collaborative-Proactive Effort
- Common Core Goals
 - Wildlife and Biological Diversity
 - Water Quality and Yield for all Uses
 - Opportunities for Sustainable Uses
- Locally Led Teams Develop and Implement Projects
- Partners Include
 - USFS, BLM, SITLA, USFWS, NRCS, NPS, UDAF, Farm Services Agency, Private Landowners, Sportsman Groups, Academia, Local Governments, Industry, Energy, Etc.



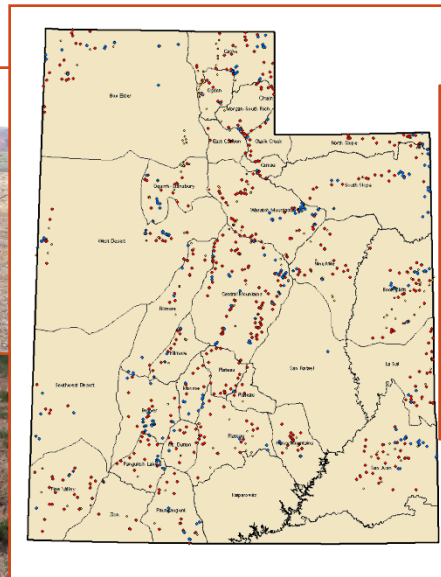
Utah Watershed Restoration Initiative



- Goal of 100,000 acres treated annually
- 1.3 million acres treated since 2004
- \$179 million invested since 2004
- Numerous treatment methods, habitat types, and objectives
- wri.utah.gov

Great Basin Research Center and Seed Warehouse

- Seed Resources and Restoration Equipment
- Range Trend Monitoring Project
- Research and Plant Materials Development



Providing Logistical Support for Restoration Projects

- Seed Resources
 - Bulk seed acquisition to reduce cost
 - Custom seed mixing to meet project goals
 - Provide plant materials suited to site potential
 - Ability to respond to emergency wildfire restoration projects

