


A Retrospective Look at Plant Materials Development



Scott Jensen, Botanist, USDA Forest Service, Rocky Mountain
Research Station, Provo, UT.

Who are we: our background and inclination

- Supermarket generation (Roundy 1999)
- Conservation Biology (Jones 2009)
- Evolutionary paradigm (Jones & Monaco 2009)



- Agrarian Society
- Agriculture-resource extraction
- Resource Paradigm (Jones & Monaco 2009)





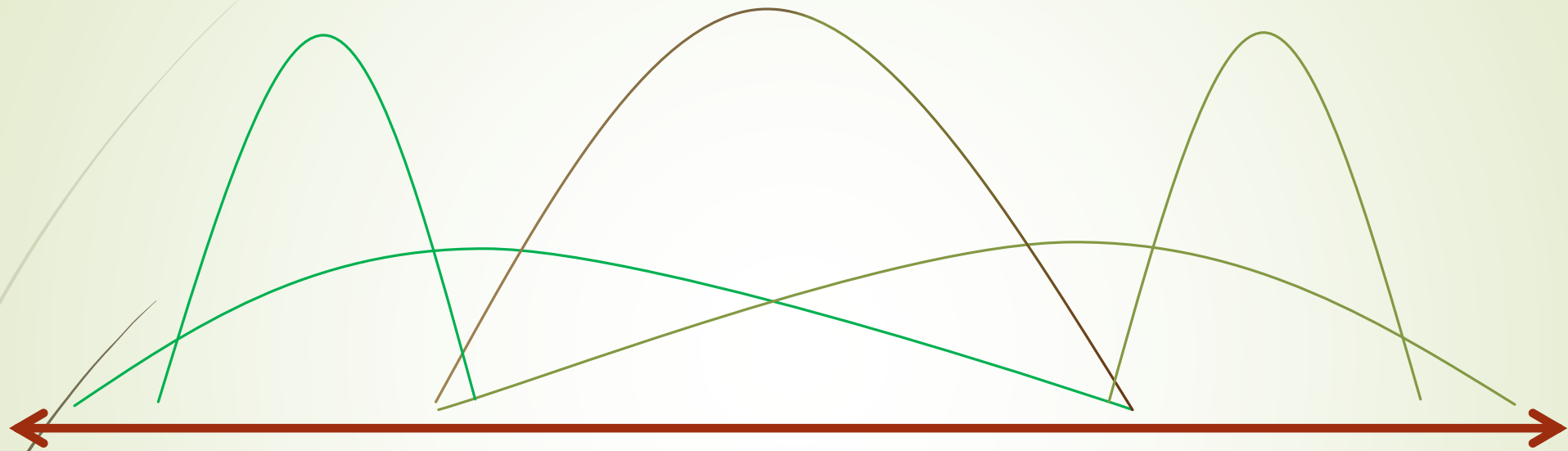
Competing paradigms

(Jones and Monaco 2009)



- Evolutionary Paradigm
- Seeks to restore putative natural patterns of genetic variation to generate an evolutionary trajectory similar to pre-anthropogenic disturbances.
- Resource Paradigm
- Depends on the delivery of economic products and ecosystem services with minimal regard for species or genotype.

What is our makeup?



