NEVADA NATIVE SEED FORUM

THE FUTURE IS GROWING (literally)

ED S KLEINER
COMSTOCK SEED LLC
917 HWY 88
GARDNERVILLE, NV 89460
775-265-0090
ed@comstockseed.com

INTRODUCTION

COMSTOCK SEED'S VIEW ON COLLECTING, GROWING, AND MARKETING NATIVE SEED

THE RESTORATION SEED INDUSTRY IS TRENDING TOWARDS LOCAL SOURCE GENETICS

THE NATIONAL SEED STRATEGY IS INFLUENCING THIS TREND

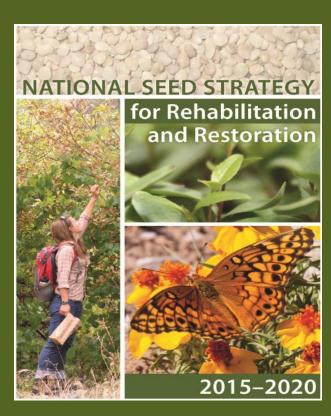
PRIVATE SECTOR CONTRACTING IS REQUIRING MORE LOCAL SOURCE SEED

SO. LETS COLLECT AND GROW MORE LOCAL NATIVE SEED

MARKETING LOCAL SEED

https://www.fs.fed.us/wildflowers/Native_Plant_Materials/documents/SeedStrategyo81215.pdf

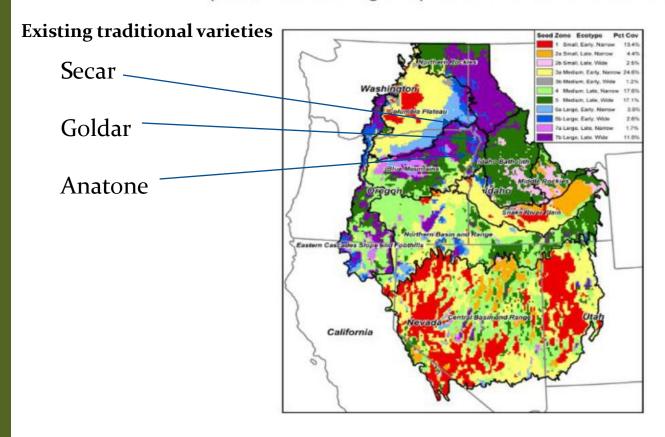
"THE RIGHT SEED IN THE RIGHT PLACE AT THE RIGHT TIME"



Regional analysis of Bluebunch wheatgrass across the intermountain west has yielded three distinct varieties with differing morphological and temporal qualities.

These qualities reflect evolution under varying microhabitat conditions

Genetic variation in adaptive traits and seed transfer zones for *Pseudoroegneria spicata* (bluebunch wheatgrass) in the northwestern United States

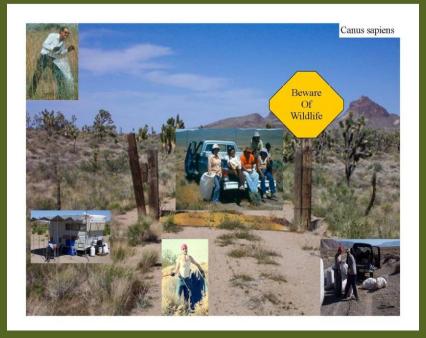


The central Great Basin needs a variety to reflect the red regions

Somersett Reno Goldar Bluebunch Wheatgrass



WILDLAND NATIVE SEED COLLECTION



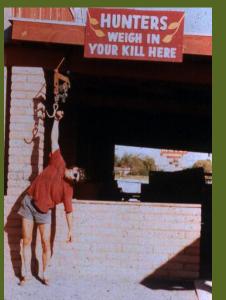


Handmade collection tools





Various appropriate technologies





Hanging out waiting for seed to ripen



HOME MADE MACHINERY















PERMITS AND PERMISSION

S800-9850 avi EMO

FOREST PRODUCTS REMOVAL PERMIT and CASH RECEIPT

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Private land permit



Department of Water and Power



the City of Los Angeles

ANTONIO R. VILLARAIGGISA

Commission
THOMAS S. SAYLES, Provided
ERIC HOLOMAN, Flor Provided
BICHARD F. MOSS
CHRISTINA E. NOONAN
JONATHAN PARFREY
GARDARA E. MOSKHOS, Jerosit