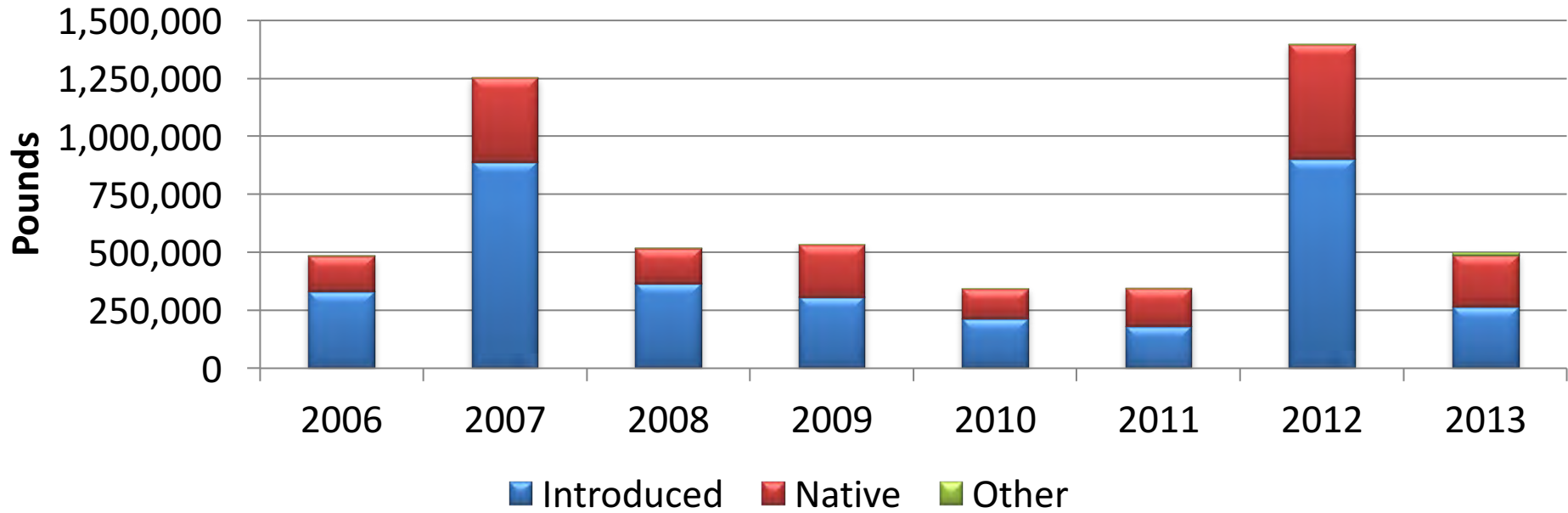


UDWR Seed Warehouse

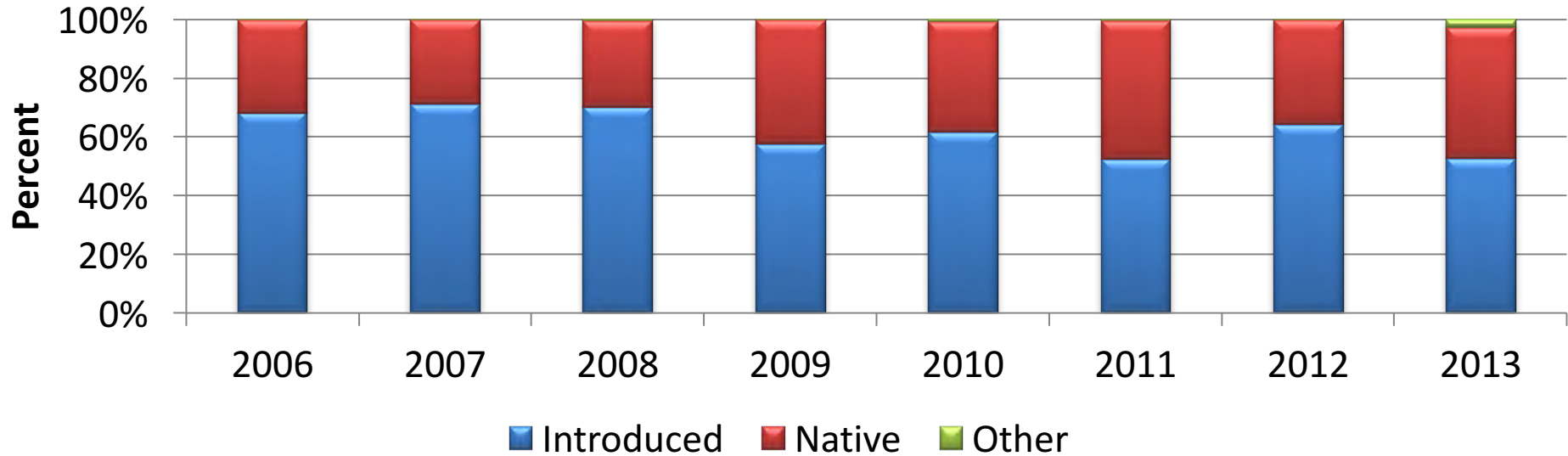
- Habitat restoration and research since 1950's
 - Modest warehouse facilities
- Current warehouse constructed in 2004 with an expansion in 2010
- Increased storage capacity from 650,000 lbs to 1.25 million lbs
 - 1.1 million lbs in temperature controlled warehouse
 - 150,000 lbs in cold storage primarily for sagebrush



