The National Seed Strategy Procurement and Contracting Challenges

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

- **INTRODUCTION**

  CURRENT TREND TO LOCALIZE SEED SOURCES IN SPECIFICATIONS

  REGIONAL AGENCY SPECIFICATIONS INFLUENCE PRIVATE SECTOR CONTRACTING FOR LOCAL SOURCE SEED (TRPA USFS BLM CALTRANS NDOT)

- **THE CHALLENGE TO SUPPLY LOCAL SOURCE SEED**

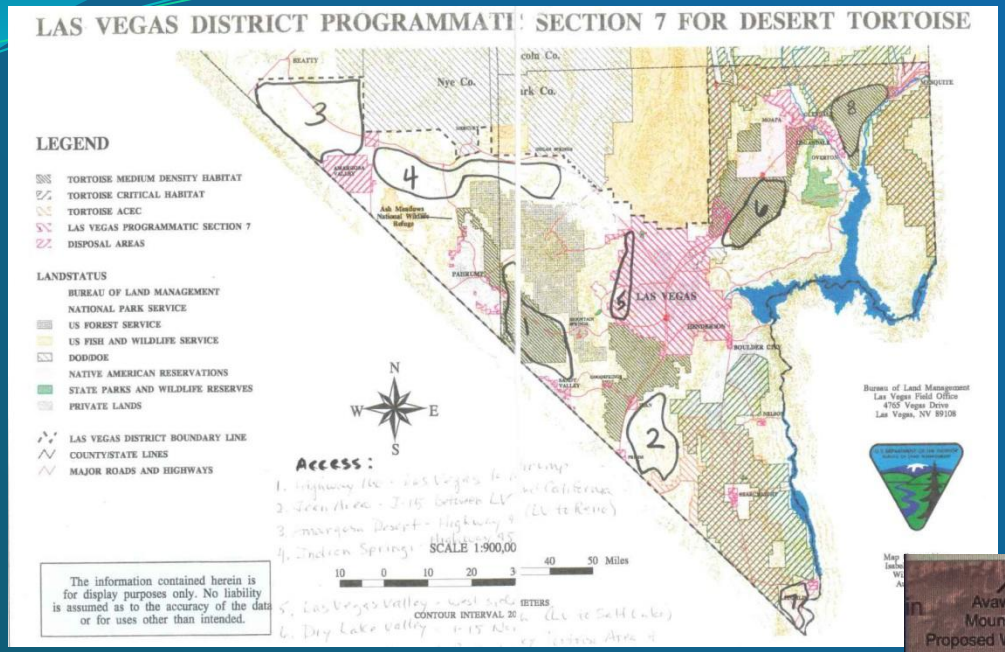
  PROCUREMENT ISSUES

  CONTRACTUAL ISSUES

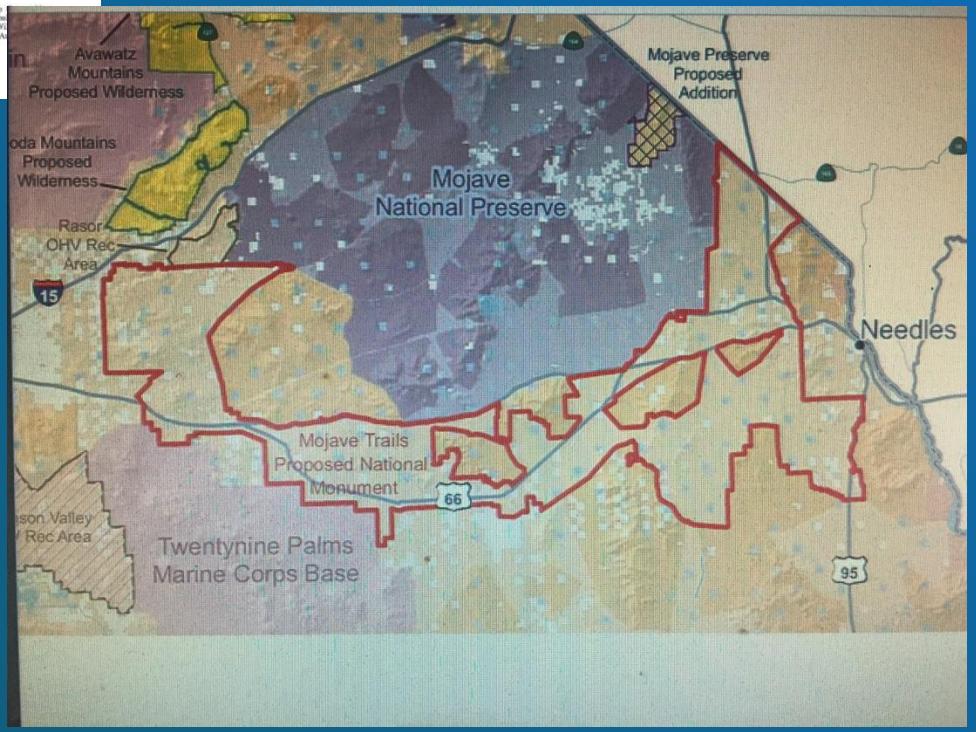
- **CONCLUSIONS**

  THE IMPORTANCE OF RESILIENCE AND COMPROMISE DURING CHANGING TIMES

PROCURMENT ISSUES



Limited access to public lands



Will the new Mojave Trail National Monument further restrict native seed collection?