Evolutionary Paradigm



Resource Paradigm

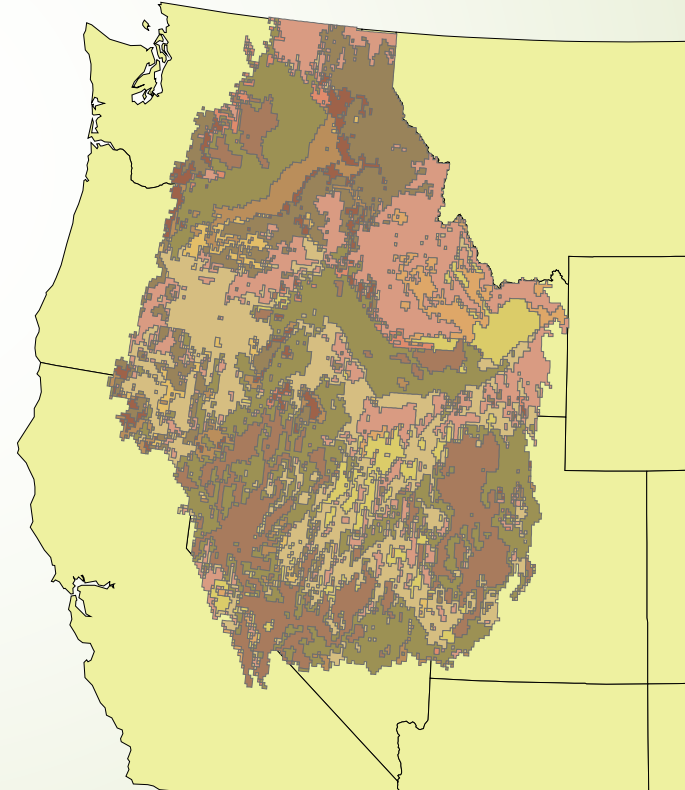


Plant Development Models

- Cultivar
Trailhead Basin Wildrye



- Seed Zones
Bluebunch wheatgrass



Cultivar Model Development

Basin Wildrye Trailhead (*Leymus cinereus*)

