

# The evolution of public/private partnerships for building local sourced seed inventories

A methodology recently used to perform a seed collection contract involving  
Provisional Seed Zones in the Eldorado National Forest

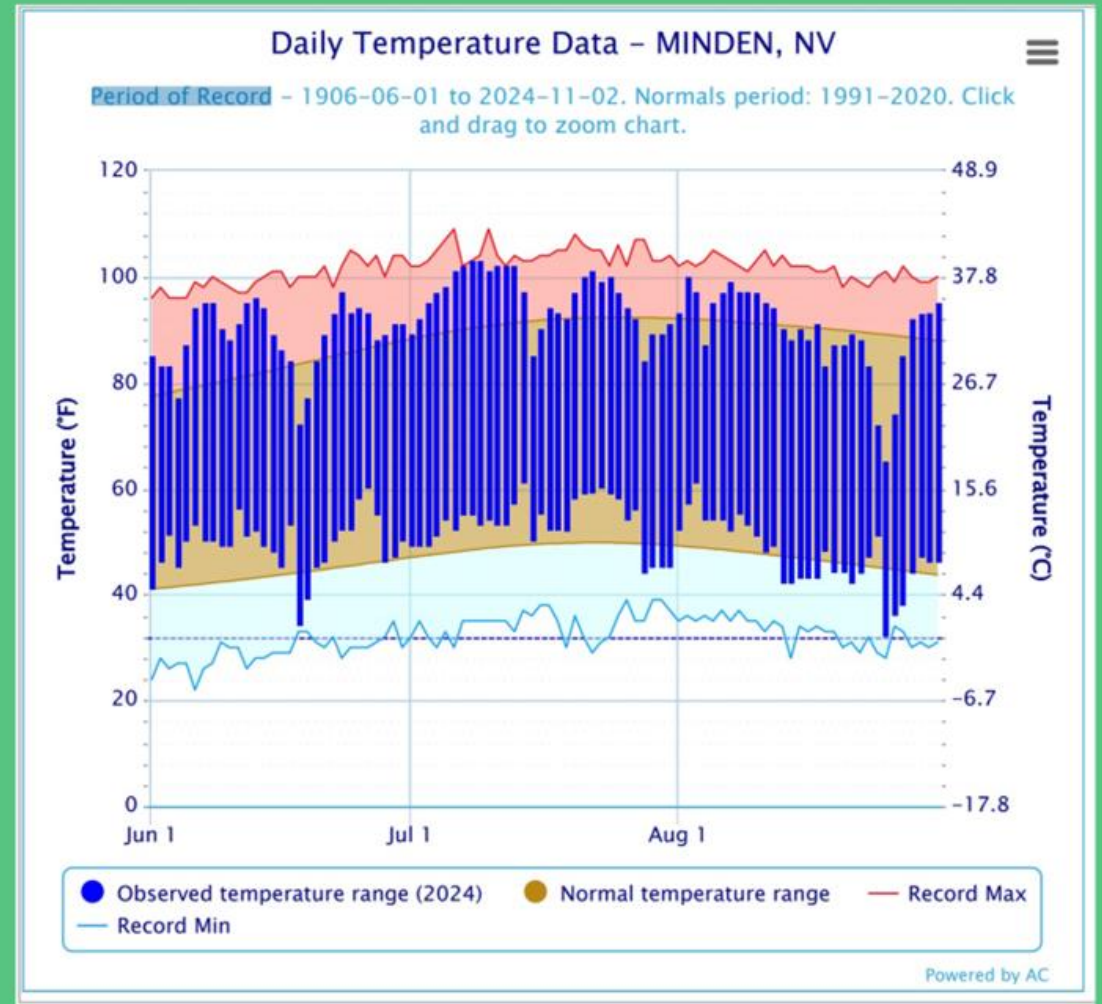
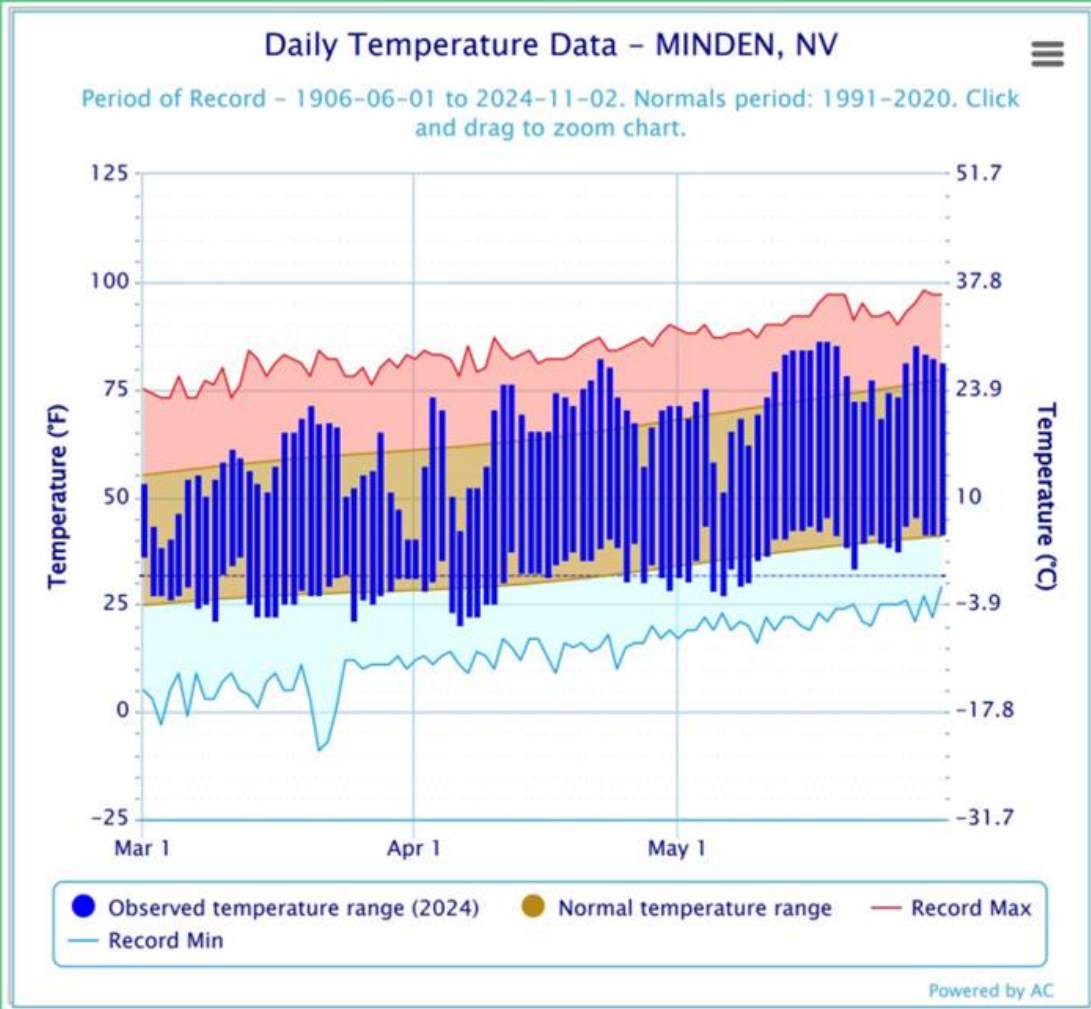


**NCB Symposium 1-13-25**

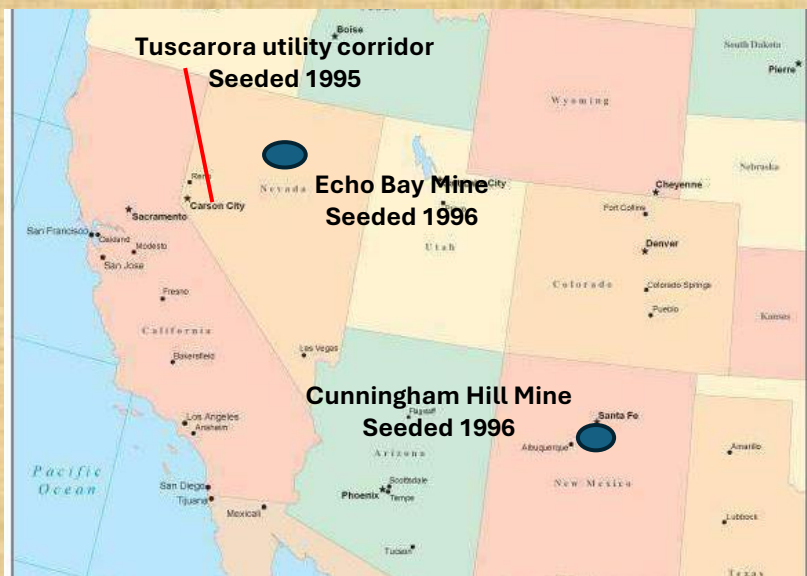
Ed Kleiner  
Comstock Seed LLC  
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775-720-3681

16 days below freezing early April into May

June 18<sup>th</sup> freeze; Comstock Farm is colder than Minden  
 Last irrigation July 1; early July, 8 days above 100 degrees



Normal hay production 25-30 tons; 2024 7 tons; native seed production down 60%  
 Normal hay processing fee, \$4-6.00/bale; 2024 \$16/bale