VARIABLE AGENCY RESPONSES TO REQUESTS FOR SEED COLLECTION PERMITS CHALLENGE OUR ABILITY TO OBTAIN LOCAL SOURCE SEED

6-14

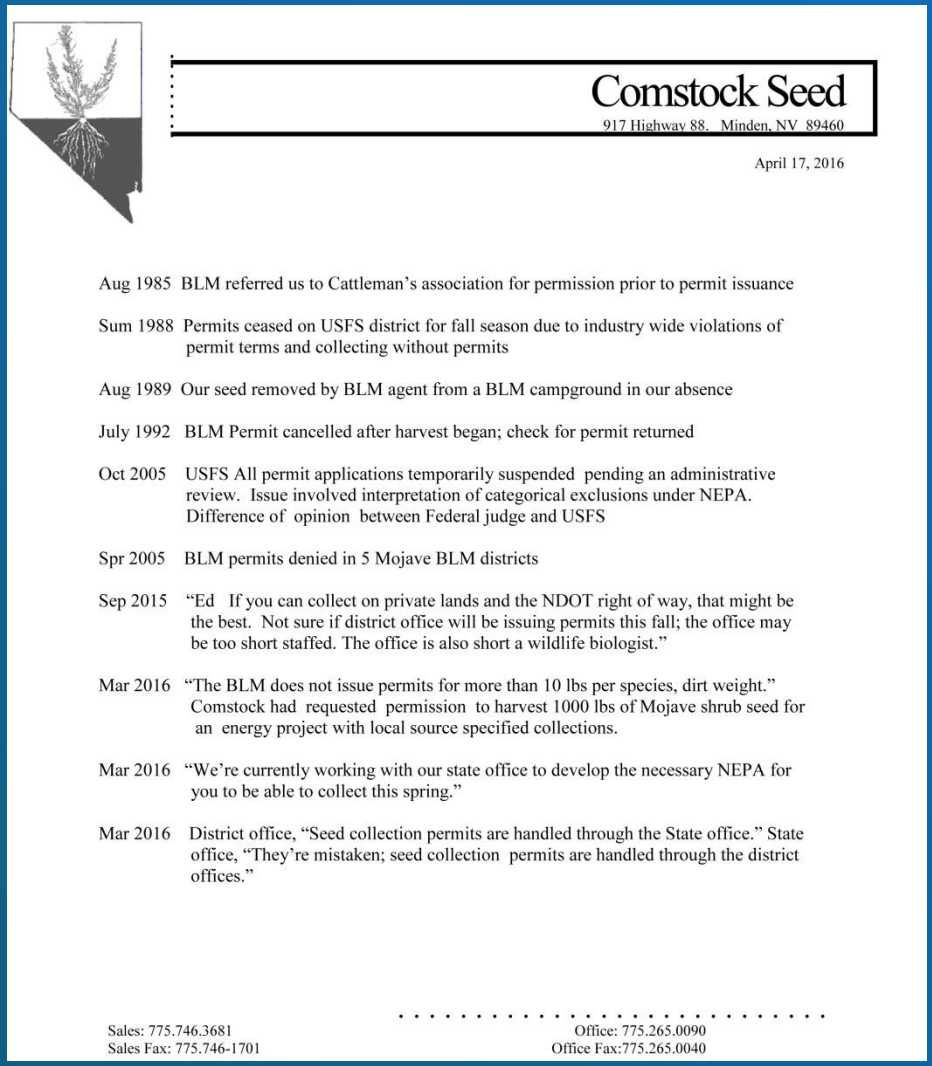
Hi Ed,

Due to drought, we do not want to issue any seed collection permits on this District for this year's seed crop. If conditions improve then we can consider seed permits at a later date.

5-14

Hi Ed

I'm trying to process a permit for you. I'll do my best. I'm out on Friday. Next week is the drop dead date for getting you a permit. I am leaving on a detail the end of the week. After I'm on detail we will probably stop issuing collection permits for a while because there will be no one to do it.



Comstock Seed
917 Highway 88, Minden, NV 89460

April 17, 2016

Aug 1985 BLM referred us to Cattleman's association for permission prior to permit issuance

Sum 1988 Permits ceased on USFS district for fall season due to industry wide violations of permit terms and collecting without permits

Aug 1989 Our seed removed by BLM agent from a BLM campground in our absence

July 1992 BLM Permit cancelled after harvest began; check for permit returned

Oct 2005 USFS All permit applications temporarily suspended pending an administrative review. Issue involved interpretation of categorical exclusions under NEPA. Difference of opinion between Federal judge and USFS

Spr 2005 BLM permits denied in 5 Mojave BLM districts

Sep 2015 "Ed If you can collect on private lands and the NDOT right of way, that might be the best. Not sure if district office will be issuing permits this fall; the office may be too short staffed. The office is also short a wildlife biologist."

Mar 2016 "The BLM does not issue permits for more than 10 lbs per species, dirt weight." Comstock had requested permission to harvest 1000 lbs of Mojave shrub seed for an energy project with local source specified collections.

Mar 2016 "We're currently working with our state office to develop the necessary NEPA for you to be able to collect this spring."

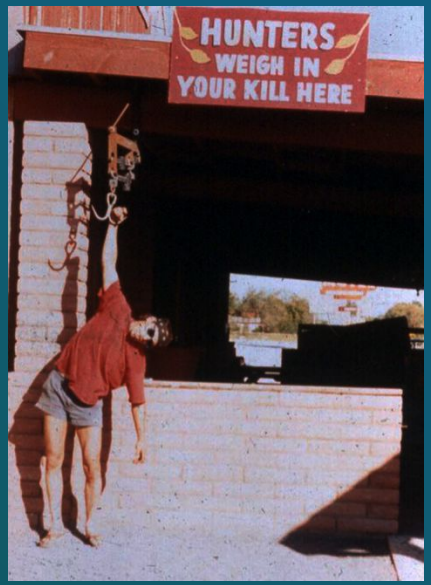
Mar 2016 District office, "Seed collection permits are handled through the State office." State office, "They're mistaken; seed collection permits are handled through the district offices."

Sales: 775.746.3681
Sales Fax: 775.746-1701

Office: 775.265.0090
Office Fax:775.265.0040

SEED COLLECTORS, A WILD BUNCH
ANNUAL SUPPLY, A WILD CARD

Various appropriate technologies



Hanging out waiting for seed to ripen

"Advanced" hopper technology

BLM INTERAGENCY BID REQUESTING SPECIFIC GENETIC SOURCES AND SEED TRANSFER ZONES

Certification	Seed (Type)	** Seed Clasification	Minimum PLS Rating	BRSW	ERSW	TRSW	Seed Origin **REQUIRED** on Source Identified, Source Orgin COUNTY, STATE, ELEVATION AND PRECIP	Seed Transfer Zones within Eco-regions only for Sagebrush Types
	GRASSES							
SI	Fourwing Saltbush **PRE-QUALIFIED**	NPVG	0.3200		3,300		Millard, UT, 5,391 ft elev, 8 in. precip	
SI	Spiny Hopsage **ANNUAL BROME FREE**	NPVG	0.3200	500			Elko NV, 5500-6500 ft elev, 9-10 in annual precip	
SI	Wyoming Big Sagebrush **2016 Collection**	NPVG	0.1600			6,000	ID (Bingham, Blaine, Bonneville, Butte, Fremont, Jefferson, Lincoln, Madison, Minidoka); Approx 2,600 Ft-7,200 Ft; Approx 10-30 in. Precip.	10-15 Deg. F./6-12; Level III Ecoregion: Snake River Plain
SI	Wyoming Big Sagebrush **2016 Collection**	NPVG	0.1600			1,480	ID (Bingham, Blaine, Bonneville, Butte, Fremont, Jefferson, Lincoln, Madison, Minidoka); Approx 2,600 Ft-7,200 Ft; Approx 10-30 in. Precip.	10-15 Deg. F./6-12; Level III Ecoregion: Snake River Plain
SI	Low Sagebrush **2016 Collection**	NPVG	0.1600	1,000			ID (Cassia, Owyhee, Twin Falls) **or** NV (Elko, Humboldt, Washoe) **or** OR (Harney, Lake, Malheur); Approx 4,900-12,500 Ft; Approx 10-26 in. Precip.	20-25 Deg. F./6-12; Level III Ecoregion: Northern Basin and Range
SI	Low Sagebrush **2016 Collection**	NPVG	0.1600	1,500			ID (Cassia, Oneida) **or** NV (Douglas, Elko, Esmeralda, Eureka, Humboldt, Lander, Lincoln, Lyon, Mineral, Nye, Pershing, White Pine) **or** UT (Beaver, Box Elder, Iron, Juab, Millard, Salt Lake, Sanpete, Sevier, Tooele, Utah, Washington, Weber); Approx 4,900-12,500 Ft; Approx 10-26 in. Precip.	15-20 Deg. F./6-12; Level III Ecoregion: Central Basin and Range
SI	Low Sagebrush **2016 Collection**	NPVG	0.1600	1,500			ID (Cassia, Oneida) **or** NV (Douglas, Elko, Esmeralda, Eureka, Humboldt, Lander, Lincoln, Lyon, Mineral, Nye, Pershing, White Pine) **or** UT (Beaver, Box Elder, Iron, Juab, Millard, Salt Lake, Sanpete, Sevier, Tooele, Utah, Washington, Weber); Approx 4,900-12,500 Ft; Approx 10-26 in. Precip.	15-20 Deg. F./6-12; Level III Ecoregion: Central Basin and Range

Theodolite GPS application use for specific source seed collections

Genetic and geographic certification

- **BLM Interagency bid 2014**

- **First time STZ's specified in the bid documents?**

- SI KRASCHENINNIKOVIA LANATA WINTERFAT
- SI ARTEMISIA NOVA BLACK SAGEBRUSH STZ 10-15 DEG. F./6-12
- SI ARTEMISIA NOVA BLACK SAGEBRUSH STZ 15-20 DEG. F./6-12
- SI ARTEMISIA TRIDENTATA V BIG SAGEBRUSH MT STZ 15-20 DEG. F./6-12
- SI ARTEMISIA TRIDENTATA V BIG SAGEBRUSH MT STZ 20-25 DEG. F./6-12
- SI ARTEMISIA TRIDENTATA W BIG SAGEBRUSH WY STZ 10-15 DEG.F./6-12
- SI ARTEMISIA TRIDENTATA W BIG SAGEBRUSH WY STZ 15-20 DEG.F./6-12

- **BLM district bid Bishop CA**

- Description, Requirements & Restrictions on Work

- Species targeted for collection include:

Scientific Name	Common Name	Desirability
Elymus triticoides	Creeping wildrye	High
Juncus balticus	Wire grass	High
Sporobolus airoides	Alkali sacaton	High
Anemopsis californica	Yerba mansa	Med
Scirpus americanus	Three square	Med
Spartina gracilis	Alkali cordgrass	Med
Muhlenbergia asperifolia	Scratchgrass	Low
Solidago spectabilis	Basin goldenrod	Low

- The maximum amount of seed should be collected (without negatively impacting the population) from the above species list up to the maximum billable amount of this contract. A mix of species is desired and collection efforts should be made based on the species desirability listed above.