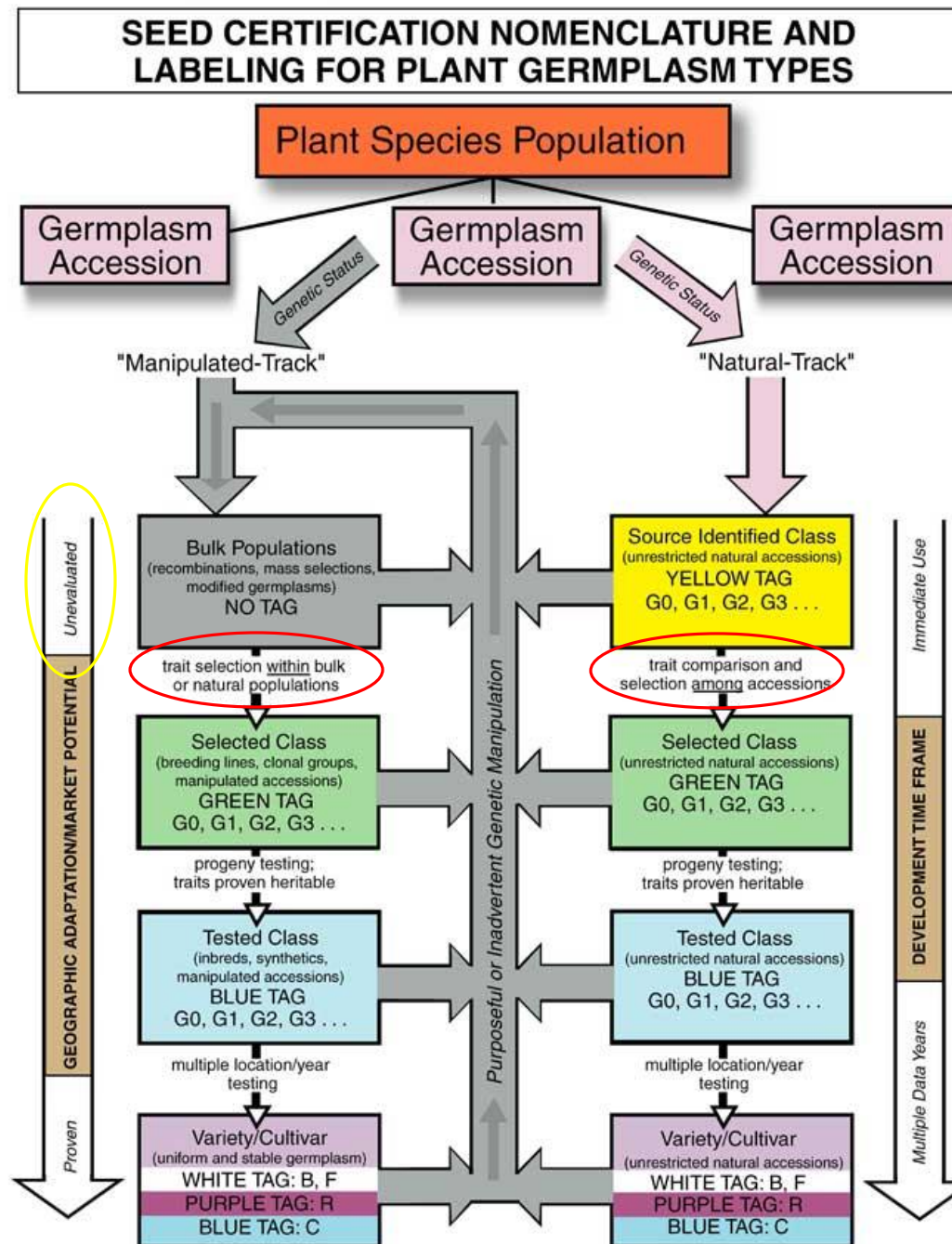


Area of adaptation for Trailhead basin wildrye

Source	Origin	Breeding Method	Key Traits	Recommended area of use.	Restoration Gene Pool
Magnar	University of Saskatchewan 1939, released 1979.	Selection of vigorous types during several generations.	Consistently superior production of viable seed	Intermountain Region	Manipulated Track Cultivar – Tertiary
Trailhead	Musselshell Co, MT. 1991	Selected from 125 accessions from MT and WY. Direct increase of field collection.	Selected for stand longevity and drought tolerance	Northern Great Plains and Intermountain Region with $\geq 8''$ precipitation.	Natural Track Cultivar Secondary – not local
Washoe	Anaconda superfund site, Anaconda MT. 2002	Natural track selected class, (n=3+ Magnar, Trailhead), based on height, vigor, and % survival.	Superior vigor and survival in Anaconda MT. mine spoils with low pH and heavy metal contamination	Anaconda smelter superfund site. Foothills of the Northern Rocky mountains. Other regions where basin wildrye is adapted.	Natural Track – Selected Secondary – not local
Continental	Magnar –Trailhead hybrid, 2009	Induced octoploid and natural octoploid hybrid. 1 recombination generation followed by 2 recurrent selection cycles	Similar or superior establishment to Magnar and Trailhead at GB test sites.	Intermountain Region and Northern Great Plains where Magnar and Trailhead have been successful.	Tertiary
Tetra	Pooled tetraploid materials from Great Basin populations, 2010	Pooled wildland collection	No intentional selection	Great Basin	Secondary – too broad to be considered local

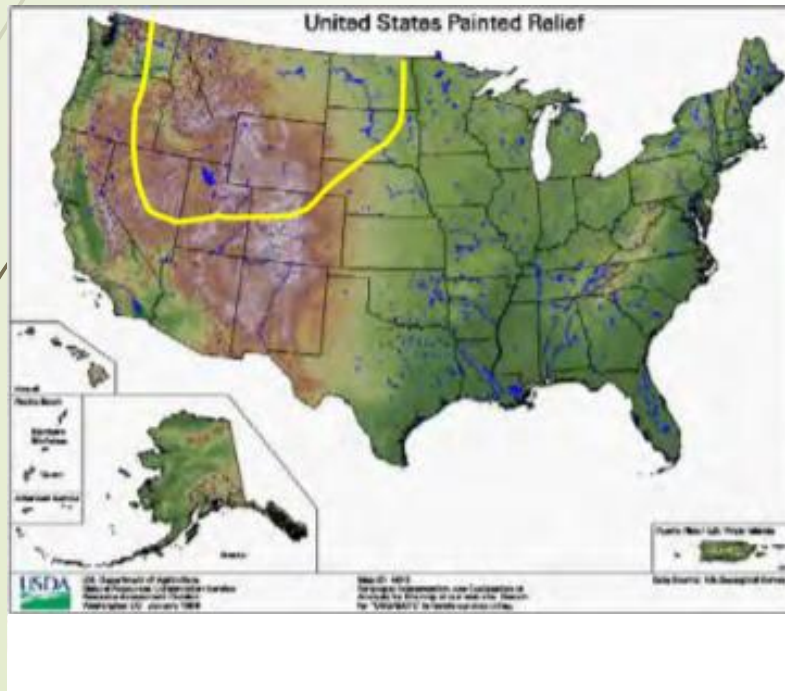
Association of Official Seed Certification Agencies (AOSCA)