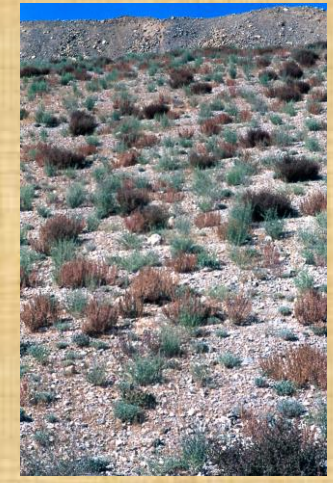
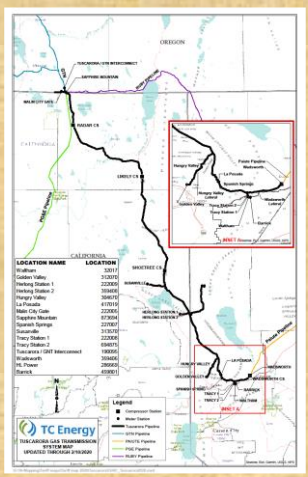
### TUSCARORA PIPELINE 1993-1995

Our first large client to request local native seed collections for six ecotypes from the Modoc Plateau to salt desert shrub communities at the southern terminus; two-year performance window

### Echo Bay Minerals Seeded 1996



### Cunningham Hill Mine seeded 1996



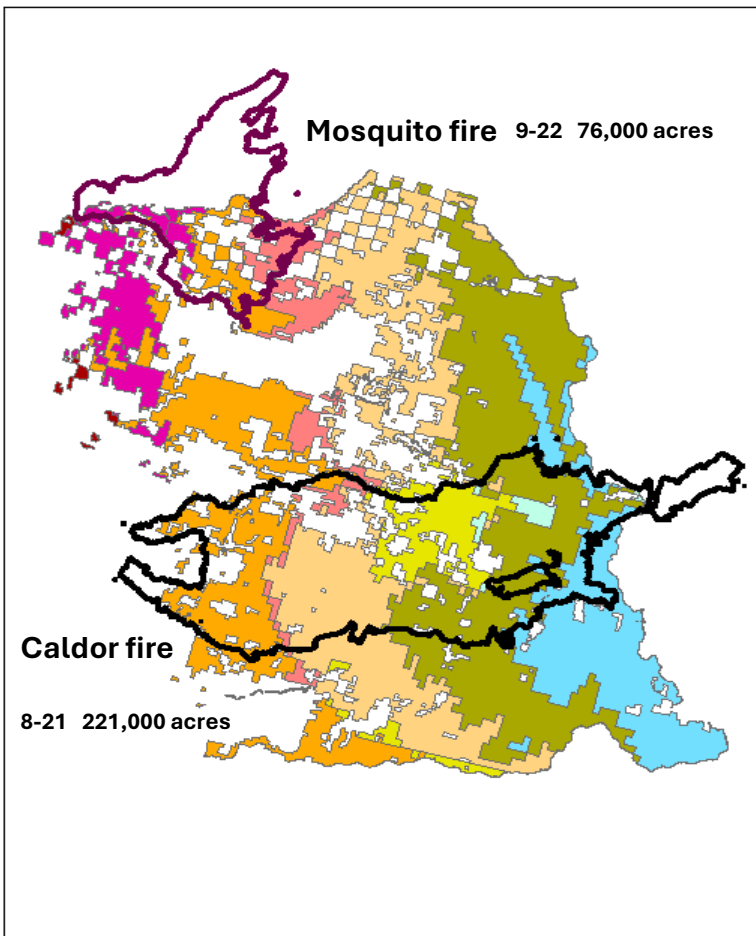
Two mines growing grass seeded locally collected grass shrub blends fall 1996



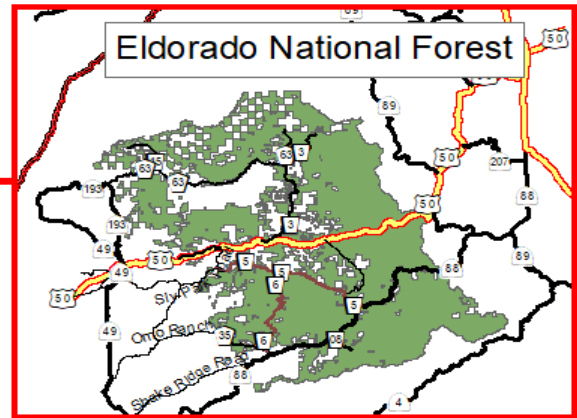
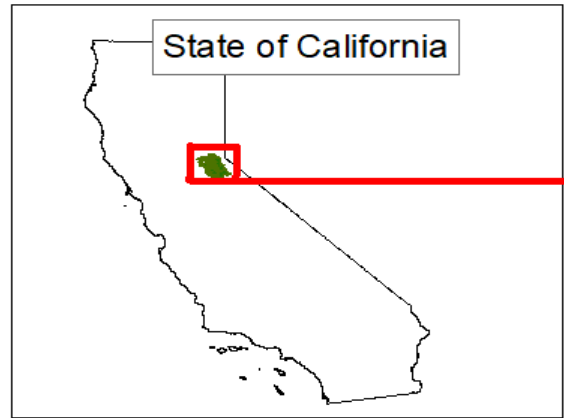
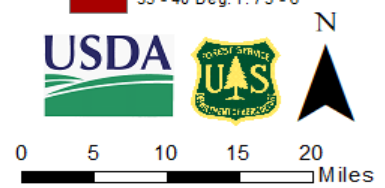
# Eldorado National Forest

## Provisional Seed Zone

### Vicinity Map



- Legend**
- Caldor Fire Scar
  - Mosquito Fire Scar
  - ENF Provisional Seed Zones**
  - 10 - 15 Deg. F. / < 2
  - 15 - 20 Deg. F. / 2 - 3
  - 15 - 20 Deg. F. / < 2
  - 20 - 25 Deg. F. / 2 - 3
  - 20 - 25 Deg. F. / < 2
  - 25 - 30 Deg. F. / 2 - 3
  - 25 - 30 Deg. F. / < 2
  - 30 - 35 Deg. F. / 2 - 3
  - 30 - 35 Deg. F. / < 2
  - 35 - 40 Deg. F. / 2 - 3
  - 35 - 40 Deg. F. / 3 - 6



**The Eldorado National Forest issued a solicitation for a two-year seed collection contract in the spring of 2024**  
**Comstock Seed was awarded the contract**

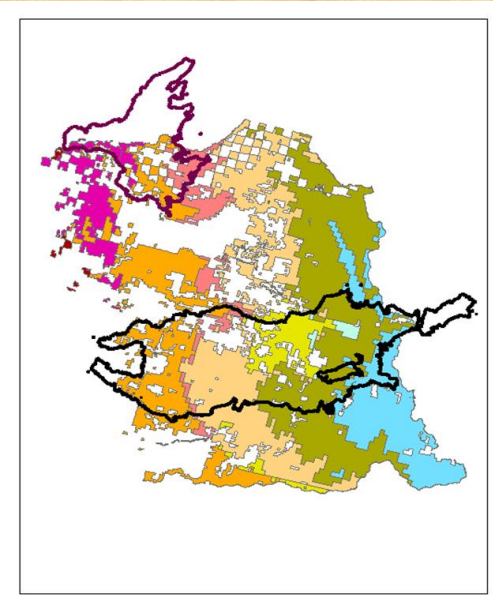
**The 11 PSZ parameters include minimum winter temperatures and aridity and follow elevational gradients between the foothills and the Sierra crest between 2500' and 8000'**

**The contract also requires 2 pressed specimens per collection**

Species	Seed Block	PSZ 35-40/3-6	PSZ 35-40/2-3	PSZ 30-35/<2	30-35/2-3	25-30/<2	Pounds	
<i>Acmispon parviflorus</i>	Early			3.00	3.00		6.00	
<i>Dendromecon rigida</i>		1.00	3.00		3.00		7.00	
<i>Hosackia stipularis</i>			3.00				3.00	
<i>Lupinus stiversii</i>					3.00			3.00
<i>Turritis glabra</i>							1	1.00
<i>Asclepias cordifolia</i>	Mid	2.00		5.00	4.50	2	13.50	
<i>Calystegia occidentalis</i>		2.00					2.00	
<i>Cirsium occidentale</i>		2.00	3.50			1	6.50	
<i>Eriodictyon californicum</i>			3.00					3.00
<i>Monardella odoratissima</i>					4.50	4.50		9.00
<i>Monardella villosa</i> subsp. <i>villosa</i>	Late	1.00					1.00	
<i>Calycadenia truncata</i>				3.00				3.00
<i>Cirsium andersonii</i>						4.50	3	7.50
<i>Ericameria arborescens</i>				4.00	4.00	4.00		12.00
<i>Grindelia camporum</i>							2	2.00
<i>Solidago elongata</i>						1	1.00	
<i>Solidago velutina</i> subsp. <i>californica</i>			3.50				3.50	
<i>Trichostema lanceolatum</i>		1.00					1.00	
Pounds/PSZ		9.00	20.00	22.50	23.50	10	85.00	