- The target species and desirability may be changed depending on availability as assessed by the contractor and confirmed by the Bishop Field Office. Contractor will keep the Bishop Field Office appraised of conditions and recommendations.

TRPA

- 5F-1: Brush, logs, rocks and other natural materials can be placed strategically across the project to make traffic difficult or impossible. These materials can also add aesthetic appeal if place appropriately.

- 5F-2: In areas that have had high levels of recreational traffic, such as hikers, joggers or mountain bikers, a well defined trail can be created that will concentrate traffic. In that concentrated traffic area, appropriate BMPs can be implemented that can reduce erosion.

- **Objective Six: Use native plant materials whenever possible**[xii]

- Guideline 6A: Native plant material should be used whenever possible. The plant list should be designed so that the *target* plant community reflects an appropriate local native plant community. The planted material should contain a mix of early colonizers, intermediate seral species and target 'climax' community members.[xiii]

- Guideline 6B: Seed or cuttings should be taken at the appropriate time and should be collected from as close to the project site as possible.[xiv] Plant material that is to be used for seedlings/live plants may need to be collected well in advance of project construction, sometimes *as much as a year in advance.*

  - 6B-1: Non-local commercially available native grass species may be appropriate as a foundation for the seed mix.[xv]

- Guideline 6C: Seed or plant material collection should be supervised by a person knowledgeable about local native plant material collection.

- Guideline 6D: A combination of seedlings and direct seeding should be used to provide the best combination of protection.[xvi]

- Guideline 6E: Seedlings should be planted using an appropriate technique and a high-quality slow-release nutrient source.[xvii]

- Guideline 6F: Plants should be planted at the appropriate time of year. The planting time should be specified in the planting plan. A contingency should be provided if the target planting window is not achieved.[xviii]

- Guideline 6G: Environmental, ecological and physiological requirements of seed should be considered when preparing a seed planting specification. Typically, seeds may be raked into the soil surface to a depth of no more that 0.5 inches in order to keep seed material from moving off site. Planting specialists should be contacted for further information (see Comstock Seed and Western Botanical in 'Appendix One').

EARLY TAHOE REGIONAL PLANNING AGENCY GUIDELINES ARE USED IN VARIOUS LOCAL SPECIFICATIONS TODAY

LOCAL SOURCE EMPHASIS WITHOUT MANDATES

NON-LOCAL SOURCE NATIVE SPECIES ALLOWED BUT PREFERABLY LIMITED

Table 5-4: Attributes of Suitable and Available Species

TRPA APPROVED PLANT SPECIES ATTRIBUTES TABLE[1]

Scientific Name[2,3]	Common Name	Growth Form[4]	Mature Height (feet)	Nitrogen Fixation	Drought Tolerance[5]	Saturation Tolerance[5]	Shade Tolerance[5]	Lifespan[5]	Fire Hazard	Seed (Bulk per Pound)
Grasses, Rushes, and Sedges										
Achnatherum lemmonii	Lemmon's needlegrass	G - B	2	No	High	None	Intolerant	Long	–	95,000
Achnatherum occidentale	western needlegrass	G - B	2	No	High	None	Intermed.	–	–	285,000
Agropyron desertorum 'Nordan'	crested wheatgrass 'Nordan'	G - B	2	No	High	None	Intolerant	Long	–	194,120
Agrostis exarata	spike bentgrass	G - R	3	No	Low	Med.	Intolerant	Mod.	Low	5,600,000
Bromus carinatus	California brome	G - B	4	No	Med.	None	Intolerant	Short	Low	106,680
Bromus marginatus	mountain brome	G - R	4	No	Med.	Low	Intolerant	Long	–	142,880
Calamagrostis canadensis	bluejoint	G - R	4.9	No	Low	High	Intolerant	Long	–	3,837,472
Carex praegracilis	slender sedge	G - R	2	No	Low	High	Intermed.	Long	–	–
Danthonia californica	California oatgrass	G - MS	2	No	Med.	None	Intolerant	Short	–	90,000–165,000
Deschampsia caespitosa	tufted hairgrass	G - B	3.4	No	Low	High	Intolerant	Long	Low	1,308,333
Deschampsia elongata	slender hairgrass	G - B	3	No	Med.	Med.	Intolerant	Short	–	1,860,000
Elymus elymoides	squirreltail	G - B	1.5	No	High	None	Intolerant	Long	Low	192,000
Elymus glaucus	blue wildrye	G - B	3.3	No	High	High	Tolerant	Mod.	Low	134,500
Elymus trachycaulus	slender wheatgrass	G - B	3	No	High	Low	Intolerant	Mod.	Low	135,000
Festuca brevipila	hard fescue	G - B	0.5	No	High	None	Intolerant	Mod.	Low	591,920
Festuca ovina 'Covar'	**Covar' sheep fescue**	G - B	0.5	No	High	None	Intolerant	Long	Low	530,320
Festuca rubra	red fescue	G - R	2	No	Med.	None	Tolerant	Long	Low	454,087
Festuca rubra ssp. arenaria	'Boreal' creeping red fescue	G - B	3	No	Med.	Low	Tolerant	–	Low	–
Glyceria striata	fowl mannagrass	G - B	5.7	No	Low	High	Tolerant	Short	–	–
Hordeum brachyantherum	meadow barley	G - B	2	No	Med.	High	Intolerant	Mod.	–	30,000
Hordeum brachyantherum ssp. californicum	California barley	G - B	1.6	No	Med.	None	Intolerant	Short	–	30,000
Juncus arcticus ssp. littoralis	mountain rush	G - R	4	No	Low	High	Intermed.	Long	–	3,000,000
Juncus effusus	common rush	G - B	6.6	No	Med.	Med.	Intolerant	Long	–	45,359,242
Leymus triticoides	beardless wildrye	G - R	3	No	High	High	Intolerant	Long	–	170,304
Melica californica	California oniongrass	G - B	4	No	Med.	Low	Intermed.	Short	–	300,000
Phalaris arundinacea	reed canarygrass	G - R	5	No	Low	High	Intolerant	Long	–	537,920
Phleum alpinum	Alpine timothy	H - B	1.4	No	Low	Low	Intermed.	Mod.	Low	1,044,689