Pounds Used Native and Introduced

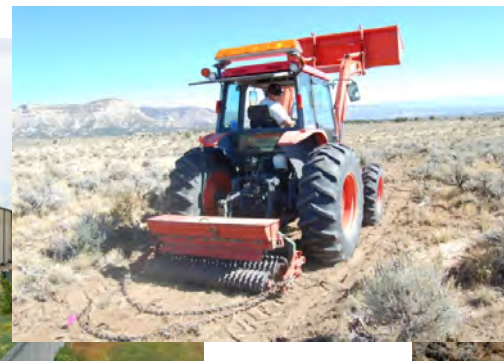


Proportion Native vs. Introduced

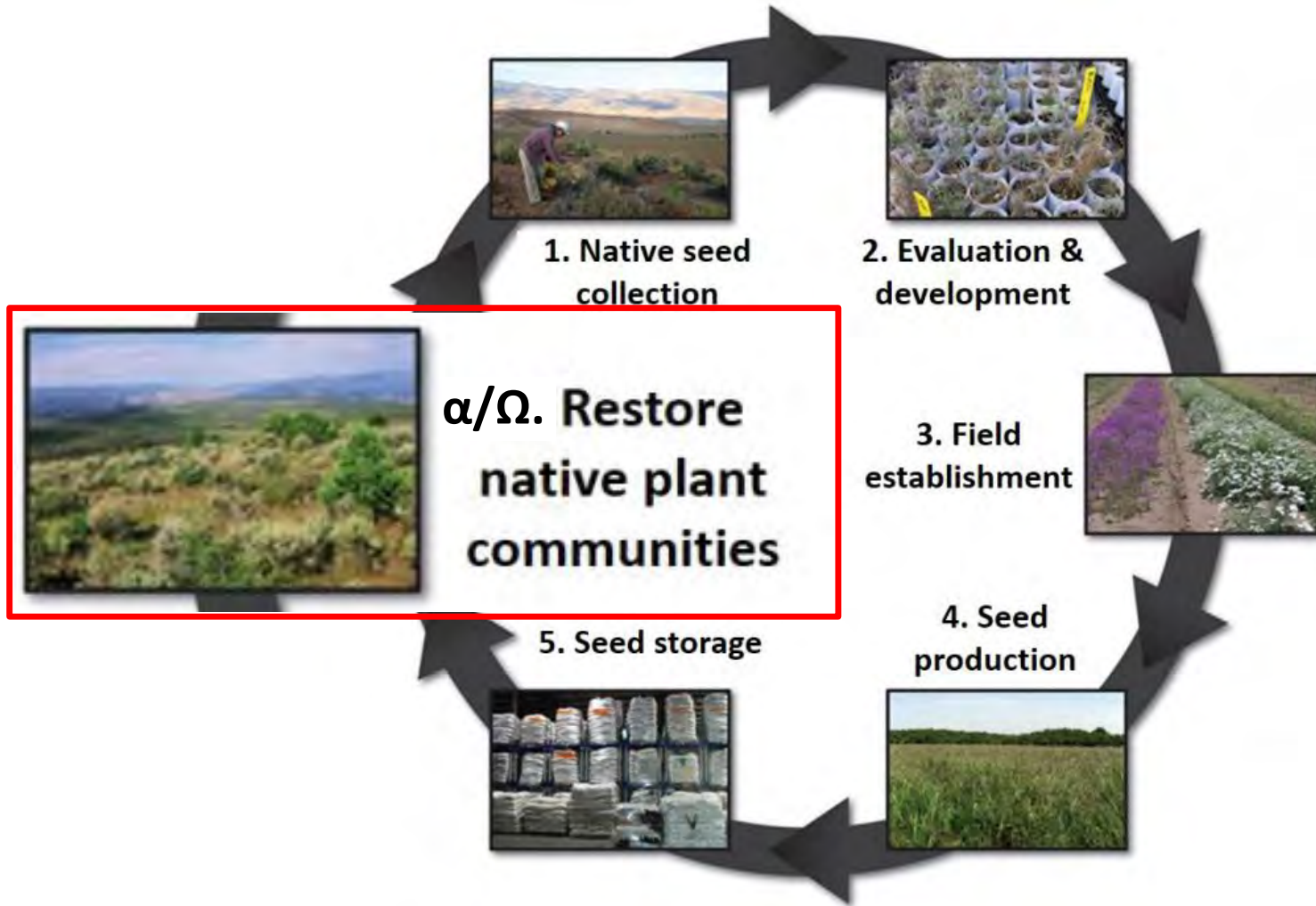


UDWR Native Seed Increase

- Germination and Propagation Facilities
 - Greenhouse, Drive-in Coolers, Incubators, and Shade House
- 2 Farms
 - Snow Field Station, Ephraim UT
 - 22 Acres
 - Fountain Green, UT
 - 20 Acres
- Specialized Equipment
 - Planting, Maintenance, Harvesting, and Cleaning



UDWR Seed Development Strategy



UDWR Species Prioritization

- Wildlife use/preference
- Broad Distribution
- Habitat/Performance
- Agronomic Potential
- Commercial acceptance

Currently in Grow-out	Wildlife Use/Preference					Subtotal x5
	Sage Grouse	Sage Grouse Chick	Pollinator Use	Pollinator Syndrome	Other Wildlife	
Species						
Cleome lutea	1	1	3			25

Distribution					Subtotal x2
Broad Distribution	Utah Distribution	Distribution in Great Basin	Distribution in Colorado Plateau		
1	1	1	1	1	8

Habitat/Performance					Subtotal x3
Nitrogen Fixer	Drought Tolerant	Grazing Tolerant	Competitive w/ cheatgrass and introduced	Other	
	1				3

Agronomic Potential							Subtotal x4	Grand Total	Priority
Determinant Flowering	Upright Stature	Good Seed Retention	Years of Seed Production	Years Until Seed Production	Other				
	1	1	1				12	48	High



UDWR Seed Development Strategy

- Initial collection informed by prioritization/ opportunity
- Small scale increase done ‘in-house’
- Pooled source material for Pre-variety Germplasm Release
 - Multiple sources from across a geographic (e.g., Great Basin) or ecological classification (e.g., STZ)
 - Selection of source populations may or may not occur
 - Based off population performance/ traits
 - Maintains a large genetic diversity
 - Potentially could become a variety with more testing
- Seed released to commercial grower
- Purchased back in bulk for restoration projects