Species	Seed Block	PSZ 35-40/3-6	PSZ 35-40/2-3	30-35/<2	30-35/2-3	25-30/<2	Pounds	
<i>Aquilegia formosa</i>	Early				2.00		1.00	
<i>Scrophularia californica</i>			2.00				2.00	
<i>Lupinus latifolius</i>			3.00	3.00				6.00
<i>Lupinus polyphyllus</i>						3.00		3.00
<i>Epilobium ciliatum</i>	Mid		1.00	1.00	1.00		3.00	
<i>Rhododendron occidentale</i>			2.00		2.00			4.00
Pounds/PSZ		0	8.00	4.00	8.00	0	20.00	

Species	Seed Block	PSZ 35-40/3-6	PSZ 35-40/2-3	PSZ 30-35/<2	30-35/2-3	25-30/<2	Pounds
<i>Bromus sitchensis</i> var. <i>carinatus</i>	Early	1.00	10.00	12.00	5.00	1.00	29.00
<i>Poa secunda</i>			9.00		5.00	1.00	15.00
<i>Bromus laevipes</i>	Mid	1.00	9.00		5.00		15.00
<i>Elymus elymoides</i>		1.00	9.00	12.00	5.00	1.00	28.00
<i>Elymus glaucus</i>		1.00	9.00	12.00	5.00	1.00	28.00
<i>Melica aristata</i>		1.00			5.00	1.00	7.00
<i>Stipa lemmonii</i>		1.00	9.00		5.00		15.00
<i>Stipa occidentalis</i>	Late			11.50	5.00	1.00	18.50
<i>Agrostis scabra</i>					5.00		5.00
<i>Panicum capillare</i>		1.00		7.50	5.00	1.00	14.50
Pounds/PSZ		7.00	45.00	55.00	50.00	7	175.00



**The Mosquito fire species list in the northern Eldorado NF includes**  
**34 species within 5 PSZ's**  
**75 collections**  
**225 collection sites identified**  
**280 lbs requested**

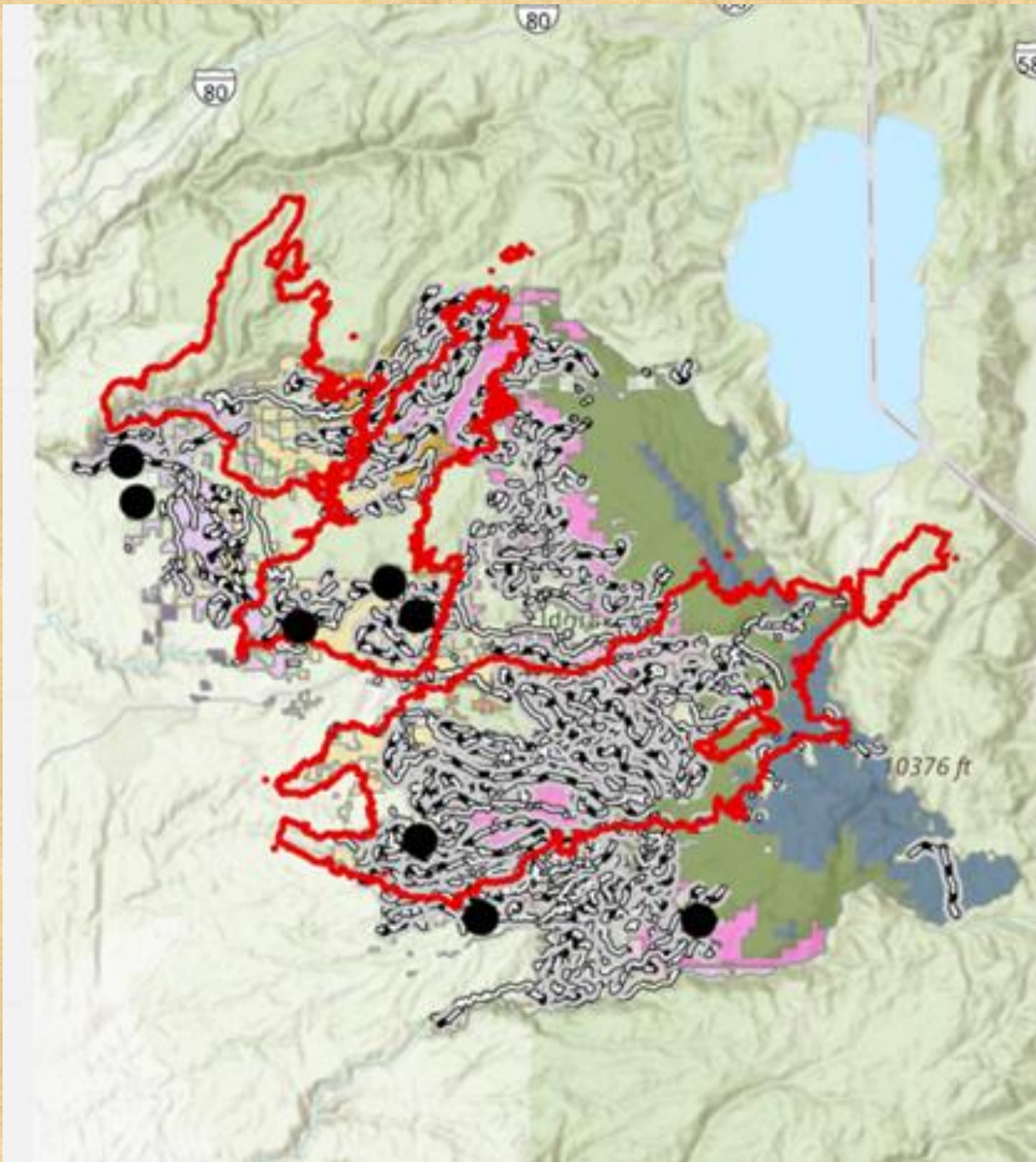


**The Caldor Fire species list in the southern Eldorado NF includes**  
**11 species within 7 PSZ's**  
**33 collections**  
**99 collection sites identified**  
**70 lbs requested**

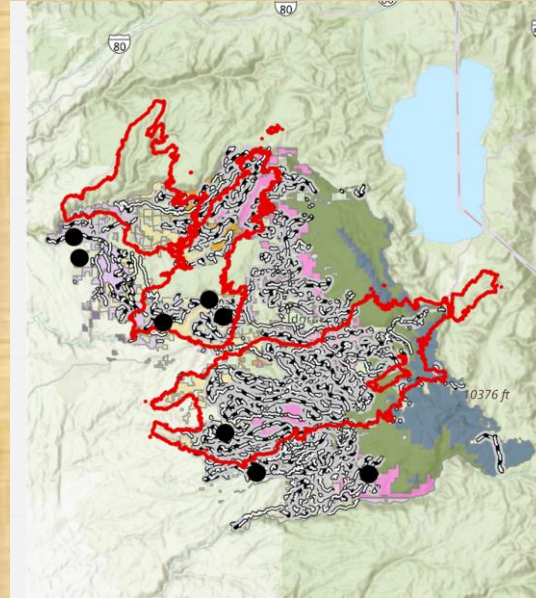
Species	Seed Block	30-35/<2	30-35/2-3	25-30/<2	25-30/2-3	20-25/<2	20-25/2-3	15-20/<2	lbs/Species
<i>Bromus sitchensis</i> var. <i>carinatus</i>	Early	2.00	4.50	2.00	1.00	2.00	1.50	1.00	14.00
<i>Poa secunda</i>			4.50		0.50		1.50	1.00	7.50
<i>Festuca rubra</i>					2.00		2.00		
<i>Elymus elymoides</i>	Mid	2.00	4.50		1.00				7.50
<i>Elymus glaucus</i>				2.00	1.00		1.50		4.50
<i>Melica aristata</i>			4.50	2.00					6.50
<i>Stipa lemmonii</i>							2.00	1.00	3.00
<i>Stipa occidentalis</i>		2.00						1.50	3.50
<i>Phleum alpinum</i>						2.00	1.00	3.00	
<i>Agrostis scabra</i>	Late		4.50		0.50	2.00		1.00	8.00
<i>Panicum capillare</i>		2.00	4.50	2.00					8.50
	Pounds/PSZ	8.00	27.00	10.00	4.00	10.00	6.00	5.00	70.00

## ARCGis roadmaps and road closures

This map also shows the historic  
King Fire from September, 2014  
97,717 acres burned