FIGURE 1. Germplasm development flow chart.

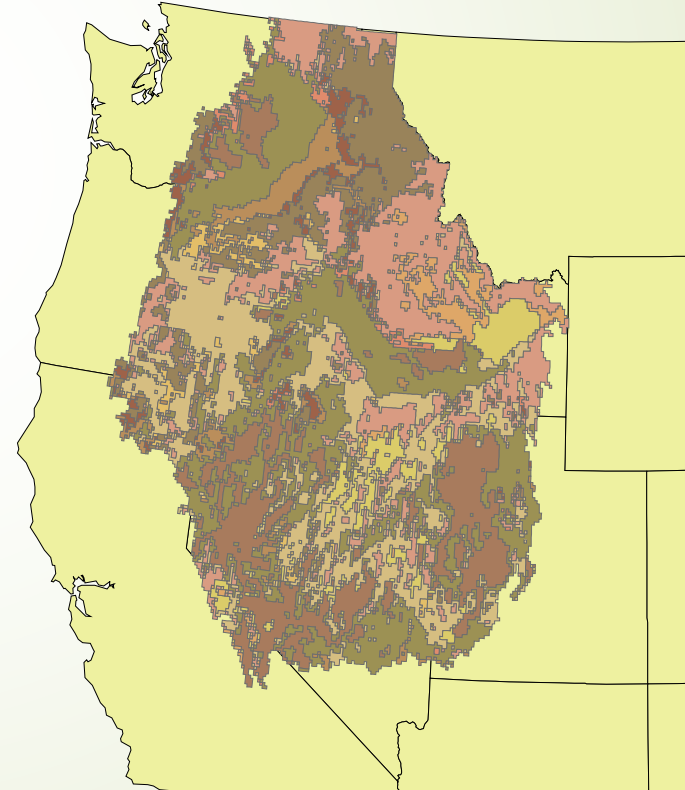


Plant Development Models

- Cultivar
Trailhead Basin Wildrye



- Seed Zones
Bluebunch wheatgrass



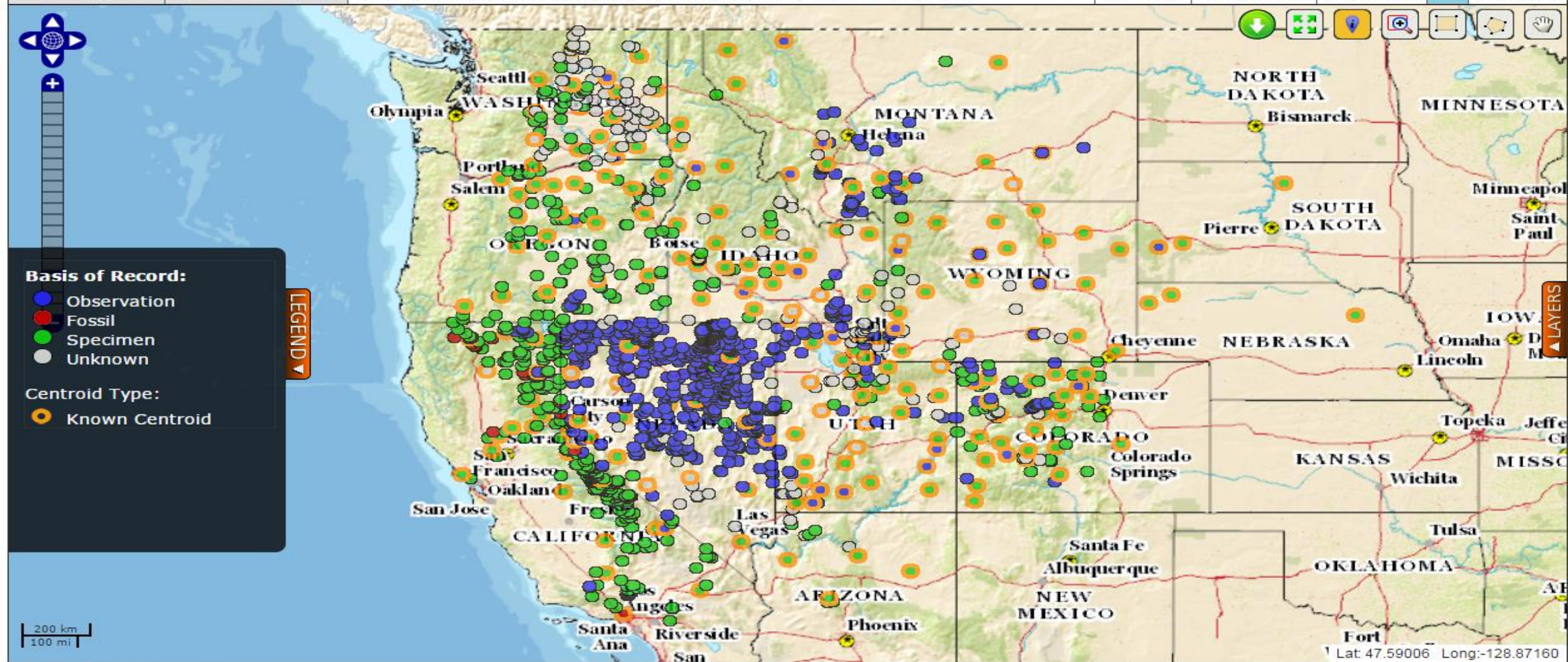


Biodiversity Information Serving Our Nation (BISON) - Explore & download U.S. species occurrence data & maps

[Home](#)
[About](#)
[Data Providers](#)
[Statistics](#)
[API](#)
[Examples](#)
[Blog](#)
[Help](#)