'UDWR Tetra' Great Basin Wildrye

SELECTED SEED

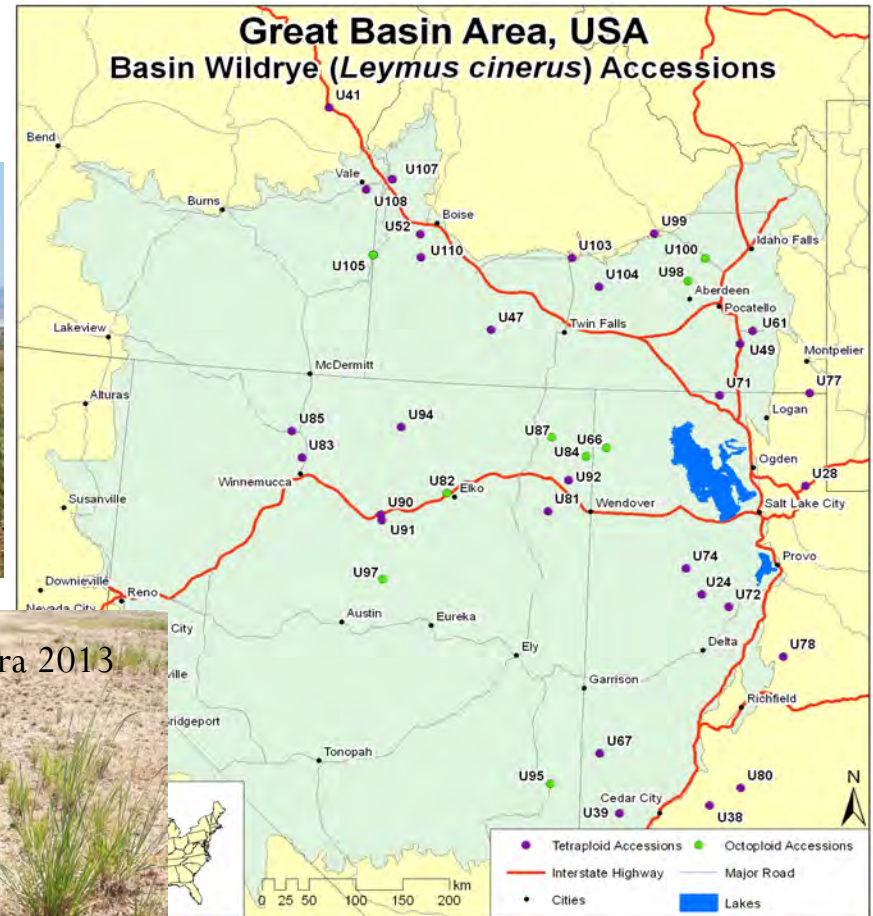


Species Name: *Leymus cinereus*
 Common Name: Basin Wildrye
 Germplasm ID, Gen.: UDWR Intermountain Tetra, G1
 G1 State, County, Elev.: UT, San Pete, 5500 ft.
 G0 State, County, Elev.: UT, NV, OR, ID, various, 2000-6000 ft.

G0 Indigenous? UNK Cert. # G-3001
 G0 Natural-Track? YES Lot # SFS Tetra-11

The seed in this container, with label properly affixed thereto, was produced in compliance with the Seed Certification Requirements and Standards established by the Utah Crop Improvement Association for Selected Germplasm certified seed. Compliance (any warranty, express or implied) is based on and limited to representative field inspections and seed sample analysis. This tag must be accompanied by a seed analysis label to comply with state and federal seed laws.

Member of Association of Official Seed Certifying Agencies



Hamlin Valley Project

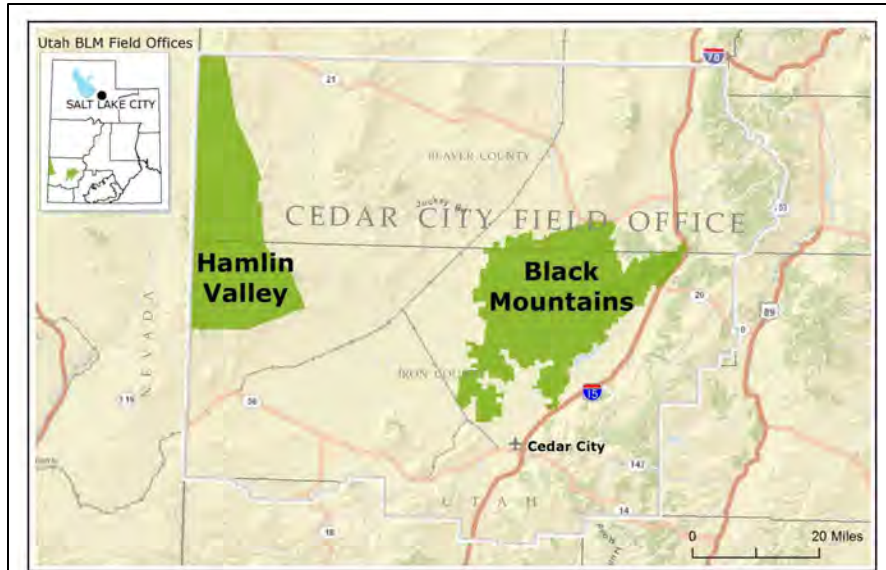


Figure 1. The Hamlin Valley and Black Mountains Project Areas in Beaver and Iron Counties, Utah.



Landscape Conservation Forecasting™ Hamlin Valley and Black Mountains

Report to Bureau of Land Management, Cedar City Field Office
in partial fulfillment of Cooperative Agreement No. L12AC20604

By

Louis Provencher¹, Joel Tuhy², Gen Green³, Elaine York³, and Tanya Anderson⁴

The Nature Conservancy, Reno¹ and Las Vegas⁴, Nevada
The Nature Conservancy, Moab² and Salt Lake City³, Utah