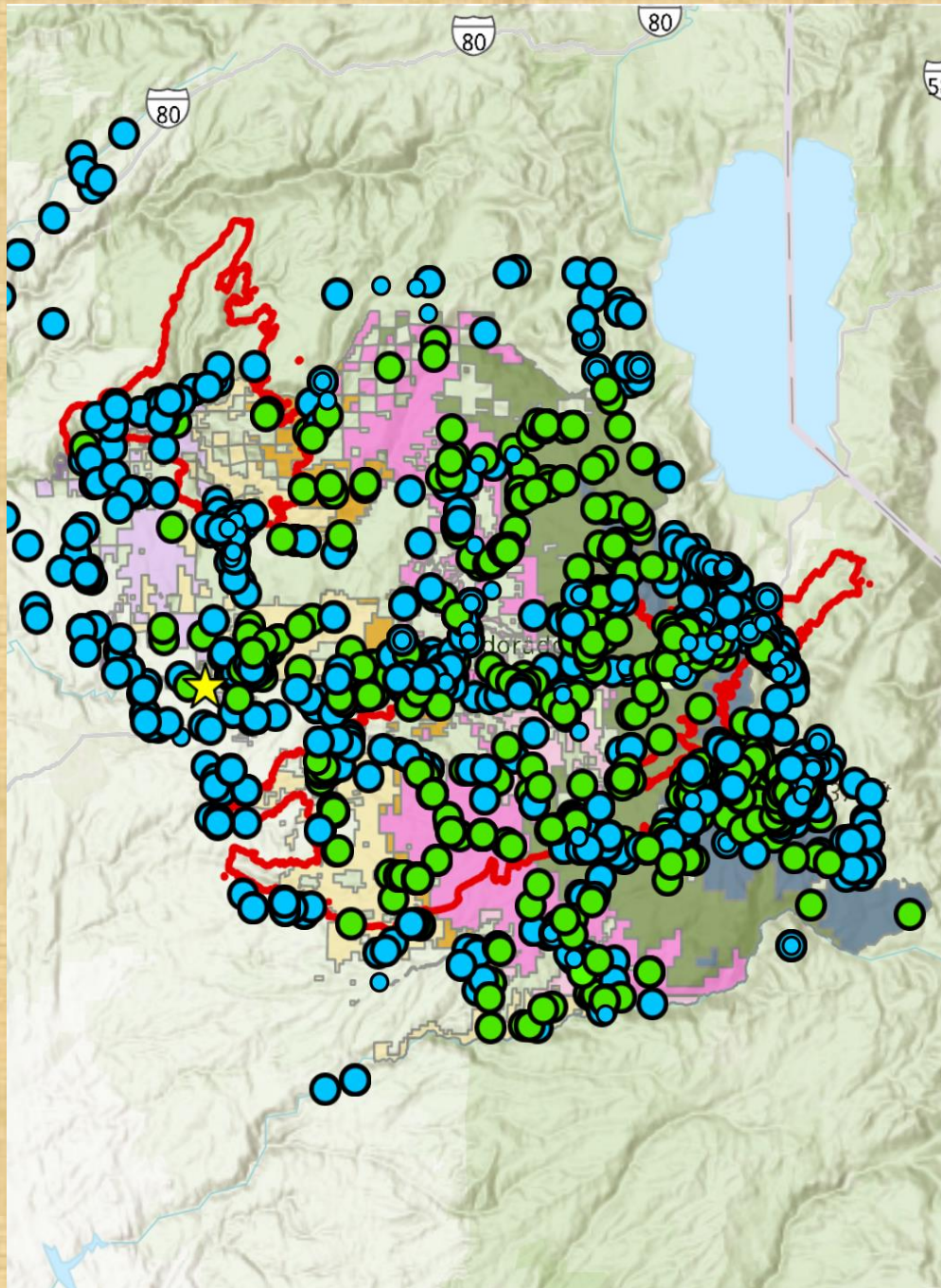


**Access issues  
Caldor Fire  
3<sup>rd</sup> season post fire  
trees continually  
falling**



**Roots burned out  
hollow ground cave-ins common**

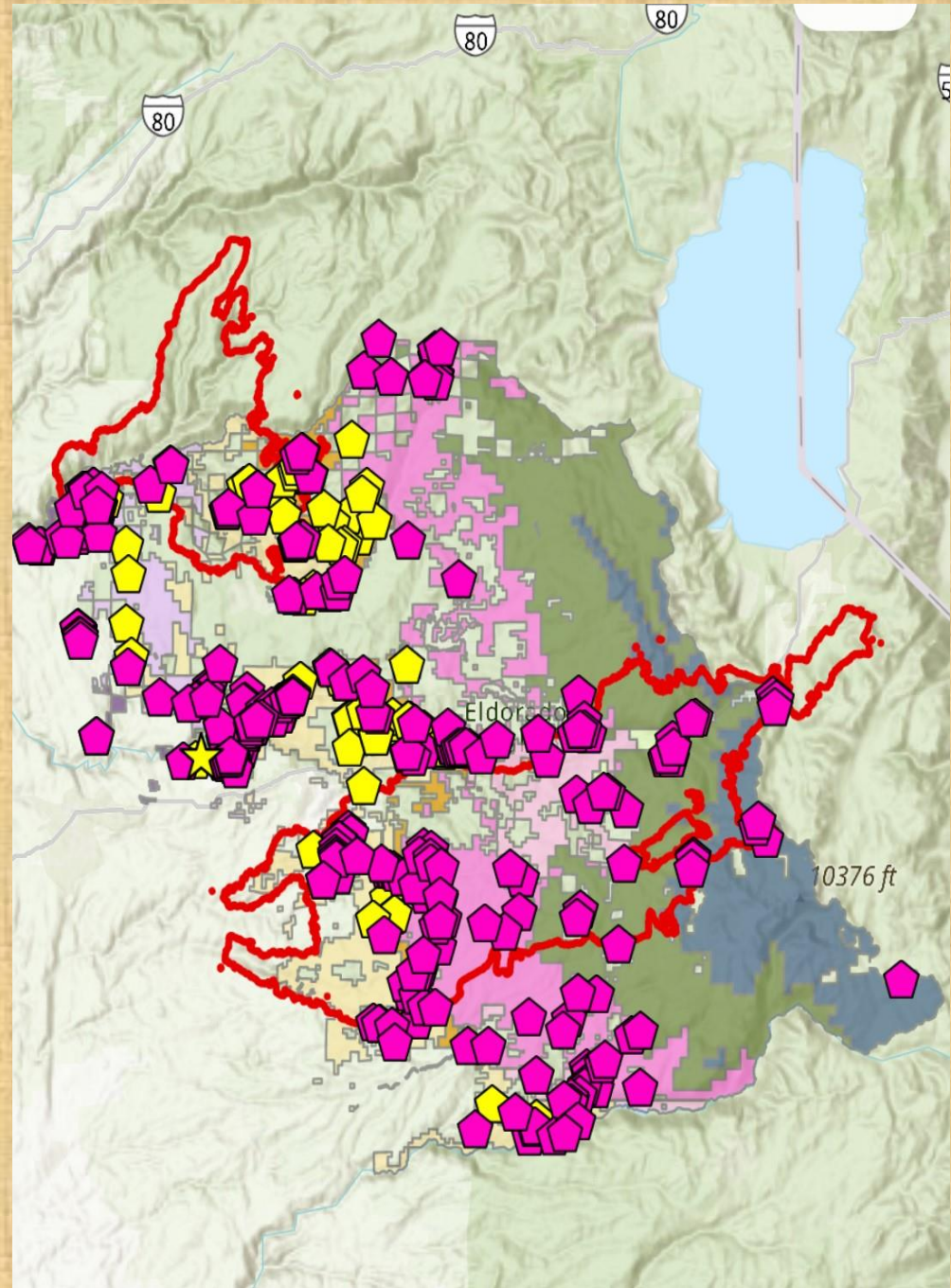


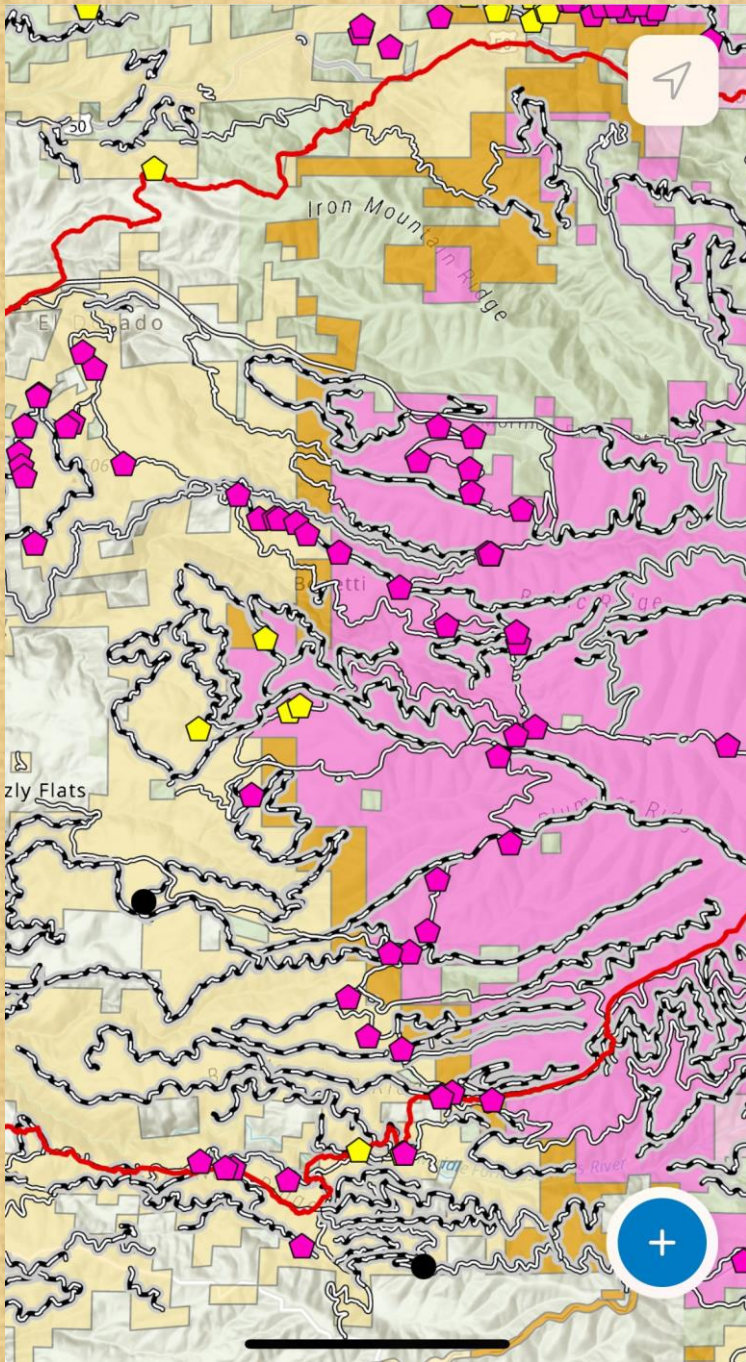


**ARC GIS layers  
supplied by USFS  
included Calflora  
and Inaturalist  
data fields**

**Blue dots Calflora  
Green dots Inaturalist**

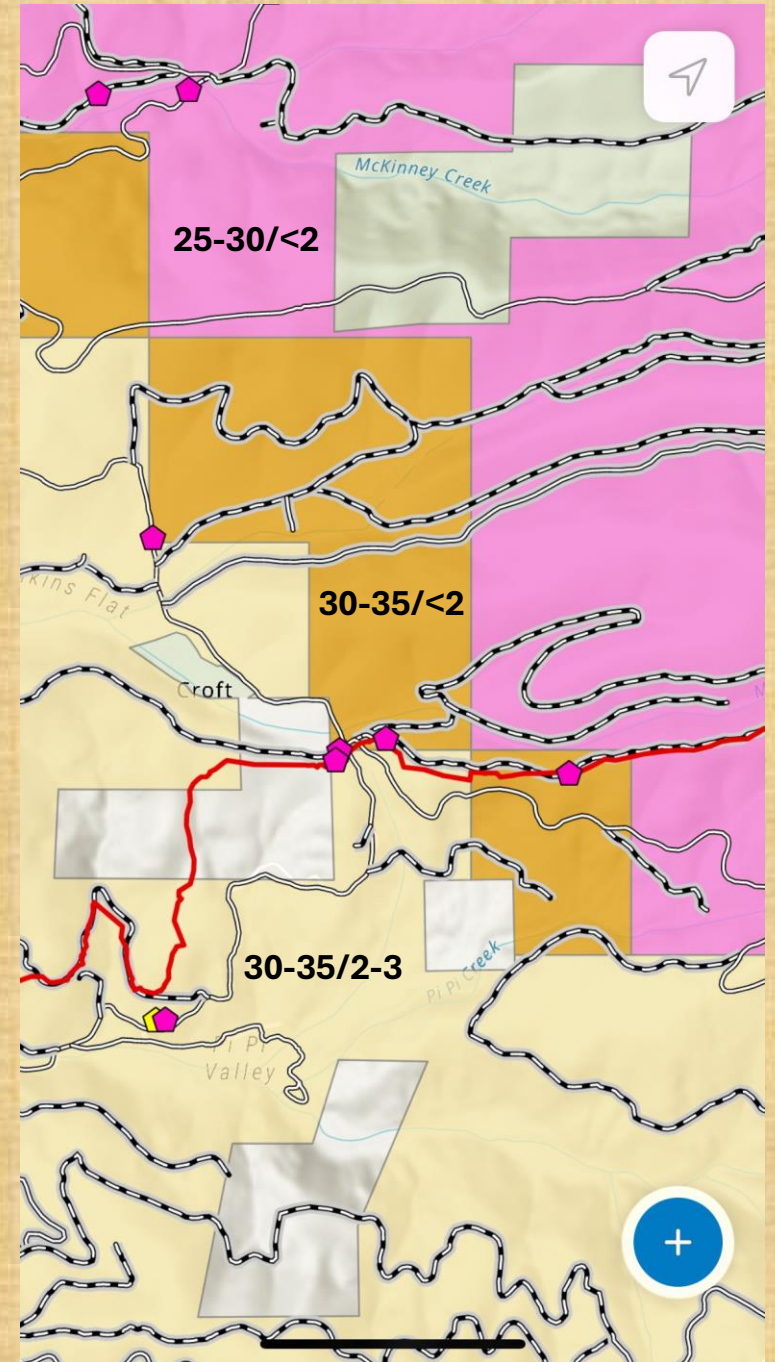
**Yellow dots ENF  
Red dots Comstock**





**Where PSZ boundaries meet, collection sites are similar for multiple PSZ's**

**The Forest Service requested multiple seed collections within each PSZ which currently numbers 324 species sites**





225 SoEI 1-002

38.788492°N 120.345596°W



Id



SiteNumber

225 SoEI 1-002



Species Available/Approx. # of Each

100's



Notes

Dirt road side; extensive patches; ope...



Observer

Ed Kleiner



Date

8/30/2024, 3:51PM



ARC site example

Seed collection site form

Eldorado National Forest

Attachment 4. Seed Collection Site Form

Site Number 48

GrCa 3-001

Name: AcPa 1-005 GrCa 1-004 FeId 2-001 59-24

Location (include Latitude and Longitude in decimal degrees):

38.986691 N 120.802087 W

Description: Road side ridgetop - mostly sun s facing  
Volcanville Rd

Species Available and Approximate Number of Each Species:

All three species common

Notes:

Mosquito 35-40/2-3

- 1 ELGL 1-001
- 2 ELGL 2-001
- 3 ELGL 2-002
- 4 BRCA 1-001
- 4A BRCA 1-002 FERU 1-001
- 5 ACOC 1-001
- 6 ERAR 1-001
- 7 ACOC 1-002
- 8 ACOC 4-002 MEAR 5-001 ELGL
- 9 STLE 3-004
- 10 EPCI 1-001
- 10A ERAR 1-002
- 10B BRCA 1-003
- 11 BRLA 1-001 STLE 1-001 BRCA 2-003
- 12 STLE 1-002
- 13 ACPA 1-001
- 14 ERCA 1-001

**226 site forms were defined  
that established 324  
species collection sites.**

**Species that do not have  
a PSZ numerical code  
were not collected in 2024**

CALDOR Grasses		Common names are added		Species		Lbs		Sites		Plants	Cot	C.S. *
Species	Common name	Zone								Pressed	bk lbs	
Bromus carinatus 8	Alaska brome	30-35/<2									4.00	1.92
Agrostis scabra 5	Ticklegrass	30-35/<2									0.80	
Poa secunda 4	Sandbreg bluegrass	30-35/<2								74	2.00	0.90
Elymus elymoides 3	Squirreltail	30-35/<2									8.50	
Stipa occidentalis 4	Western needlegrass	30-35/<2								181	19.40	
Melica aristata 5	Bearded melic	30-35/<2									2.50	1.20
Panucum capillare	Witchgrass	30-35/<2										