ITIS Enabled Search by Scientific Name

Refine Your Search
 Previous Search (1) ⓘ
 3,021 results (2,834 georeferenced) for *Leymus cinereus* using ITIS taxonomy





Conserve the range of *genetic variation*

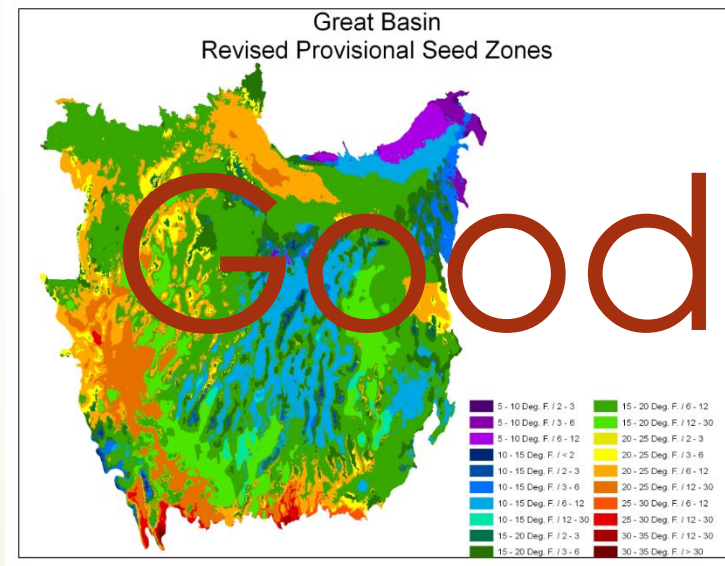
- To achieve ... management goals restoration efforts on USFS and BLM lands are best served through the use of **locally adapted** and **regionally appropriate** native seed sources.