CNALD O SICHOLS

June 19, 2013

Mr. Ed Kleiner Comstock Seed 917 U.S. Highway 88 Minden, NV 89460

Dear Mr. Kleiner:

Subject: Native Seed Collection

This is in response to your e-mail dated May 31, 2013, to Ms. Lori Gillem of my staff, requesting permission to collect the following native seeds on City of Los Angeles (City) lands in the following areas:

 Purshia tridentata
 T1S, R26E, Sections 16, 21
 Grant Lake Area

 T4S, R28E, Sections 4, 5, and 6
 Sherwin Creek Area

 Wyothia mollis
 T4S, R28E, Sections 7 and 8
 Sherwin Creek Area

Permission is contingent on the Los Angeles Department of Water and Power (LADWP) receiving a signed copy of this etter indicating your acceptance of the terms and conditions listed below. Please return the signed copy of this letter to 300 Mandich Street, Bishop, California \$3514-3449, attention Ms. Gillem. If the signed copy of this letter and verification of insurance coverage have not been returned within 30 days, we will assume that you no longer plan to do this work and this permission shall be considered null and void.

This permission is subject to the following terms and conditions:

- This permission will expire at the end of the day on December 31, 2013. If additional
 time is needed for seed collection, it will be necessary for you to contact Ms. Gillem at
 (760) 873-0407 and request an extension.
- Please notify Ms. Gillem at the above-noted number when you have completed your harvesting.

Water and Power Conservation . . . a way of life

□ Bishop, Califernia melling address 300 Mandich Streat • Bishop, CA 93514-3449 • Telephone: (760) 873-0208 • Fax [750) 873-0268 H1 North Fopy Street, Lux Argeles, CA 90012-2609 • □ Asialong address - Box 51111 • Lux Argeles, CA 90051-0 00 Telephone: (2015) 5647-21 • Cabb andress - Box 5101 • Lux Argeles, CA 90051-0 00 Telephone: (2015) 5647-21 • Cabb andress - Box 4700-2000 CD CAB ANDRAS - CABb andress - DEWARNIA.





Private sector seed collection contract with regional source requirements

Treatment A: 1.92 acres (59.52 LBS)

Treatment B: 18.45 acres (286 LBS)

Total: 345.52 PLS/LBS

		NATIVE	SEED MIX		
SCIENTIFIC AND COMMON NAME	POUNDS PURE LIVE SEED PER ACRE	POUNDS PURE LIVE SEED NEEDED FOR 20 ACRES	ESTIMATED NUMBER OF SEEDS IN ONE POUND	ESTIMATED NUMBER PLS FOR 20 ACRES	ESTIMATED NUMBER OF LIVE SEEDS PER SQ FOOT
Achnotherum hymenoides (INDIAN RICEGRASS)	ž	60	141,000	2,820,000	10
Sphoeralcea ambigua (desert globemallow)	2	40	500,000	10,000,000	23
Ambrosia dumosa (white bursage)	5	100	38,400	768,000	4.
Larrea tridentata (Creosote bush)	4	80	80,000	1,600,000	7
Ephedra nevadensis (Nevada ephedra)	1,5	30	19,900	398,000	1
Total.	15.5	310	779,300	15,586,000	45

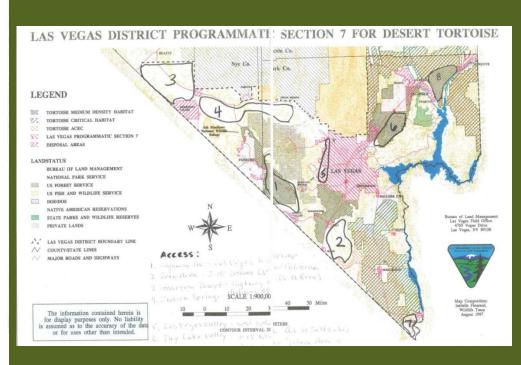
THIS TABLE INDICATES RATES FOR DRILL SEEDING FOR TREATMENT "B", TREATMENT "A" WILL REQUIRE DOUBLE THIS AMOUNT FOR BROADCAST APPLICATION.