CONTEMPORARY CONTRACTS MANDATING LOCAL SOURCE SEED

CALTRANS SPEC

SEED MIX

SEED	BOTANICAL NAME (COMMON NAME)	PERCENT GERMINATION (MINIMUM)	POUNDS PURE LIVE SEED PER ACRE (SLOPE MEASUREMENT)
HYDROSEED (SEED MIX 1) 172,000 SQFT	ACHNATHERUM OCCIDENTALIS[3] (WESTERN NEEDLEGRASS)	63	2.9
	BROMUS CARINATUS[3] (CALIFORNIA BROME)	72	17.3
	ELYMUS ELYMOIDES[3] (BOTTLEBRUSH SQUIRRELTAIL)	54	7.3
	ELYMUS GLAUCUS[3] (BLUE WILDRYE)	77	13.0
	POA SECUNDA[3] (PINE BLUEGRASS)	63	5.5
	LOTUS PURSHIANUS[3] (PURSHING LOTUS)	63	16.6
	LUPINUS LEPIDUS[3] (SIERRA LUPINE)	63	13.6
	LUPINUS BREWERI[3] (BREWERS LUPINE)	63	13.6
	ACHILLEA MILLEFOLIUM[3] (WHITE YARROW)	77	1.3
			91.1
HYDROSEED (SEED MIX 2) 171,300 SQFT	AGROSTIS IDAHOENSIS[3] (IDAHO BENTGRASS)	63	0.3
	CAREX AMPLIFOLIA[3] (SEDGE)	81	2.3
	CAREX UTRICULATA[3] (BEAKED SEDGE)	81	2.3
	CAREX NEBRASCENSIS[3] (NEBRASKA SEDGE)	81	2.3
	DESCHAMPSIA CESPITOSA[3] (TUFTED HAIRGRASS)	72	0.9
	HORDEUM BRACHYANTHERUM[3] (MEADOW BARLEY)	72	5.0
	JUNCUS BALTICUS[3] (BALTIC RUSH)	81	0.3
	JUNCUS NEVADENSIS[3] (RUSH)	81	0.3
	JUNCUS ORTHOPHYLLUS[3] (RUSH)	81	0.3
	GEUM MACROPHYLUM[3] (GEUM)	63	1.0
	POTENTILLA GRACILIS[3] (SLENDER CINQUEFOIL)	63	0.5
	SIDALCEA OREGONA[3] (SPICATE CHECKER BROOM)	63	1.0
			16.5

[1] SEED PRODUCED IN CALIFORNIA ONLY.
[2] SEED SOURCE FROM (*Enter County Name*) COUNTY ONLY.
[3] SEED SOURCE FROM SIERRA NEVADA SOURCES ABOVE THE 4000 FOOT ELEVATION LEVEL.

NDOT SPEC

NEVADA TAHOE BOND ACT REVEGETATION GUIDELINES 6B-1 (within NDOT contract)

211.02.03 Seed Origin. **All seed used in the identified seed mix shall originate from within the Lake Tahoe Basin or within 50 miles of the Basin and within 1000 vertical feet of the project elevation.** The exception to this requirement will be as stated in the Nevada Tahoe Bond Act Revegetation Guidelines: 6B-1: Non-local, commercially available native grass species may be appropriate as a foundation for the seed mix. Species such as Elymus glaucus, Stanislaus 5000 or Mokelunme Brome may be acceptable as a partial component of the seed mix but unless the project is an emergency stabilization project, these **non-local materials shall make up only a portion of the entire seed mix, not to exceed 25% except in unusual circumstances.** Seed mixes shall be ordered pre-mixed. All seeds shall be cleaned, milled and de-bearded (to remove any appendages that may cause clogging problems during seeding operations).

NV 18 month testing NDOT 12 month testing
shrubs 6 month testing;
*** sometimes, only some shrubs (artr, chna, krla)**
CA 15 month testing Caltrans 12 month testing

Bid requests 21 locally collected species; cleaned and tested; some species only 1/10th lb

SPECIFICATIONS IN FLUX

4. Seed: Apply Northstar Revegetation Seed Mix at approximately 75 lbs/acre PLS (if hand seeding) or 100 lbs/acre PLS (if hydraulic application). Northstar Mountain Mix, obtained from Comstock Seed, 917 Hwy 88, Gardnerville, NV 89410, 775-265-0090.

Seed shall be uniformly broadcast with hand-held seeders or hydraulically with other materials. If broadcast by hand methods, seed and fertilizer shall then be raked lightly into the soil in order to attain greater seed-soil. Regardless of the method of application, 95% of seed must have direct contact with the soil. Care shall be taken not to bury the seed more than 1/8" below the soil surface. Seed shall not be left uncovered more than 24 hours unless otherwise approved by the Owner. Seeding shall not occur under conditions that would allow the seed to become windborne (greater than 5 mph maximum wind speed).

Table 1. Revegetation Seed Mix

PLS LBS/AC	Variety & Species
26.00	Brome California Sierra
9.00	Squirreltail
13.00	Wildrye Blue High Elevation
9.00	Fescue Idaho
8.60	Wheatgrass Slender Revenu
0.50	Gooseberry Sierra
2.50	Bitterbrush
0.20	Ceanothus Velutinus
0.15	Currant Wax
5.50	Wildflower Mix – Sierra
1.00	Daisy Shasta
75.00	

HOME RUN SKI-WAY 85,000 SF.

All seed shall conform to all laws and regulations pertaining to the sale and shipment of seed required by the California Food and Agricultural Code of 1982, Regulations of 1983, and the Federal Seed Act. All seed must be tested within 1 year prior to application date. Seed tags must reflect the most recent test date. Submit original seed tests by lot number to the Owner for approval prior to mixing and subsequent placement. Weed seed shall not exceed 0.50% of the pure live seed specified and shall not include any seed of cheatgrass, (*Bromus tectorum*) or sweet clovers (*Melilotus officinalis, M. alba*). Crop seed shall not exceed 0.50%

1 year testing; .5% max weeds; no cheatgrass or sweetclover

Seed. All seed shall conform to all laws and regulations pertaining to the sale and shipment of seed required by the California Food and Agricultural Code of 1982, Regulations of 1983, and the Federal Seed Act. Seed shall be TRPA-approved species. For Sagebrush, test seed within 60 days prior to seeding, unless otherwise directed by the Engineer. All other seed must be tested within 6 months of application date. Test results will be provided to Forest Botanist for seed used on USFS parcels. Seed tags must reflect the most recent test date. Deliver all seed to the project site in sealed bags a minimum of thirty (30) days prior to application to allow for testing, and submit original seed tests by lot number to the Engineer for approval prior to mixing and subsequent placement. Weed seed shall not exceed 0.25% of the pure live seed specified and shall not include any seed of Cheatgrass, (Bromus tectorum), Russian thistle (Salsola tragus) or Sweet clovers (Melilotus officinalis, M. alba).

6 month testing all species; .25% max weeds; no cheatgrass, sweetclover, or russian

A. SEED

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 AND RABBITBRUSH, 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.

6 month test for chna and artr; 1 year testing on other species; .25% max weeds; no cheatgrass, sweetclover, or russian thistle

MATERIALS

Seed. All seed shall conform with all laws and regulations pertaining to the sale and shipment of seed required by the Nevada State Department of Agriculture and the Federal Seed Act. All shipments of seed shall be reported to the Nevada State Department of Agriculture for inspection. Deliver seed to the site tagged and labeled in accordance with the State Agricultural Code and acceptable to the County Agricultural Commissioner. All seeds must be tested within one month of application. Seed tags must reflect the most recent test date.

Seed shall be of a quality having a minimum Pure Live Seed as specified. Weed seed shall not exceed 0.25 percent of the pure live seed and inert material. All seed is subject to inspection, and tags shall be submitted to the LA or their representative for approval and acceptance. Individual seed test results, by species and lot number, **shall be provided 30 days prior to commencing the work**, prior to acceptance and before seed is blended. Weed seed shall not exceed 0.25% of the pure live seed specified and shall not include any seed of Cheatgrass (*Bromus tectorum*) or Sweet clovers (*Melilotus officinalis, M. alba*). Crop seed shall not exceed 1%. The LA reserves the right to reject seed if other undesirable species are present in excessive quantities. All seed tags and lab tests must reflect the most recent test date.