Locally Adapted model Development and Deployment

Local Sources



Generalized Provisional Seed Zones

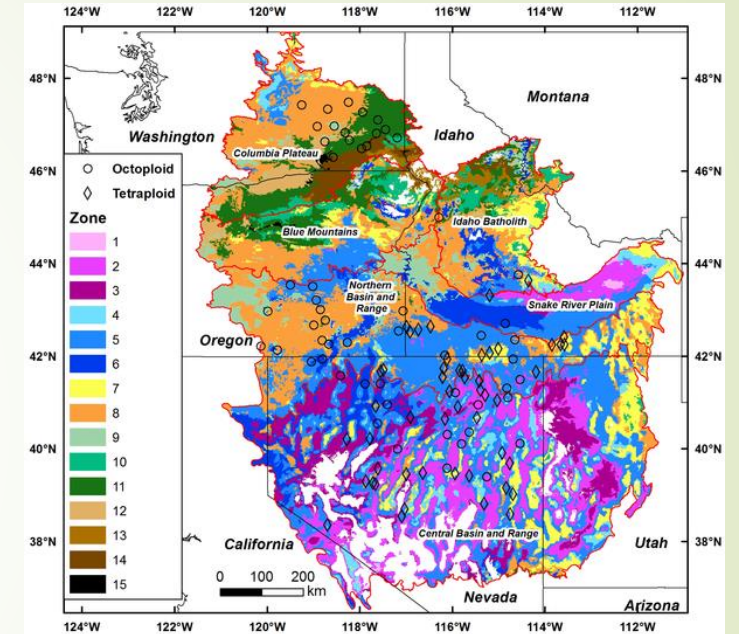


Empirical Seed Zones



Seed Source Recommendations

- Pool seed from
 - the same ecosystem
 - more than 50 parents
 - at least 5 locations
- If environmental uncertainty is anticipated
 - Include material from other ecosystems similar to anticipated future environment (composite provenances)