Bromus carinatus 1	Alaska brome	30-35/2-3									30.30	18.20
Bromus laevipes 3	Woodland brome	30-35/2-3										
Festuca rubra 1	Creeping red fescue	30-35/2-3										
Poa secunda 5	Pine bluegrass	30-35/2-3										
Elymus glauca 4	Blue wildrye	30-35/2-3										
Elymus elymoides 2	Squirreltail	30-35/2-3										
Melica aristata 3	Bearded melic	30-35/2-3										
Stipa lemmonii 3	Lemmon needlegrass	30-35/2-3										
Agrostis scabra 1	Ticklegrass	30-35/2-3										
Descgampsia caespitosa	Tufted hairgrass	30-35/2-3										
Panucum capillare 2	Witchgrass	30-35/2-3										
Stipa occidentalis 1	Western needlegrass	30-35 2-3										
Bromus carinatus 5	Alaska brome	25-30/<2										
Festuca rubra	Red fescue	25-30/<2										
Elymus glauca 5	Blue wildrye	25-30/<2										
Elymus elymoides 7	Squirreltail	25-30/<2										
Poa secunda 3	Sandbreg bluegrass	25-30/<2										
Agrostis scabra 3	Ticklegrass	25-30/<2										
Stipa occidentalis	Western needlegrass	25-30/<2										
Melica aristata 4	Bearded melic	25-30/<2										
Panucum capillare	Witchgrass	25-30/<2										
Bromus carinatus 4	Alaska brome	25-30/2-3										
Poa secunda 6	Pine bluegrass	25-30/2-3										
Elymus elymoides 1	Squirreltail	25-30/2-3										
Elymus glauca 7	Blue wildrye	25-30/2-3										
Agrostis scabra 6	Ticklegrass	25-30/2-3										
Bromus carinatus 9	Alaska brome	20-25/<2										
Festuca rubra 6	Creeping red fescue	20-25/<2										
Stipa lemmonii	Lemmon's needlegrass	20-25/<2										
Stipa occidentalis 7	Western needlegrass	20-25/<2										
Phleum alpinum	Alpine timothy	20-25/<2										
Agrostis scabra 4	Ticklegrass	20-25/<2										
Poa secunda	Pine bluegrass	20-25/<2										
Bromus carinatus 11	Alaska brome	20-25/2-3										
Bromus laevipes 4	Woodland brome	20-25/2-3										
Poa secunda	Pine bluegrass	20-25/2-3										
Festuca rubra 4	Red fescue	20-25/2-3										
Elymus glauca 9	Blue wildrye	20-25/2-3										
Stipa occidentalis 6	Western needlegrass	20-25/2-3										
Bromus carinatus 10	Alaska brome	15-20/<2										
Poa secunda 8	Pine bluegrass	15-20/<2										
Stipa occidentalis 8	Western needlegrass	15-20/<2										
Stipa lemmonii	Lemmon's needlegrass	15-20/<2										
Elymus elymoides 10	Squireltail	15-20/<2										
Festuca rubra 5	Red fescue	15-20/<2										
Phleum alpinum	Alpine timothy	15-20/<2										
Agrostis scabra	Ticklegrass	15-20/<2										