November 2015

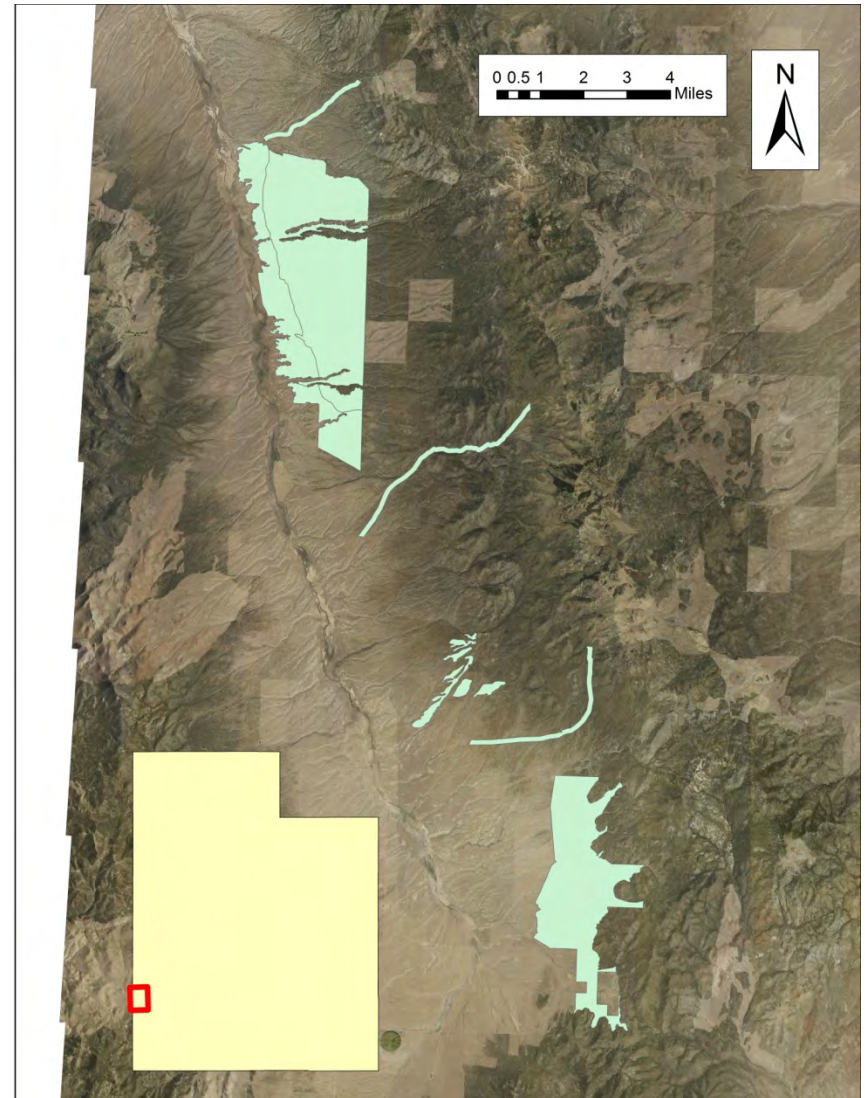
Key Conclusions

Key conclusions of the Landscape Conservation Forecasting™ assessment in the BLM Cedar City Field Office are summarized below:

1. The Hamlin Valley and Black Mountains Project Areas, encompassing about 630,000 acres (255,000 ha) combined, are largely undeveloped landscapes that support a diversity of ecological systems in the southeastern part of the Great Basin ecoregion.
5. At present, many ecological systems in the two Project Areas are in fair to poor condition, as indicated by high values of the metric of unified ecological departure, although this metric allows for a limited area of introduced-species seedings to be considered beneficial. This is especially true of systems that cover extensive areas, are readily accessible, and/or support various multiple land uses.
6. For the most part, conditions after 25 years of "MINIMUM MANAGEMENT" (no active treatments or management) are forecasted to remain moderately to highly departed—especially in large, accessible systems with multiple land uses.

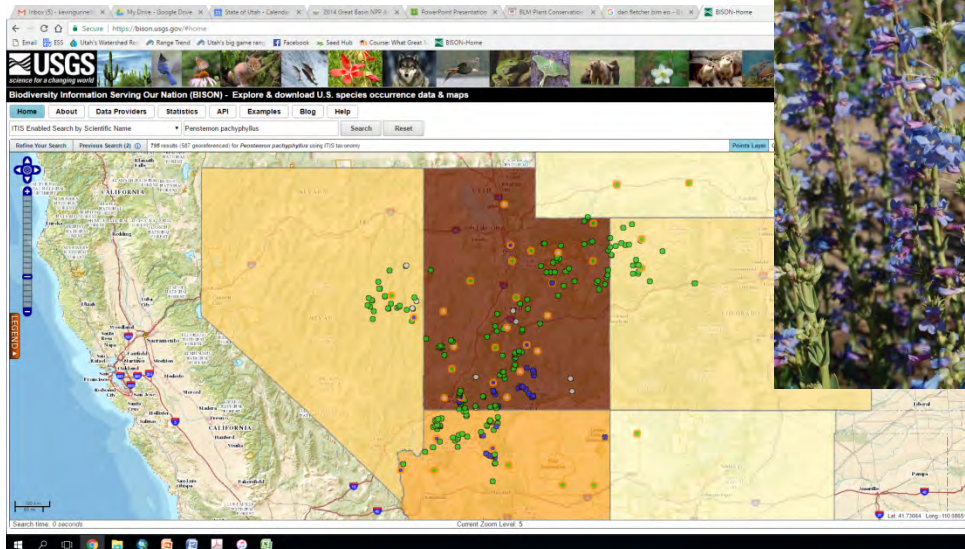
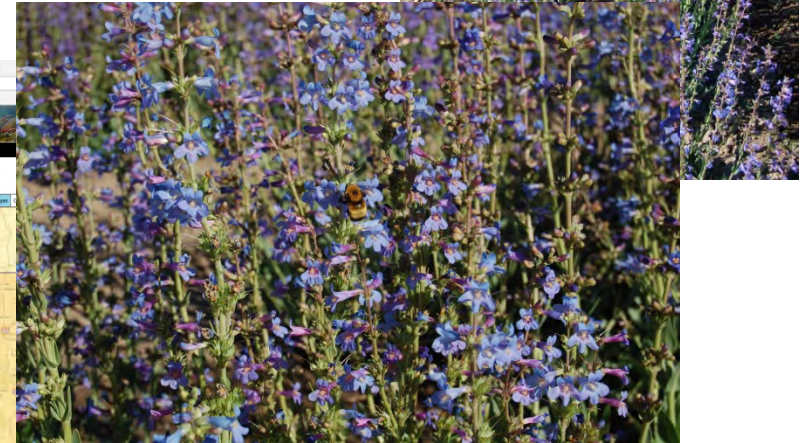
Hamlin Valley Project