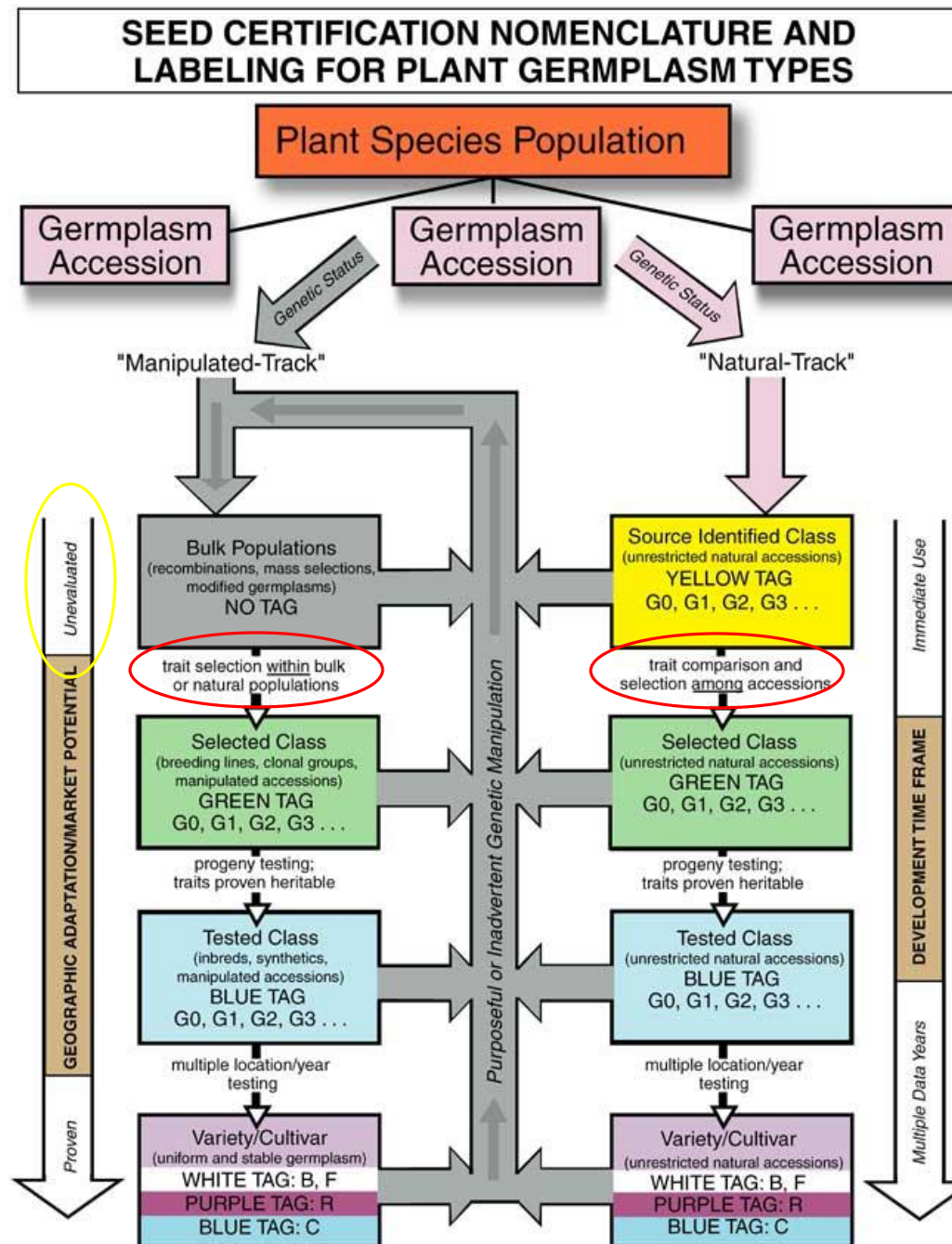
Recent NRCS and USFS Releases

- Eagle Germplasm western yarrow
 - 2011 - USFS RMRS 2011
- Mountain Home Germplasm Sandberg bluegrass
 - 2011- USFS RMRS 2011
- Amethyst Germplasm hoary tansyaster
 - 2015 – NRCS Aberdeen
- Soda Springs Germplasm Parsnipflower buckwheat
 - 2017 – NRCS Aberdeen



Association of Official Seed Certification Agencies (AOSCA)

FIGURE 1. Germplasm development flow chart.



Recent ARS FRRL Forb Releases

- NBR-1 Germplasm basalt milkvetch 2008 – ARS FRRL
- Majestic Germplasm, Spectrum Germplasm Western Prairie Clover 2011 – ARS FRRL

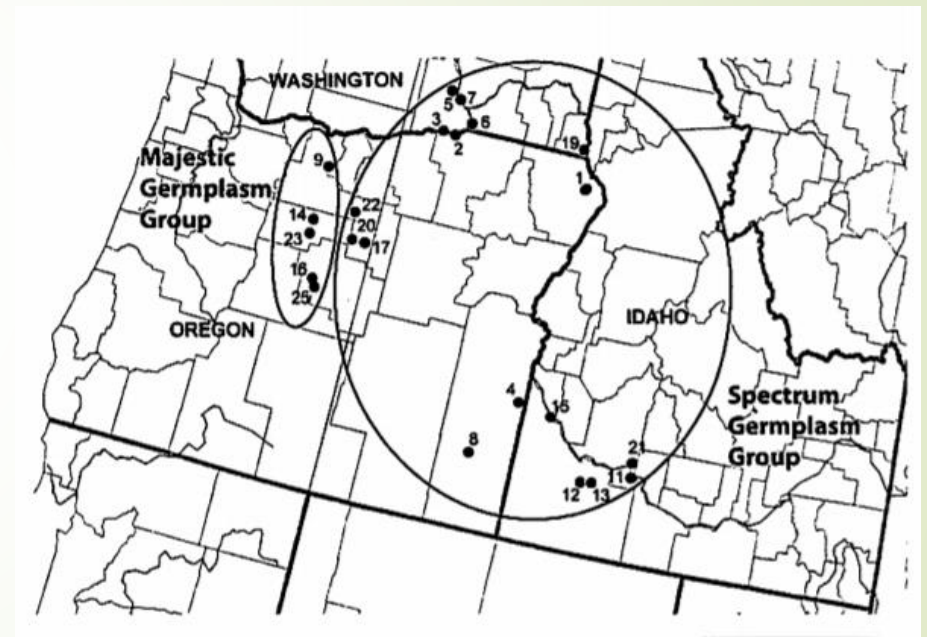
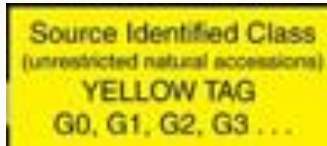