34 contract collections (black)  
 additional collections (in red)

# Collection status sheets

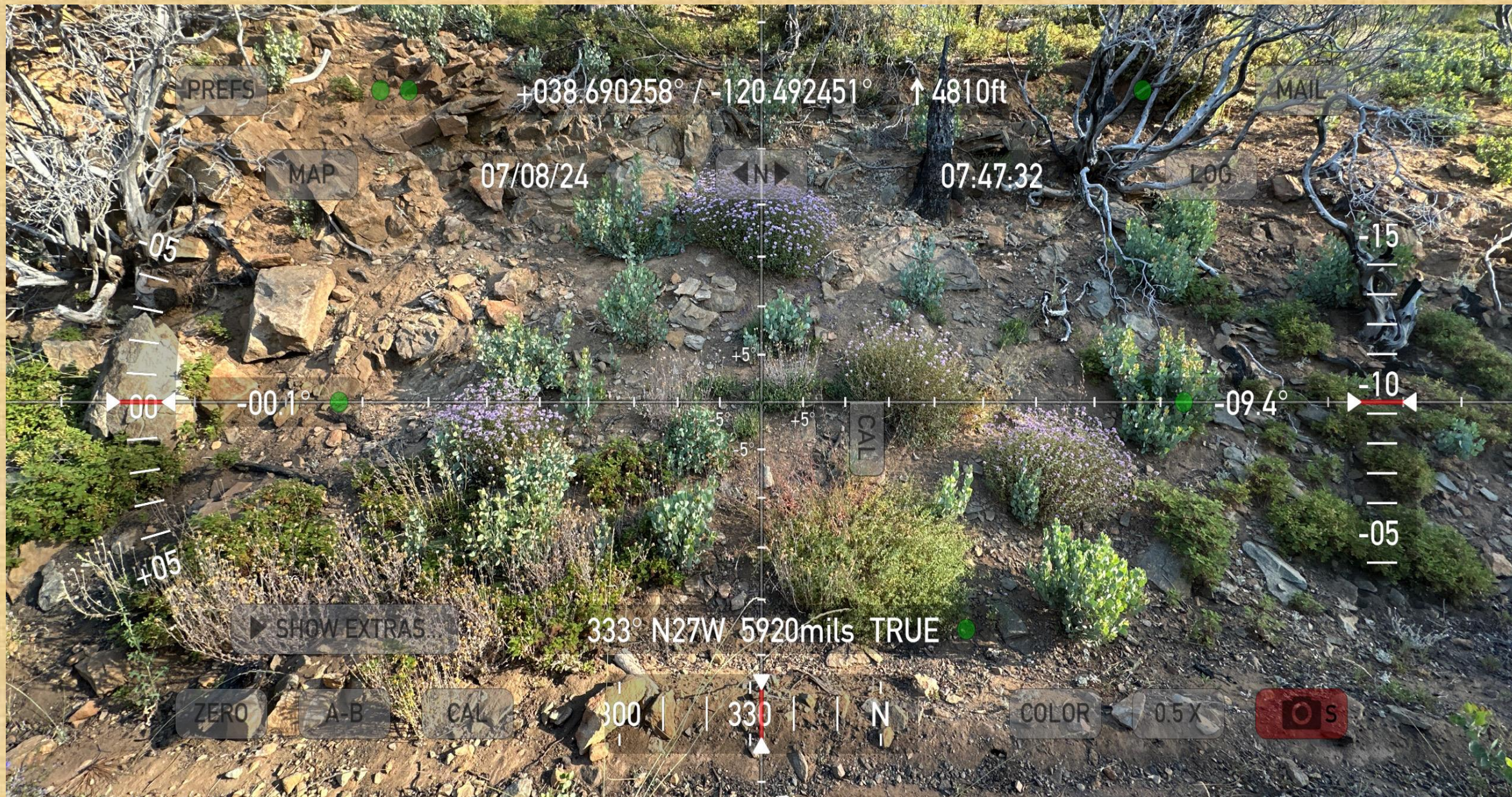
- 1 Mosquito Riparian locations, collections, and cleanouts
- 1 Mosquito Herbs and Shrubs locations, collections, and cleanouts
- 1 Mosquito Grasses locations, collections, and cleanouts
- 1 Caldor Herbs locations, collections, and cleanouts
- 1 Caldor Grasses locations, collections, and cleanouts

## Caldor contract grass list

Species	Seed Block	30-35/<2	30-35/2-3	25-30/<2	25-30/2-3	20-25/<2	20-25/2-3	15-20/<2	lbs/Species
Bromus sitchensis var. carinatus	Early	2.00	4.50	2.00	1.00	2.00	1.50	1.00	14.00
Poa secunda			4.50		0.50		1.50	1.00	7.50
Festuca rubra				2.00		2.00			4.00
Elymus elymoides		2.00	4.50		1.00				7.50
Elymus glaucus	Mid			2.00	1.00		1.50		4.50
Melica aristata			4.50	2.00					6.50
Stipa lemmonii						2.00		1.00	3.00
Stipa occidentalis		2.00					1.50		3.50
Phleum alpinum						2.00		1.00	3.00
Agrostis scabra	Late		4.50		0.50	2.00		1.00	8.00
Panicum capillare		2.00	4.50	2.00					8.50
		Pounds/PSZ	8.00	27.00	10.00	4.00	10.00	6.00	5.00



# Theodolite photos also recorded for location reference



# Seed collection log

2024 collection summary  
5-16 to 10-22

DATE	SPECIES	SITE #	M/C	PSZ	FIELD LBS
16-May	POSE	21	M	1-001	30-35/2-3 1.0
29-May	STLE	32	M	1-004	35-40/2-3 28.0
	POSE	35	M	1-003	30-35/2-3 1.0
	ACPA	19	M	2-002	30-35/2-3 4.0
	ACPA	33	M	1-003	35-40/2-3 11.0
31-May	ACPA	16	M	2-001	30-35/2-3 6.0
	ACPA	40	M	1-004	35-40/2-3 2.6
	POSE	41	M	2-003	35-40/2-3 2.2
	Lupine sp.	41	M		35-40/2-3 3.8
6-Jun	ELGL	56	M	3-003	35-40/2-3 7.0
	BRCA	55	M	2-002	35-40/2-3 2.0
	BRCA	11	M	2-003	35-40/2-3 9.0
	POSE	37	M	2-001	35-40/2-3 1.0
	STLE	12	M	1-002	35-40/2-3 2.0
	BRCA	50	M	3-001	30-35/2-3 5.0
	ACPA	13	M	1-001	35-40/2-3 1.0
	ACPA	48	M	1-005	35-40/2-3 2.0
7-Jun	ELGL	51	M	2-007	30-35/2-3 19.0
	BRCA	51	M	3-001	30-35/2-3 15.0
	STLE	51	M	2-002	30-35/2-3 12.0
10-Jun	DECA	94	C	1-001	30-35/2-3 8.0
	POSE	99	C	5-001	30-35/2-3 4.0
	BRCA	65	C	5-001	25-30/<2 1.0
	ACOC	100	C	1-004	25-30/2-3 3.0
	POSE	75	C	3-001	25-30/<2 1.0
	POSE	100	C	5-002	30-35/2-3 5.0
	ELGL	99	C	4-002	30-35/2-3 3.0
	STLE	65,97	C	3-004	30-35/2-3 16.0
	EPCI?	93	C	1-001	30-35/2-3 1.0
13-Jun	BRCA	30,31,32	M	2-004,5,6	30-35/2-3 27.0