- BLM Habitat Restoration Project through the WRI
- 14,195 acres of Pinyon-Juniper Reductions/Seeding
 - 3,550 acres high diversity native grass/forb mix.
- Crucial sage grouse habitat
- Desire to use native/locally adapted species, especially forbs



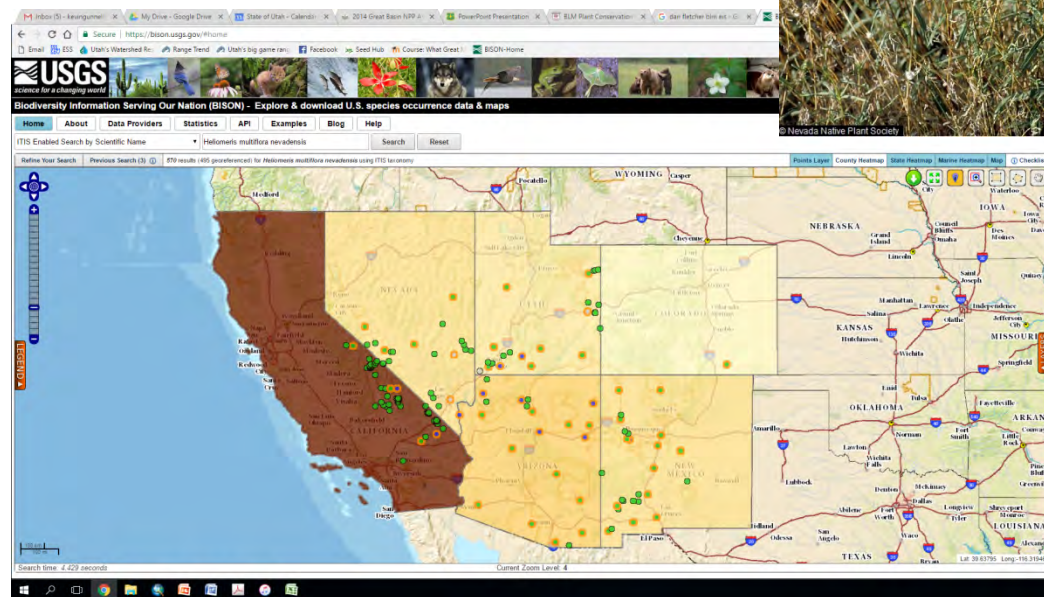
Penstemon pachyphyllus

- Increase field established 2010
 - 2 collection sources
 - 14-24 in. precip. / 70-80 deg. (old designation)
- Distributed to grower October 2012
 - 66 lbs



Heliomeris multiflora nevadensis

- Increase field established 2010
 - 9 collection sources
 - 15 - 20 Deg. F. / 6 – 12
- Distributed to grower Aug. 2015
 - 15 lbs



Hamlin Valley Project

- Purchased seed fall 2016

Seed Kind	Source ID Location	Pounds Purchased	Bulk Price per Pound	Cost
Showy Goldeneye	White Pine NV	500	\$30.00	\$15,000.00
Thickleaf Beardtongue	White Pine NV	1400	\$35.00	\$49,000.00

Hamlin Valley Project

- Purchased seed fall 2016
- Seed mixed and applied Oct.-Nov. 2016

Seed Kind	Source ID Location	Pounds Purchased	Bulk Price per Pound	Cost
Showy Goldeneye	White Pine NV	500	\$30.00	\$15,000.00
Thickleaf Beardtongue	White Pine NV	1400	\$35.00	\$49,000.00