SEED MUST BE COLLECTED FROM THE EASTERN MOJAVE—SOUTHERN NEVADA OR EASTERN SAN BERNARDING COUNTY, NO SEED FROM THE SONORAN DESERT.

NO STRAW MATS WITH NETTING WILL BE ALLOWED

Seeding will happen January to March of 2015

BLM permitted collection regions within Clark Co, NV



SEED DRYING

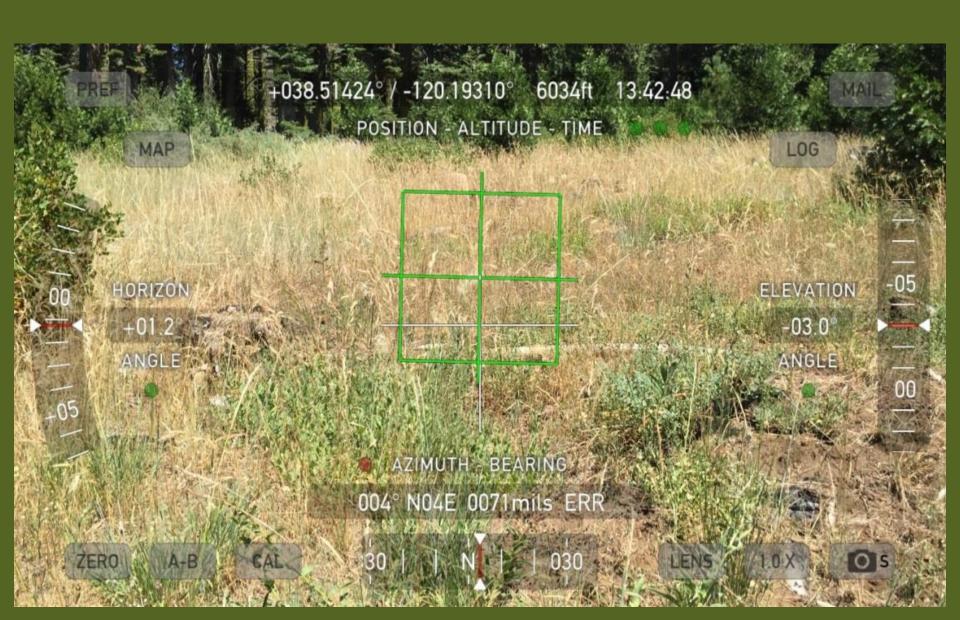






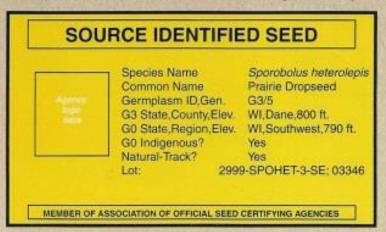


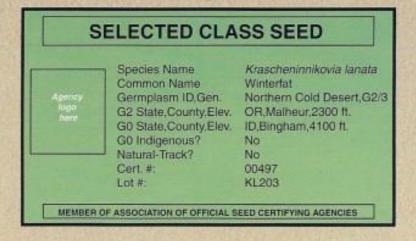
Some clients request verification of seed source Theodolite GPS application used for source confirmation of native seed collections

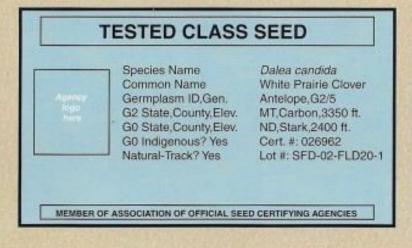


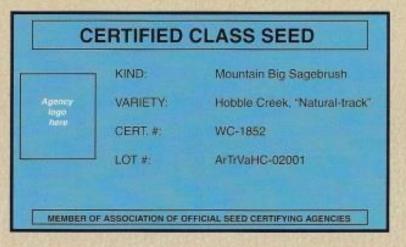
Certified seed sourcing from state departments of agriculture

FIGURE 2. AOSCA Pre-Variety Germplasm and Variety/Cultivar tag examples.