Figure 2. Collection sites of 22 populations of *Dalea ornata* with Majestic Germplasm group representing one genetic diversity structure and Spectrum Germplasm group representing a second genetic diversity structure.

Commercial Seed Production from SSL GBRC materials

2016 Seed Production



Species	Source	Quantity
Thickleaf penstemon	14-24 in. /70-80 CBR*	3,510 lbs.
Nevada Showy goldeneye	15-20 Deg. F. / 6-12 CBR	1,205 lbs.
Gooseberryleaf globemallow	15-20 Deg. F. / 6-12 CBR	500 lbs.
Gooseberryleaf globemallow	15-20 Deg. F. / 6-12 CBR	33 lbs.
Munro's globemallow	10-15 Deg. F. / 6-12 CBR	23 lbs.
bigflower agoseris	20-25 Deg. F. / 3-6 CBR	107 lbs.
Yellow spiderflower	15-20 Deg. F. / 6-12 CBR	75 lbs.
Erigeron speciosus	15-20 Deg. F. / 3-6 CBR	19 lbs.
Leymus cinereus	10-15 Deg. F. / 6-12 CBR	438 lbs.
Leymus cinereus	15-20 Deg. F. / 3-6 CBR	286 lbs.
Leymus cinereus	15-20 Deg. F. / 6-12 CBR	345 lbs.
Leymus cinereus	20-25 Deg. F. / 6-12 CBR	136 lbs.
		6,677 total lbs.

2017 Seed Production

Species	Source	Quantity
Agoseris grandiflora	20-25 Deg. F. / 3-6 CBR	67 lbs.
Argemone munita	15-20 Deg. F. / 6-12 CBR	5 lbs.
Cleome lutea	15-20 Deg. F. / 6-12 CBR	16 lbs.
Erigeron speciosus	15-20 Deg. F. / 3-6 CBR	99 lbs.
Heliomeris multiflora nevadensis	15-20 Deg. F. / 6-12 CBR	300 lbs.
Leymus cinereus	10-15 Deg. F. / 6-12 CBR	1370 lbs.
Leymus cinereus	15-20 Deg. F. / 3-6 CBR	450 lbs.
Leymus cinereus	15-20 Deg. F. / 6-12 CBR	1193 lbs.
Leymus cinereus	20-25 Deg. F. / 6-12 CBR	685 lbs.
Mentzelia albicaulis	20-25 Deg. F. / 6-12 CBR	2.5 lbs
Nicotiana attenuata	15-20 Deg.F / 3-6 CBR	99 lbs.
Nicotiana attenuata	15-20 Deg. F. / 6-12 CBR	11 lbs.
Sphaeralcea grossulariifolia	15-20 Deg. F. / 6-12 CBR	33 lbs.
Sphaeralcea grossulariifolia	15-20 Deg. F. / 6-12 CBR	1000 lbs.
Sphaeralcea munroana	10-15 Deg. F. / 6-12 CBR	23 lbs.
Total		5353.5 lbs.

The current seed supply

- 2012 Restoration projects
- 4.5+ million lbs. of seed requested.
- Of the total lbs., 73% were native.
 - 39% wildland collections.
 - 59 species
 - 1.3+ million lbs. wildland collected
 - Between 2009- 2013 33% of BLM seed came from wildland harvest.