Acres:		3550					
KIND OF SEED	LOT NUMBER	POUNDS IN MIX	Seeds per sq.ft.	Test Date	Price per Pound	Total Amount	
Alfalfa 'Ladak +'	847-9-14003	2000	2.79	Aug-15	\$3.88	\$7,750.73	
Arrowleaf Balsamroot--Sevier, UT	BASA-P-UTSV	200	0.05	Aug-16	\$24.46	\$4,892.65	
Arrowleaf Balsamroot--Box Elder, Sevier, S:	BASA-M-UT	100	0.03	Jul-16	\$24.46	\$2,446.33	
Arrowleaf Balsamroot--Wasatch UT	BASA-15	100	0.02	Aug-16	\$24.46	\$2,446.33	
Bluebunch Wheatgrass 'Anatone	H4-15-84261	5384	4.36	Sep-15	\$6.31	\$33,989.11	
Bluebunch Wheatgrass 'Anatone	5M0501-100	400	0.28	Oct-15	\$6.31	\$2,525.19	
Bluebunch Wheatgrass 'Anatone	5DH-501-100	1800	1.55	Oct-15	\$6.31	\$11,363.37	
Bluebunch Wheatgrass 'Columbia'	1692-0	1000	0.80	Sep-16	\$6.31	\$6,312.99	
Firecracker Penstemon 'Richfield'	2011.0592	140.6	0.22	Aug-16	\$42.09	\$5,917.85	
Firecracker Penstemon 'Richfield'	2012.0446	260	0.47	Aug-16	\$42.09	\$10,943.40	
Gooseberryleaf Globemallow--Beaver UT	21H	500	1.41	Aug-16	\$45.55	\$22,775.51	
Indian Ricegrass 'Nezpar'	NBS-RR3-NEZ-3	8800	7.01	Sep-15	\$6.04	\$53,115.36	
Lewis Flax 'Maple Grove'	S13-283-12	297	0.45	Aug-16	\$13.84	\$4,109.23	
Lewis Flax 'Maple Grove'	2013.0350	800	1.24	Aug-16	\$13.84	\$11,068.63	
Munro Globemallow--Iron UT	V-88681	200	0.57	Aug-16	\$45.45	\$9,090.00	
Palmer Penstemon-Elko NV	SIS5129	1900	6.56	Aug-16	\$23.62	\$44,885.40	
Sandberg Bluegrass--Mountain Home	NBS-CF3-MTH-1	500	2.62	Aug-16	\$4.97	\$2,484.42	
Scarlet Globemallow--Iron, UT	28Y	59	0.02	Aug-16	\$86.07	\$5,078.34	
Showy Goldeneye--White Pine NV	16-GE	500	2.76	Sep-16	\$35.86	\$17,929.69	
Thickleaf Penstemon - Whitepine NV	16-TL	1100	2.09	Sep-16	\$39.63	\$43,592.35	
Thickspike Wheatgrass 'Bannock'	450-126-486X1	2190	1.94	Aug-15	\$6.51	\$14,260.28	
Thickspike Wheatgrass 'Critana'	NBS-LH3-CRI-1	357	0.31	Aug-16	\$6.51	\$2,324.62	
Thickspike Wheatgrass 'Critana'	NBS-CF3-CRI-2	1000	0.85	Aug-16	\$6.51	\$6,511.54	
Western Wheatgrass 'Arriba'	1485-1	1800	1.13	Aug-15	\$4.88	\$8,785.79	
Western Wheatgrass 'Recovery'	5HW592-17	1750	1.04	Aug-16	\$4.88	\$8,541.74	
Western Yarrow-Lincoln WA	099-568-402A	350	6.79	Aug-16	\$23.60	\$8,261.03	
Yellow Beeplant--Nye NV	SIS5179	50	0.03	Aug-16	\$49.10	\$2,455.00	
BULK POUNDS PER ACRE:	9.45	33537.6		TOTAL		\$353,856.90	
PLS POUNDS PER ACRE:	8.35						
Dollars per acre:		\$99.68					
Live seeds/Ft²:		47					



Hamlin Valley Project

- Purchased seed fall 2016
- Seed mixed and applied Oct.-Nov. 2016

Seed Kind	Source ID Location	Pounds Purchased	Bulk Price per Pound	Cost
Showy Goldeneye	White Pine NV	500	\$30.00	\$15,000.00
Thickleaf Beardtongue	White Pine NV	1400	\$35.00	\$49,000.00