Seed Cleaning Testing























Farming challenge: Grow quality seed

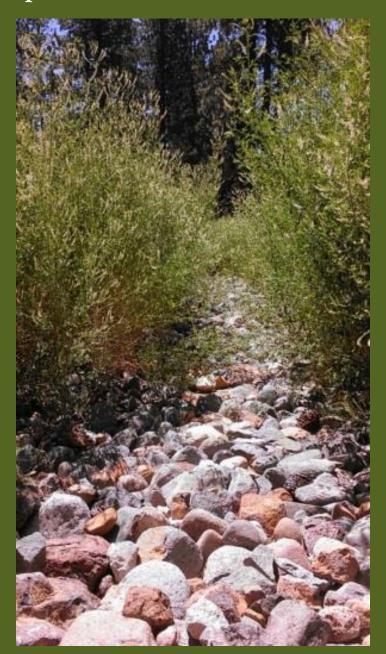
MATERIALS

NDOT Seed Specification 12 month testing, sagebrush 6 months

1. All seed shall conform to all laws and regulations pertaining to the sale and shipment of seed required by the Nevada Department of Agriculture and the Federal Seed Act. For sagebrush, test seed within six (6) months prior to seeding, unless otherwise directed. All other seed must be tested within 12 months of application date. Seed tags must reflect the most recent test date. Submit original seed tests by lot number at a minimum of 30 days prior to application for approval. Following approval, seed may be mixed and delivered to the site. Deliver all seed to the project site in sealed bags with proper labeling. Weed seed shall not exceed 0.25% of the pure live seed specified and shall not include any seed of cheatgrass (Bromus tectorum), sweet clovers (Melilotus officinalis, M. alba), and Russian thistle (Salsola kali). Crop seed shall not exceed 0.25%. Requests for substitute species and/or varieties must be submitted in writing. Written approval is required for all requested substitutions.



Enhanced weed and crop specifications are now common





Storage Testing Blending Labeling







Comstock Seed 917 Highway 88 Gardnerville, NV 89460 (775) 265-0090

Order Date: 09/23/16 Order Number: 25228 Project Name: D'ANDREA LOTS Project Number: Blend Name: D'ANDREA LOTS

	Pure	Total		
Species & Variety	Seed %	Viable	Tested	Origin
INDIAN RICEGRASS NEZPAR	5.31	81	06/07/16	MT
WHEATGRASS SIBERIAN VAVILOV	9.06	95	04/29/16	ID
WHEATGRASS CRESTED EPHRAIM	12.66	68	04/27/16	WY
SAGEBRUSH BIG WYOMING	2.47	72	05/18/16	CA
SALTBUSH FOURWING	10.76	40	11/19/15	NV
RABBITBRUSH RUBBER	2.59	83	03/29/16	UT
SQUIRRELTAIL	6.72	64	10/02/15	UT
MORMON TEA GREEN	4.95	87	09/18/16	UT
FESCUE SHEEP VNS	2.24	96	04/07/16	MT
KOCHIA PROSTRATE	3.53	61	04/27/16	UT
RYEGRASS ANNUAL GULF	6.52	99	01/05/16	OR
PENSTEMON PALMER	2.22	97	08/16/16	UT
BLUEGRASS BIG SHERMAN	5.52	78	06/21/16	MT
BITTERBRUSH	2.56	84	09/02/16	CA
WHEATGRASS BLUEBUNCH SECAR	6.80	95	08/10/15	WA

Bulk Lbs: 32.07 PLS Lbs: 20.70

Other Crop: 0.05 Hard Seed: 0.00 Weed Seed: 0.03 Dormant: 3.77 Inert Matter: 16.00