Seed tags shall show the following information:

- Scientific name
- Common name
- Lot number
- Percent purity
- Percent germination, including hard and dormant seed
- Percent weed seed
- Origin

Species and/or varieties may only be substituted upon the written approval of the Owner or their Representative.

Table 1. Revegetation Seed Mix

Botanical Name	Common Name/Variety	PLS lbs/acre
Achillea millfolium	Yarrow	0.10
Bromus carinatus	California brome	3.00
Chyrsothamnus nauseosus	Rabbitbrush	1.00
Elymus elymoides	Squirreltail	4.00
Elymus trachycaulus	Slender wheatgrass	3.00
Eriogoum umbellatum	Sulfur buckwheat	1.00
Linum lewisii	Lewis flax	0.50
Lupinus argenteus	Silvery lupine	3.00
Poa secunda	Sandberg bluegrass	1.00
TOTAL		16.6

1 month testing; .25% max weeds; no cheatgrass, sweetclover, or russian thistle

Enhanced weed specifications are now common

MATERIALS

A. Seed

NDOT Seed Specification

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.

Weed specification; no cheatgrass, sweetclover, or russian thistle

Yellow sweet clover King's Beach Lake Tahoe

SEED SIZE CONSIDERATION

SEED MIX

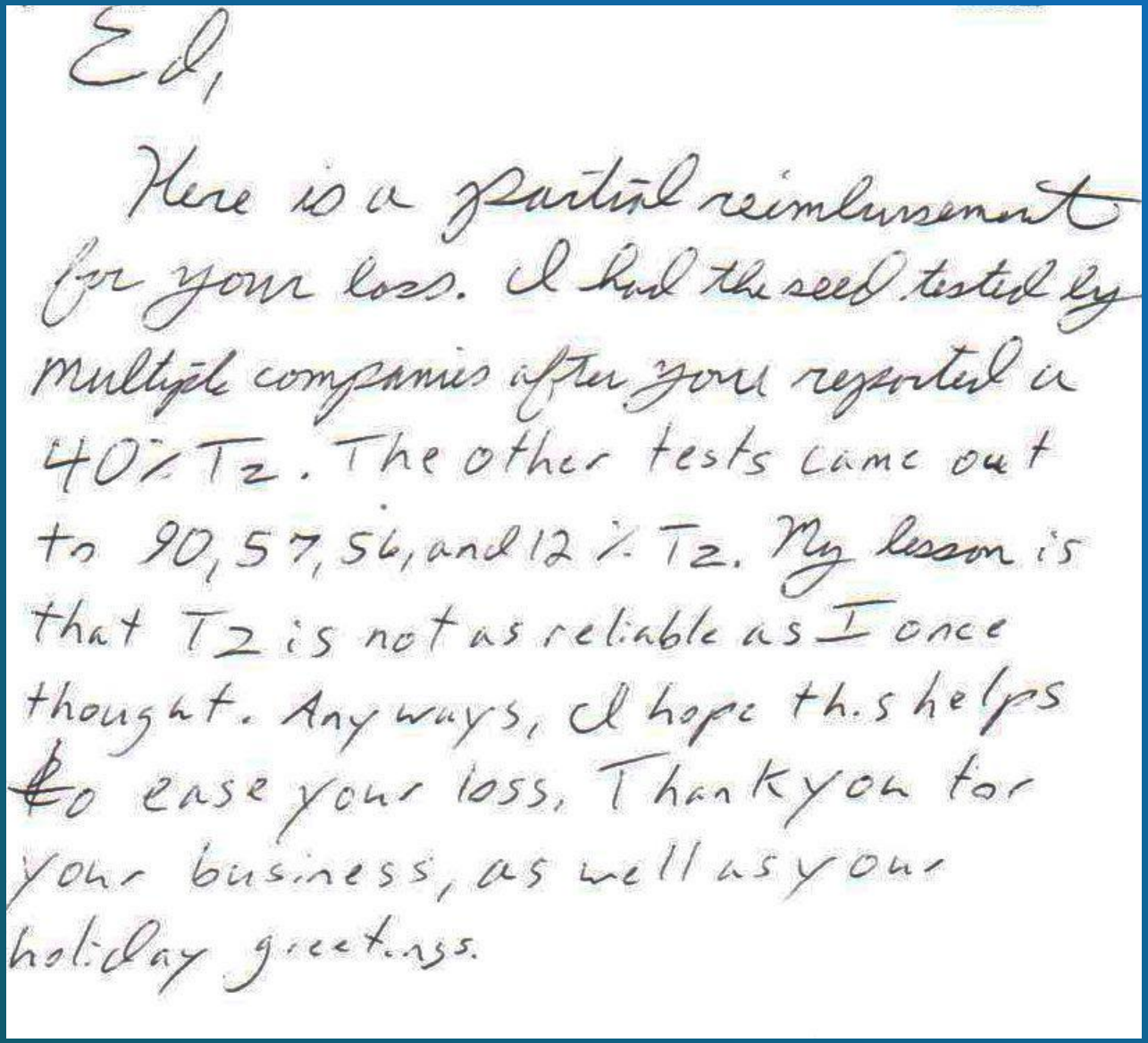
BOTANICAL NAME (COMMON NAME)	PERCENT GERMINATION (MINIMUM)	POUNDS PURE LIVE SEED PER ACRE (SLOPE MEASUREMENT)
ACHNATHERUM HYMENOIDES (RICE GRASS)	50	~~10~~ 2
ACHNATHERUM SPECIOSUM (DESERT NEEDLEGRASS)	50	~~5~~ 2
AMBROSIA DUMOSA (BURROBUSH)	50	~~10~~ 2
ATRIPLEX POLYCARPA (CATTLE SPINACH)	50	~~10~~ 2
CHRYSOTHAMNUS NAUSEOSUS (RUBBER RABBITBRUSH)	50	~~10~~ 2
LARREA TRIDENTATA (CREOSOTE BUSH)	40	~~10~~ 2
LEPIDIUM FREMONTII (DESERT ALLYSUM)	40	~~5~~ 2
LUPINUS ODORATUS (MOJAVE LUPINE)	80	~~10~~ 2
MALACOTHRIX GLABRATA (DESERT DANDELION)	50	~~5~~ 2
XYLORHIZA TORTIFOLIA (DESERT ASTER)	50	~~5~~ 2

Arbitrary specifications do not take into account seed size. Result: unintended consequences

AREA: Area 1 — Total Area: 1.00 Acres

SPECIES	LBS/ACRE	SEEDS/LB	SEEDS/FT SQ	% SEEDS *
INDIAN RICEGRASS RIMROCK	2.00	141,000.00	6.47	4.91
NEEDLEGRASS DESERT	2.00	115,000.00	5.28	4.00
AMBROSIA DUMOSA	2.00	38,400.00	1.76	1.34
SALTBUSH SPINACH	2.00	800,000.00	36.73	27.83
RABBITBRUSH RUBBER	2.00	400,000.00	18.37	13.92
CREOSOTE	2.00	80,000.00	3.67	2.78
PEPPERGRASS	2.00	180,000.00	8.26	6.26
LUPINE MOJAVE - SPARCIFLORUS	2.00	124,000.00	5.69	4.31
DESERT DANDELION	2.00	500,000.00	22.96	17.39
ASTER MOJAVE (DESERT)	2.00	496,000.00	22.77	17.26
	20.00		**131.97**	**100.00%**

TESTING ISSUES



Ed,

Here is a partial reimbursement for your loss. I had the seed tested by multiple companies after you reported a 40% T2. The other tests came out to 90, 57, 56, and 12 % T2. My lesson is that T2 is not as reliable as I once thought. Anyways, I hope this helps to ease your loss. Thank you for your business, as well as your holiday greetings.