Acres:		3550					
KIND OF SEED	LOT NUMBER	POUNDS IN MIX	Seeds per sq.ft.	Test Date	Price per Pound	Total Amount	
Alfalfa 'Ladak +'	847-9-14003	2000	2.79	Aug-15	\$3.88	\$7,750.73	
Arrowleaf Balsamroot-Sevier, UT	BASA-P-UTSV	200	0.05	Aug-16	\$24.46	\$4,892.65	
Arrowleaf Balsamroot-Box Elder, Sevier, S:	BASA-M-UT	100	0.03	Jul-16	\$24.46	\$2,446.33	
Arrowleaf Balsamroot-Wasatch UT	BASA-15	100	0.02	Aug-16	\$24.46	\$2,446.33	
Bluebunch Wheatgrass 'Anatone	H4-15-84261	5384	4.36	Sep-15	\$6.31	\$33,989.11	
Bluebunch Wheatgrass 'Anatone	5M0501-100	400	0.28	Oct-15	\$6.31	\$2,525.19	
Bluebunch Wheatgrass 'Anatone	5DH-501-100	1800	1.55	Oct-15	\$6.31	\$11,363.37	
Bluebunch Wheatgrass 'Columbia'	1692-0	1000	0.80	Sep-16	\$6.31	\$6,312.99	
Firecracker Penstemon 'Richfield'	2011.0592	140.6	0.22	Aug-16	\$42.09	\$5,917.85	
Firecracker Penstemon 'Richfield'	2012.0446	260	0.47	Aug-16	\$42.09	\$10,943.40	
Gooseberryleaf Globemallow-Beaver UT	21H	500	1.41	Aug-16	\$45.55	\$22,775.51	
Indian Ricegrass 'Nezpar'	NBS-RR3-NEZ-3	8800	7.01	Sep-15	\$6.04	\$53,115.36	
Lewis Flax 'Maple Grove'	S13-283-12	297	0.45	Aug-16	\$13.84	\$4,109.23	
Lewis Flax 'Maple Grove'	2013.0350	800	1.24	Aug-16	\$13.84	\$11,068.63	
Munro Globemallow-Iron UT	V-88681	200	0.57	Aug-16	\$45.45	\$9,090.00	
Palmer Penstemon-Elko NV	SIS5129	1900	6.56	Aug-16	\$23.62	\$44,885.40	
Sandberg Bluegrass-Mountain Home	NBS-CF3-MTH-1	500	2.62	Aug-16	\$4.97	\$2,484.42	
Scarlet Globemallow-Iron UT	28Y	59	0.02	Aug-16	\$86.07	\$5,078.34	
Showy Goldeneye-White Pine NV	16-GE	500	2.76	Sep-16	\$35.86	\$17,929.69	
Thickleaf Penstemon - Whitepine NV	16-TL	1100	2.09	Sep-16	\$39.63	\$43,592.35	
Thickspike Wheatgrass 'Dannock'	430-120-480X1	2130	1.34	Aug-15	\$6.51	\$13,866.26	
Thickspike Wheatgrass 'Critana'	NBS-LH3-CRI-1	357	0.31	Aug-16	\$6.51	\$2,324.62	
Thickspike Wheatgrass 'Critana'	NBS-CF3-CRI-2	1000	0.85	Aug-16	\$6.51	\$6,511.54	
Western Wheatgrass 'Arriba'	1485-1	1800	1.13	Aug-15	\$4.88	\$8,785.79	
Western Wheatgrass 'Recovery'	5HW592-17	1750	1.04	Aug-16	\$4.88	\$8,541.74	
Western Yarrow-Lincoln WA	099-568-402A	350	6.79	Aug-16	\$23.60	\$8,261.03	
Yellow Beeplant-Nye NV	SIS5179	50	0.03	Aug-16	\$49.10	\$2,455.00	
BULK POUNDS PER ACRE:	9.45	33537.6		TOTAL		\$353,856.90	
PLS POUNDS PER ACRE:	8.35						
Dollars per acre:	\$99.68						
Live seeds/Ft²:	47						



What works for us

- WRI provides structure for proactive work/stabilization of the market
 - On the ground work helps dictate species prioritization and needs in plant material development
 - Provides a market
- A commercial scale grower willing to take a chance and tinker
 - Small scale/part-time growers have failed repeatedly.
 - Don't have time/resources/knowledge
- When a product is developed through the GBRC, a grower can have confidence that there will be an immediate market for seed if cost is similar to wildland collected seed.
- GBRC facility provides connection between seed producers and end user/project managers
 - GBRC has early input on project proposals and can inform or suggest species by appropriateness and availability

What needs work

- More materials that can be used on landscape scale within rational budget
- Testing of performance of pooled source species, especially in restoration settings
 - Select sources with better performance to be pooled?
- Information on cultural practices for commercial production
 - Planting, harvest and weed control
 - A good grower can help make it work
- Innovative growers in multiple locations
 - Nothing is as valuable as the knowledge of a good grower
 - Not all plants will grow everywhere, even with irrigation (photo-period and temp. requirements)
- Commercial acceptance/adoption of developed materials
 - Stabilization of market for producers

Conclusion

- The UDWR model has been successful at linking small scale collection to landscape scale restoration efforts
 - Proactive management initiative for structure (WRI)
 - Seed procurement facility for logistics (GBRC)
 - Native plant materials project for development (GBRC/USFS)
- Pooled source increase by STZ is a quick and effective way to get plant materials
 - Untested materials
 - Further selection may be necessary
- Still plenty of work left to be done



Acknowledgments

- Project funded by Pittman-Robertson dollars through Federal Aid Grant W-82-R and the Great Basin Native Plant Project (GBNPP)
- Additional funding by the following agencies:
 - Utah Division of Wildlife Resources
 - Bureau of Land Management
 - U.S. Forest Service



Questions



Kevin Gunnell

kevingunnell@utah.gov

435-283-4441



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>