202							
		II, WY 8243					
Lab	ютаюту	y Report of	Analysis				
Comstack Seed 917 Highway 88 Gardnerville NV 89460		Account No. 154 Sender's Informa Fraction Fraction Fraction List Emiliar	VNS Buckwhe Eriogon 1657				ab Number (19 0679
		11220	Service				
	-73	has information provide	ded here is that of the		of the labor	with y.	
Purity Aualysis			Viability	Analysis			
Pure Seed Components In 10.27 grams. Pa	urity	Germ Date	Germination %	Dormant %	Hand %	Total Viable	
flower umboliotian		10/13/09	7	39	-11-	46	
Nuclinus Grans Required 200 Crop Seed D	0.09% 0.02% 1.89%						
Other Crop Seeds				one Found			
has tyres, Agreement 44 p	se lb	States, 6	D Grame.				
vsted Intigold Transfer son 14 p	wr Ib	111 10		PiProbibited		mark to the same of	
angott ingress, it p				Pileroninited	Noxious (K;Kestrii	ned Naxiatis
Feed Seeds:			terminations				
roma, deveny Browns rontonum 133 p Rougress, bulliuse Poor bullions: 88 p		les.	sat, sulpium florise	122		20 %	
	er 19						
Statuse None. Kemarics No AOSA seed techniq rules for Backwheat, sulpha Power.							
Costs Recipio-teal Purity, Germination, Noxious exer	nı, TZ test.	Ne other tests re	ques.ed.				







FARMING NATIVE SEED

Marketing challenge Why farming is important? Custom collections are expensive

COMPARATIVE PRICE LIST L	OCAL VS COMMERCIAL SOURCE*	
	COMMERCIAL \$/PLS LB	LOCAL COLLECTION \$/PLS LB
INDIAN RICEGRASS	8 RIMROCK	85
SANDBERG BLUEGRASS	11 VNS	55
SQUIRRELTAIL	15 TOE JAM	50 weed issues USFS Truc
GREAT BASIN WILDRYE	13 TRAILHEAD	30
CREEPING WILDRYE	SHOSHONIE	50
DESERT NEEDLEGRASS	NA	125
WESTERN NEEDLEGRASS	NA	190
SLENDER WHEATGRASS	5 PRYOR	26
TUFTED HAIRGRASS	22 NORTRAN	75
YARROW	50 YAKIMA	75
MEADOW BARLEY	26 VNS	85
BLUEBUNCH WHEATGRAS	S 6 GOLDAR	35-140

Farming natives is not necessarily less expensive but costs are decreasing Farming reduces the impact on public lands
Farming will improve availability, stabilize markets, help to reduce costs

THE SUPPLY SIDE

FARM PRODUCTION NATIVE SEED







S&S Seed farms

Constantia Farm Doyle CA





Los Alamos, CA

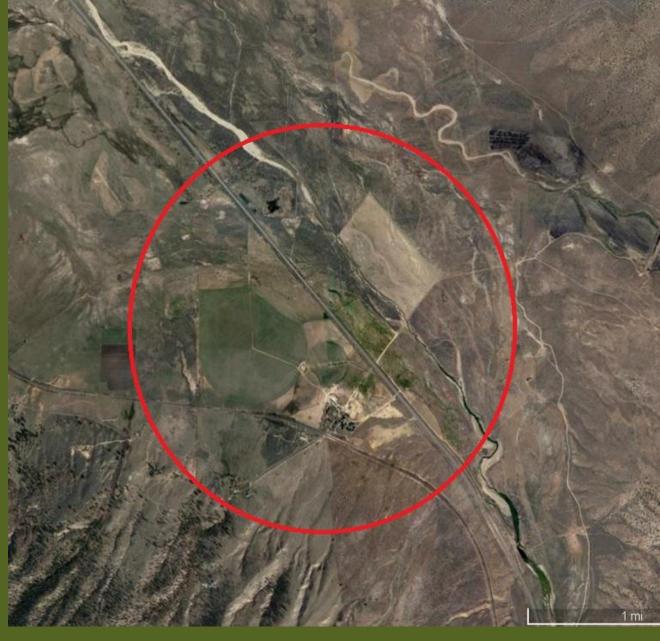




Constantia Farm Doyle, CA

Test plots





Beware of sandy soils

Comstock Farm sales Hay and Seed 2018



Many natives do not like heavy bottomland clay soils

Great Basin Wildrye establishment



10-11 with weeds 1st year growth





11-11 burnt



3-12



5-14



2018 Leymus cinereus harvest





7-12 harvest

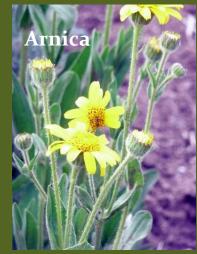
Leaving plants standing through the winter Flail mowing each spring recycles residual carbon