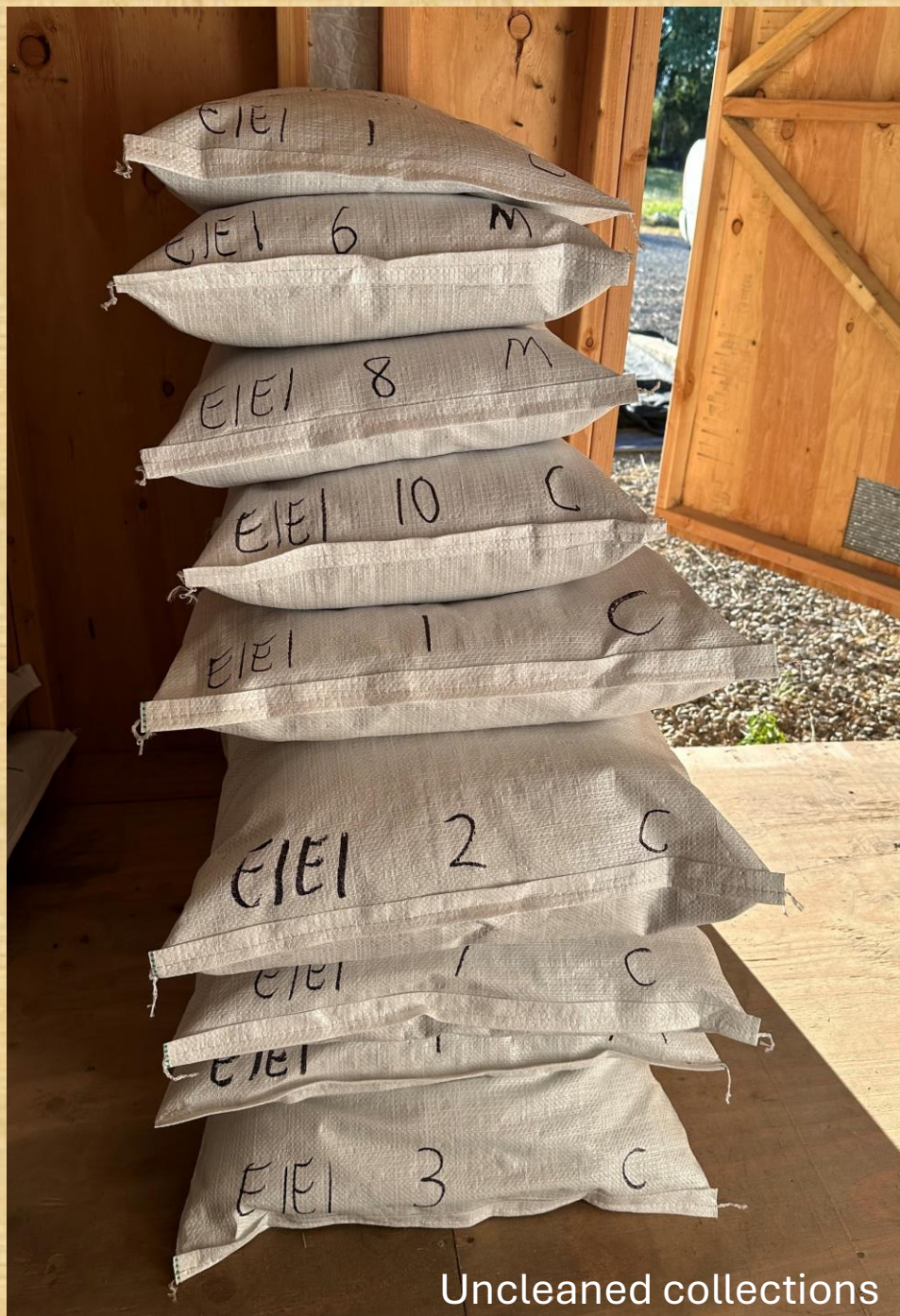


Horizontal bags turned frequently for drying;  
vertical bags are dried, sorted, and  
sewn shut until cleaning

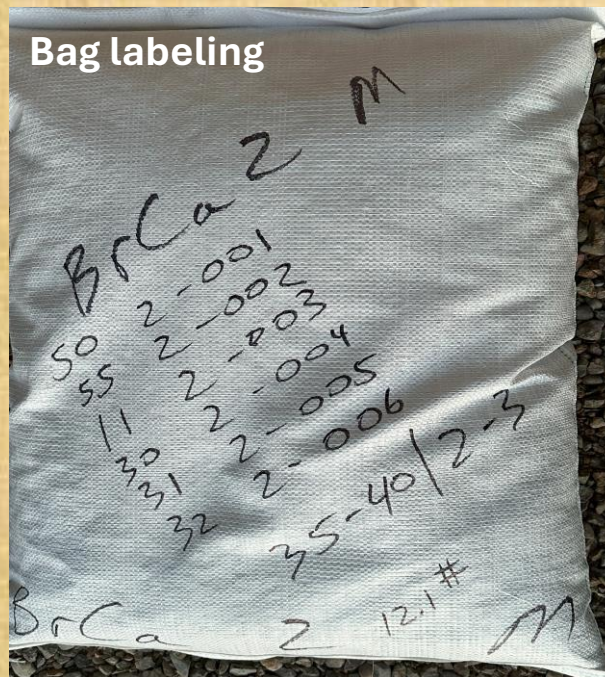
**Peak season for seed collections 6-24 to 8-8**

Collection date	# of sites visited
16-May	1
29-May	4
31-May	4
6-Jun	8
7-Jun	3
10-Jun	9
13-Jun	10
18-Jun	4
19-Jun	7
24-Jun	18
26-Jun	5
30-Jun	12
3-Jul	15
7-Jul	19
12-Jul	16
16-Jul	8
19-Jul	11
21-Jul	18
25-Jul	11
26-Jul	15
1-Aug	13
5-Aug	10
8-Aug	17
12-Aug	7
15-Aug	9
20-Aug	9
30-Aug	6
3-Sep	2
20-Sep	4
7-Oct	6
18-Oct	4
22-Oct	5