TESTING RESULTS ERUM 2008

DATE	PURITY	WEEDS	CROP	VIABILITY
8-18-08	90.01	.02 cheatgrass 43/lb	.01 crested wheat 43/lb	22% TZ
9-16-08	85.90	0 quackgrass 6/lb nox	.79 prickly poppy 999/lb penstemon 227/lb	65% TZ
9-26-08	85.63	0	.59 prickly poppy 983/lb	43% TZ
9-08-09				28% TZ
9-11-09	95.36	0	.05 Indian ricegrass 44/lb	2%germ 18% dorm

TESTING RESULTS ERUM 2009

DATE	PURITY	WEEDS	CROP	VIABILITY
10-05-09	75.00	.09	.02	29% TZ
10-13-09				7% GERM 39% DORMANT 46% TOTAL

Private sector seed collection contract with regional source requirements

- The use of seeds from onsite or adjacent lands is important, because seed from distant or unidentified sources could be of ecotypes that are less likely to survive conditions on the site (Bossard et al., 2000; Bainbridge, 2007). To achieve this objective on remote revegetation sites like that at Ivanpah, it is necessary to collect local seed specifically for the project.
- **Seed will be collected within the Ivanpah Valley and at similar elevations and conditions as those found at the Ivanpah project area.**

NATIVE SEED MIX

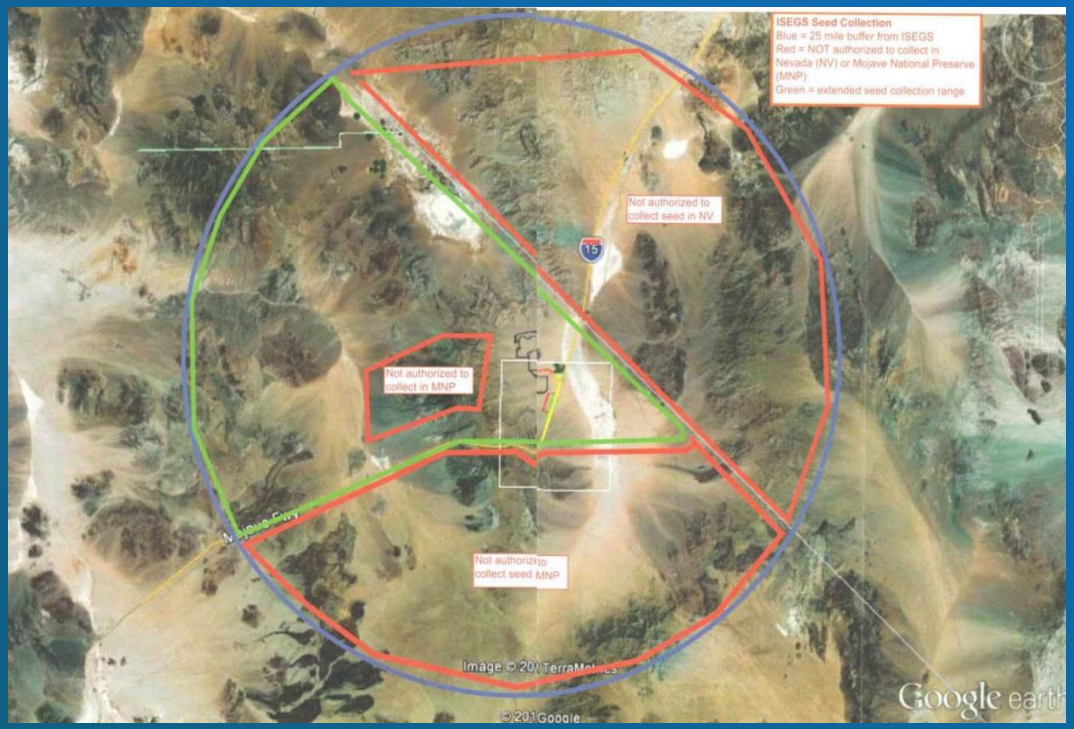
SCIENTIFIC AND COMMON NAME	POUNDS PURE LIVE SEED PER ACRE	POUNDS PURE LIVE SEED NEEDED FOR 20 ACRES	ESTIMATED NUMBER OF SEEDS IN ONE POUND	ESTIMATED NUMBER PLS FOR 20 ACRES	ESTIMATED NUMBER OF LIVE SEEDS PER SQ FOOT
Achnatherum hymenoides (INDIAN RICEGRASS)	3	60	141,000	2,820,000	10
Sphaeralcea ambigua (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 BERNARDINO COUNTY. NO SEED FROM THE SONORAN DESERT.

NO STRAW MATS WITH NETTING WILL BE ALLOWED

Seeding will happen January to March of 2015



Each contract needs to strike a balance between desire for local genetic source and expectation of performance

Narrow source requirement limits likelihood of successful performance

Contract resilience allowed us to capitalize on an exceptional and timely range condition

SEED SPECIFIED

NATIVE SEED MIX

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SEED DELIVERED

Comstock Seed
917 Highway 88. Gardnerville, NV 89460

February 9, 2017

Ivanpah collection summary

Ambrosia dumosa
Ambrosia eriocentra
Encelia virginensis
Encelia farinosa
Prunus fasciculata
Hymenoclea salsola
Mirabilis bigelovii
Mirabilis multiflora
Baileya multiflora
Castelleja angustifolia
Camissonia claviformis
Psilostophe cooperi
Adenophyllum cooperi
Larrea tridentata
Eriogonum fasiculatum
Thamnosma montana
Acamptopappus sphaerocephalus
AmTo g
AmTo b
Sphaeralcea ambigua
Ephedra nevadensis
Ericameria paniculatus
Stephanomeria pauciflora
Pleuraphis rigida
Lycium cooperi
Krameria erecta
Salazaria Mexicana