Do not put all your eggs in one basket















Rocky Mt Beeplant

Leymus triticoides Creeping wildrye (see Pine Creek project)













Farming natives has a steep learning curve Planting 2500 Astragalus and Dalea









Sprayed with Pendulum pre-emergent two weeks later; killed every plant



Cleome lutea

1 lb seed collected nw NV 2014

Seeded 1 lb 11-14

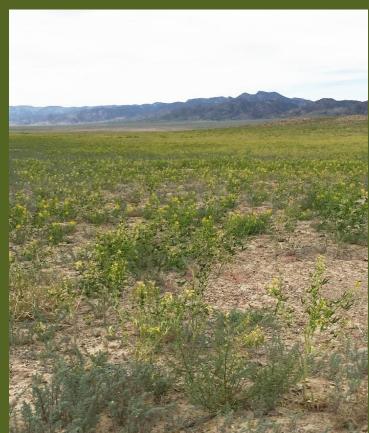
Germinated late spring 2015

Late freeze killed 70%

Collected 1.5 lbs seed from plants
6-16 collected 300 lbs

throughout NV











On the other hand Cleome serrulata did not freeze



SURVEY OF NATIVE SEED MARKETS

SEED MARKETS ARE DIVERSE AND GROWING

FEDERAL AGENCIES

INDEFINITE DELIVERY INDEFINITE QUANTITY CONTRACTS IDIQ

 $\underline{https://www.fedconnect/net/FedConnect/default.aspx?ReturnUrl=\%2ffedconnect\%2f\%3fdoc\%}$

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BLM REGIONAL PURCHASING

USFS, USFWS, NRCS, USGS

MINING

UTILITY CORRIDORS

GEOTHERMAL ENERGY

SOLAR ENERGY

SEED COMPANIES

STATE AGENCIES HIGHWAY DEPARTMENTS

CITIES, COUNTIES

NGO'S NATURE CONSERVANCY

REGIONAL AGENCIES TRPA LADWP

SKI RESORTS

GOLF COURSES

HOME OWNERS

LANDSCAPE CONTRACTORS

BUILDERS

ENGINEERING FIRMS CH2MHILL, Q&D, AECOM

PARKS RECREATION AREAS

AGRICULTURE TRADITIONAL AND DRYLAND PASTURE ALTERNATIVES HEDGEROWS

WILDLIFE REFUGES

MARKETING

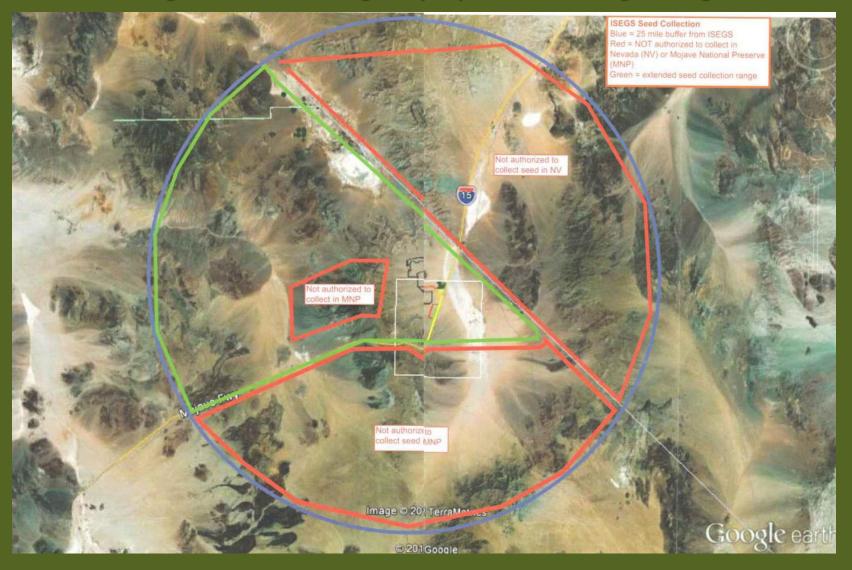
Fed biz ops; local and regional marketing