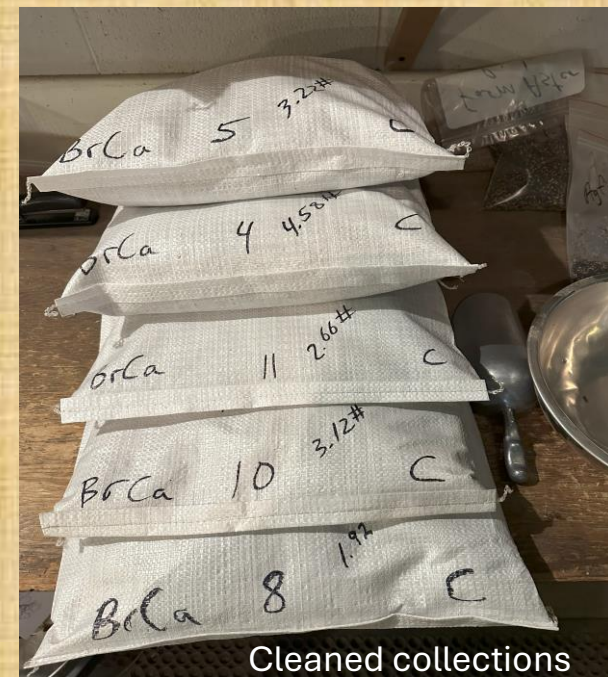




Uncleaned collections



Bag labeling



Cleaned collections



Pre-cleaning with screen table



POSE sacs being sorted by PSZ

# Small scale machinery for cleaning small seed lots



Cuisinart, mineral sieves, hair dryer



Berry macerator



Seed Tech aspirator



1950 hammermill



Field screening  
leaves residual  
organics in the field



**Mosquito Fire**  
**9-22**  
**76,000 acres**



**Mosquito Fire  
looking northeast from  
Ralston Ridge**

**High Sierras in background**

**Middle fork American River  
below**

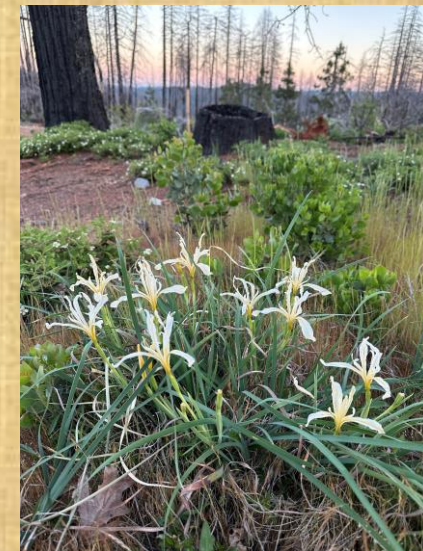


Dudleya cymosa



Caldor Fire 8-21 221,000 acres

east of Grizzley Flats



Iris hartwegii



Dicentra formosa

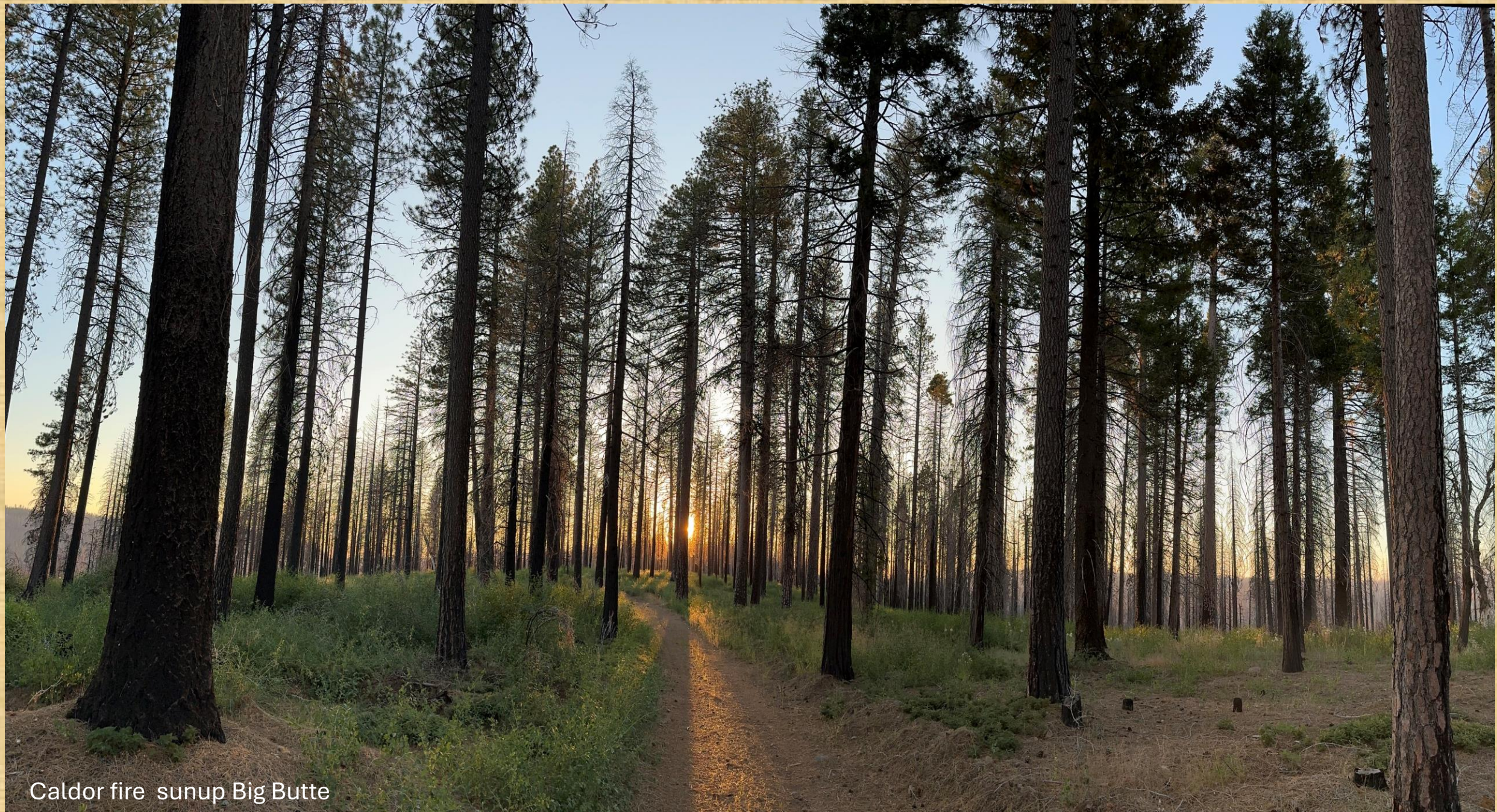




**Lower elevation PSZ Mosquito fire site**

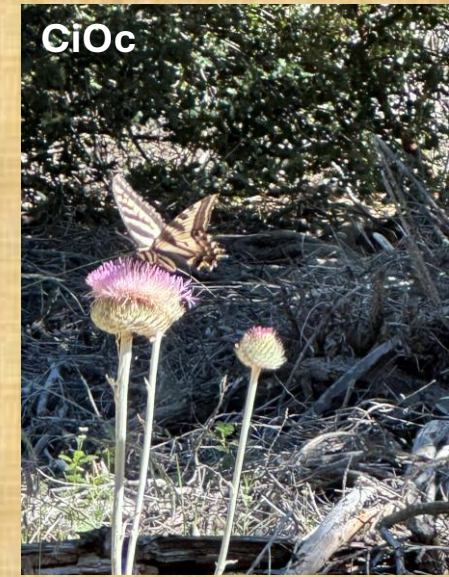
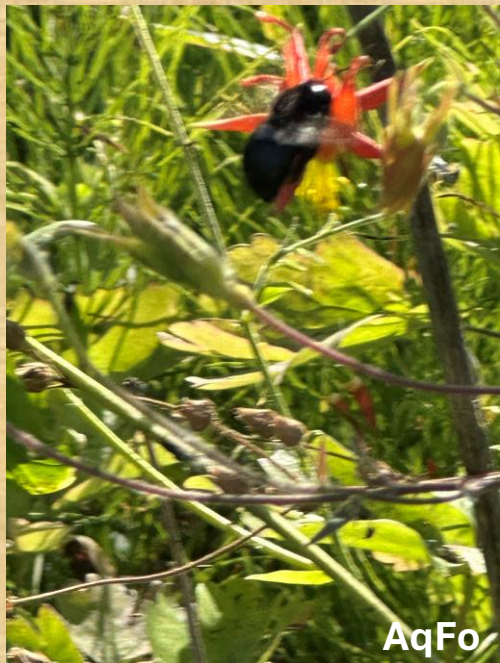


**Higher elevation PSZ Caldor fire site**



Caldor fire sunup Big Butte

# The End (is near)





**THE REMAINING 20 SLIDES WILL KNOCK YOUR SOCKS OFF**

**BUT WE DON'T HAVE TIME.....**

























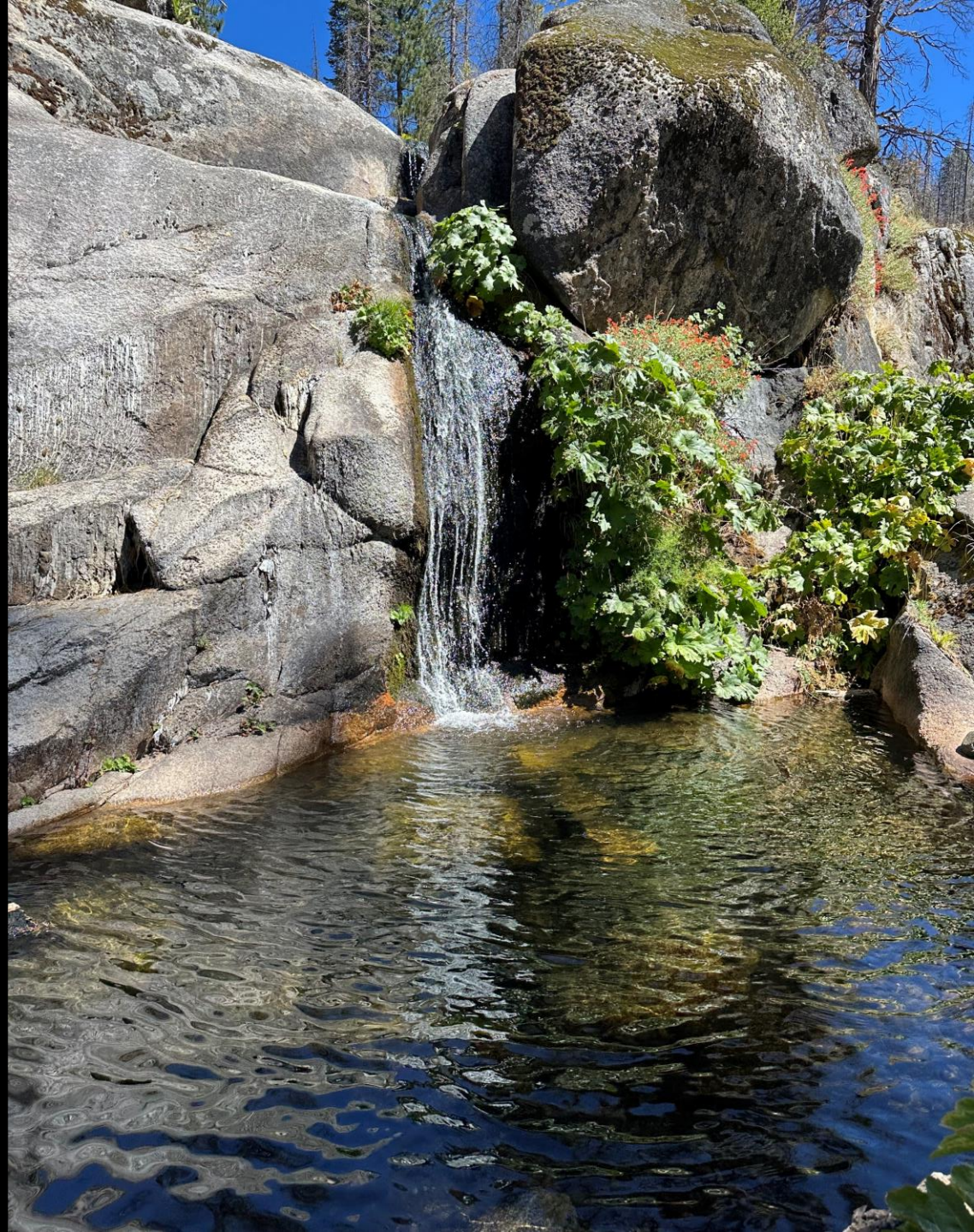








S  
W  
I  
M







**JUMP**

**AND**

**SWIM**

PREFS

+038.694657° / -120.201129° ↑ 5563ft

MAIL

MAP

07/25/24



17:27:29

LOG

-05

-50

-00.3°

-45.0°

+5°

+5°

CAL

+05

-40

▶ SHOW EXTRAS...

261° S81W 4640mils TRUE

ZERO

A-B

CAL

240

W

3

COLOR

0.5X



DON'T

JUMP

BUT

DO

SWIM





Yankee Jims Bridge North fork American River



3-ton bridge?