Traded out Indian Ricegrass
For 23 other species

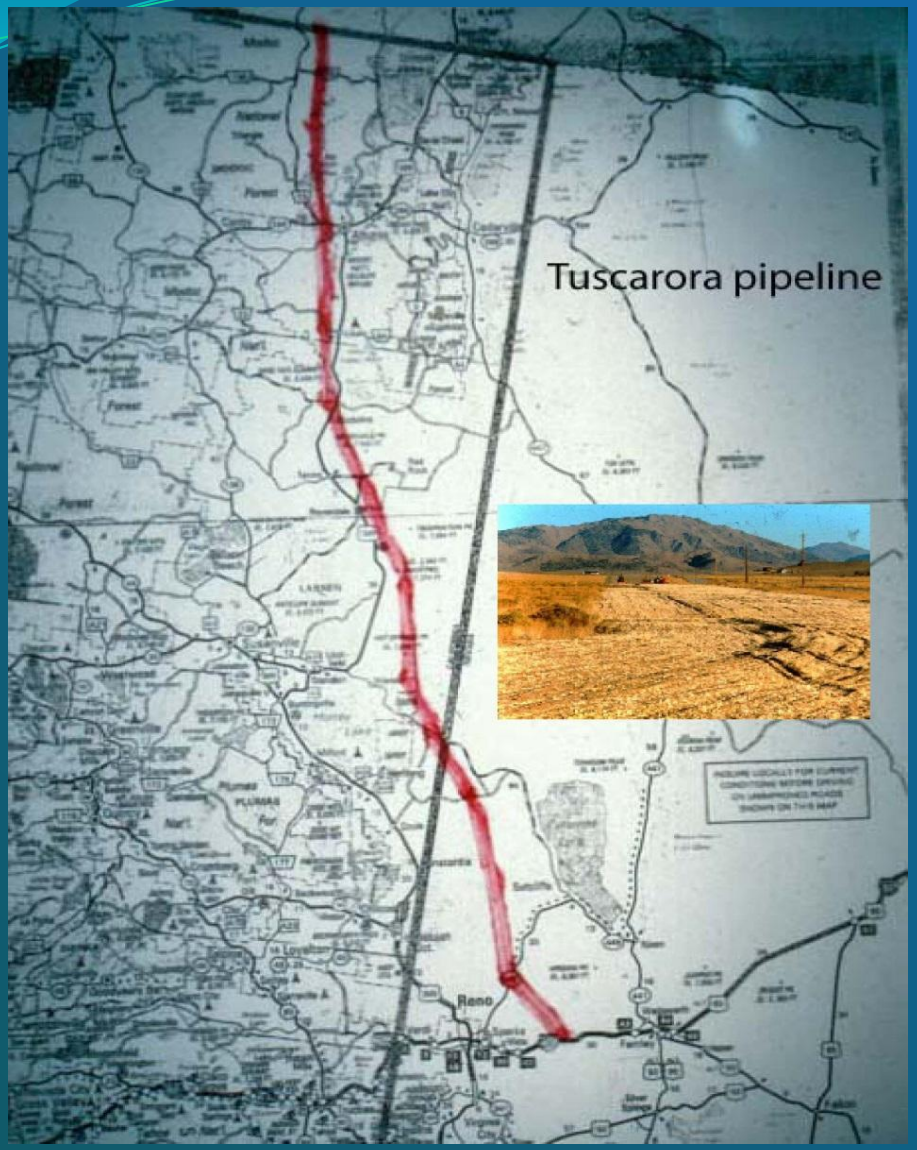
IVANPAH SOLAR PLANT

GENESIS SOLAR

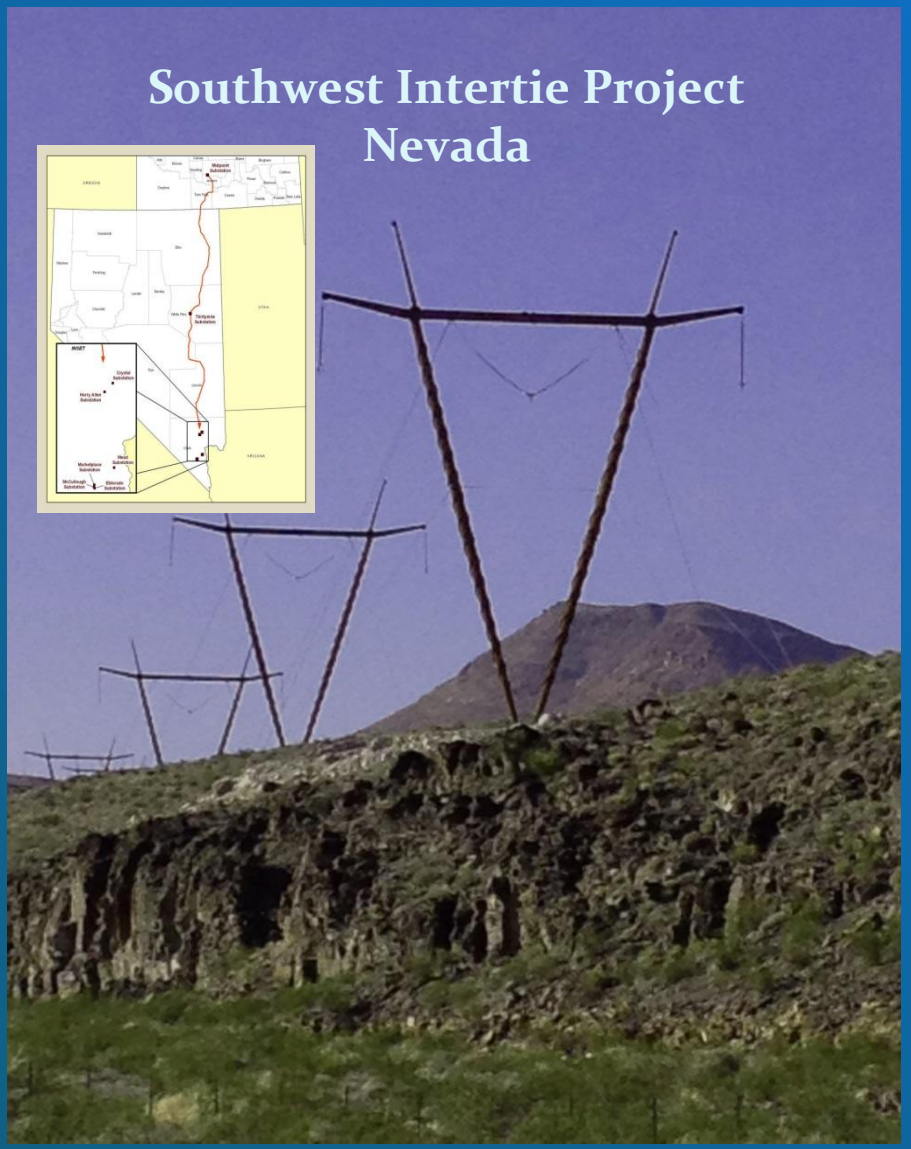
SEED COLLECTION SPECIFIED WITHIN THE PROJECT FOOTPRINT

Client eventually accepted seed from the local region

Utility corridors > multiple jurisdictions > multiple ecotypes > interstate variable requirements



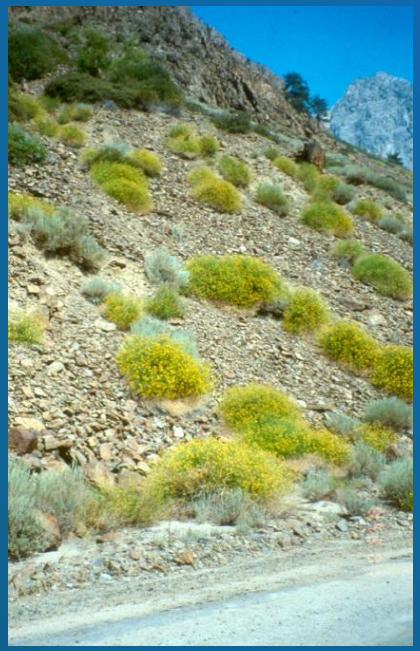
Two year collection window insured contract performance
Local source requested