Wholesale vs. Retail opportunities

XERISCAPING GOALS TRANSCEND RESIDENTIAL AND RECLAMATION MARKETS

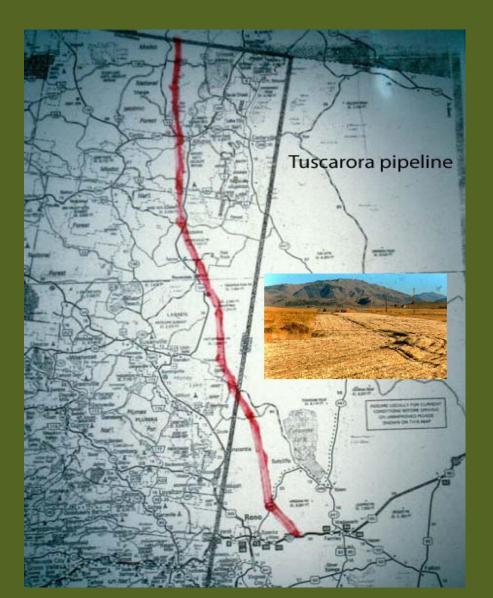
SOLAR

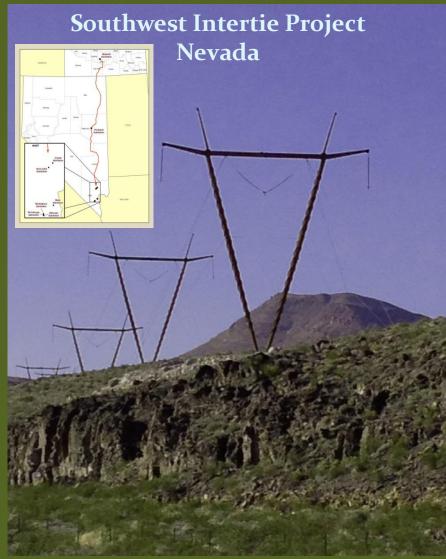
"Seed will be collected within the Ivanpah Valley and at similar elevations and conditions as those found at the Ivanpah SEGS project area. "
Resulting seed blends were greatly expanded from original target list.



ENERGY DISTRIBUTION electrical, natural gas, oil,

Utility corridors > multiple jurisdictions > multiple ecotypes > variable requirements





MINING

USFS requested seed collection for season in advance of project 1710 PLS lbs

PINE CREEK CA 2001 BEFORE RESTORATION









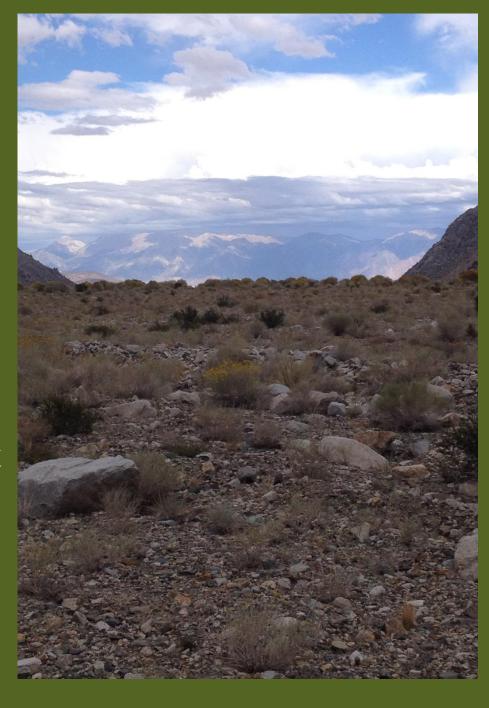
Mentzelia laevicaulis (velcro on steroids)







PINE CREEK 2014



Creeping wildrye colonized the dunes

HIGHWAYS Urban native landscapes are now common; low maintenance; no irrigation





Sommerset Reno







BIG JOBS BIG TOYS







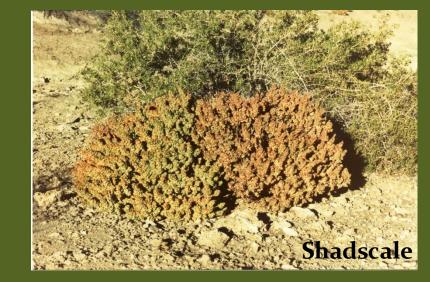








Cleome sparsiflora for GBUAPCD



From field to farm and nursery