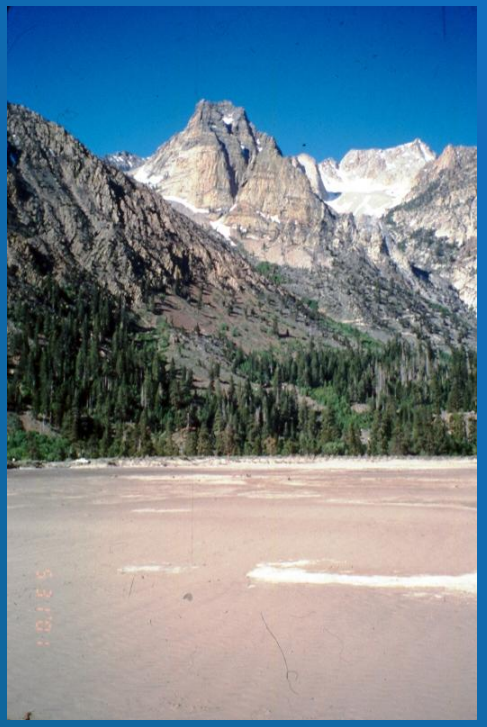


Job required both Great Basin and Mojave seed blends
Local source not specified

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

PINE CREEK CA 2001 BEFORE RESTORATION





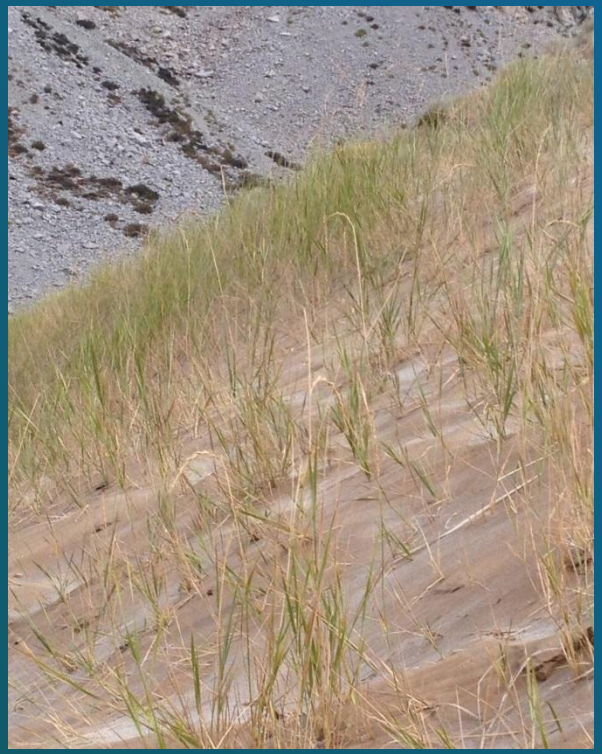
Mentzelia laevicaulis (velcro on steroids)

8400 YDS OF ALLUVIUM TRANSPORTED FROM BARROW PIT BELOW MINE

FINAL SEED BLEND

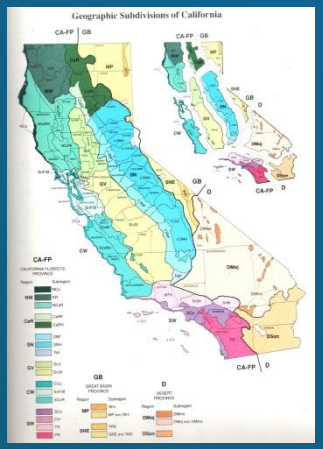
SPECIES			PLS #/ACRE
Grasses			
	Indian ricegrass	Achnantherum hymenoides	.15
	Bluegrass sandberg	Poa secunda var. juncifolia	2.50
	Wildrye Great Basin	Leymus cinereus	4.00
	Wildrye creeping	Leymus triticoides	1.25
	Squirreltail bottlebrush	Elymus elymoides	1.30
	Desert needlegrass	Achnantherum speciosa	.25
Shrubs			
	Rabbitbrush rubber	Chrysothamnus nauseousus	.15
	Desert bitterbrush	Purshia glandulosa	3.00
	Basin sagebrush	Artemisia tridentata tridentata	.50
	Bittercherry	Prunus emarginata	.25
	Desert peach	Prunus andersonii	.65
Forbs			
	Giant blazing star	Mentzelia laevicaulis	.10
	Buckwheat sulfur	Eriogonum umbellatum	.30
	Buckwheat nakedstem	Eriogonum nudum	.08
	Buckwheat flat-top	Eriogonum fasciculatum	.10
	Louisiana sagebrush	Artemisia ludoviciana	.45
	Prickly poppy	Argenome munita	.20
	Penstemon	Penstemon speciosa	.10
	Dusty maidens	Chaenactis douglasii	.
		Total:	15.43 pls lbs/acre

Final seed blend was a compromise on specification; local source plus Eastern Sierra regional sources



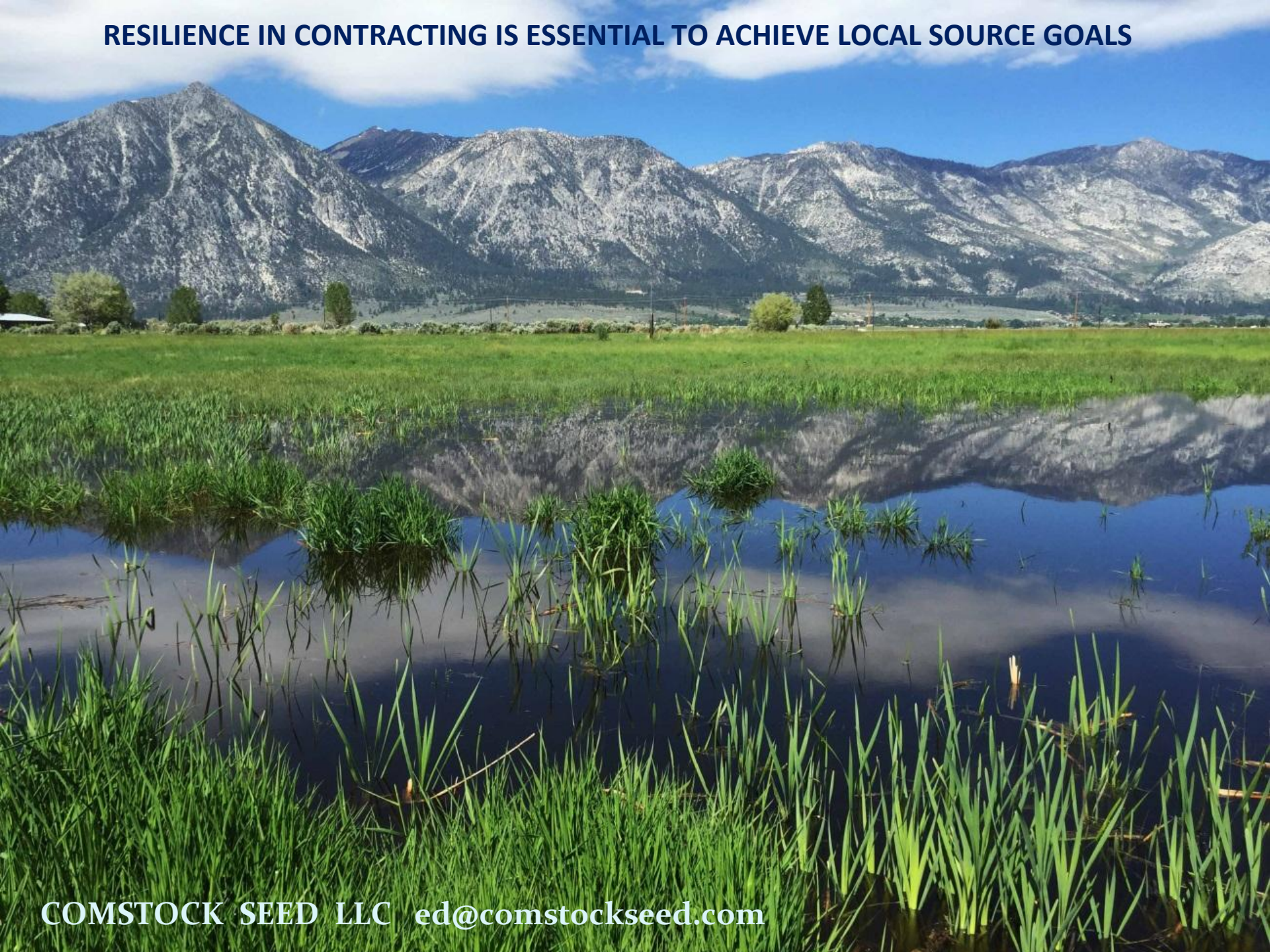
Creeping wildrye colonized the dunes

PINE CREEK
2014



Jepson geographic subdivisions used for seed source guideline

RESILIENCE IN CONTRACTING IS ESSENTIAL TO ACHIEVE LOCAL SOURCE GOALS



COMSTOCK SEED LLC ed@comstockseed.com

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

NATIVE SEED NETWORK

Institute for Applied Ecology