

An exciting new wild sunflower species: *Helianthus winteri*

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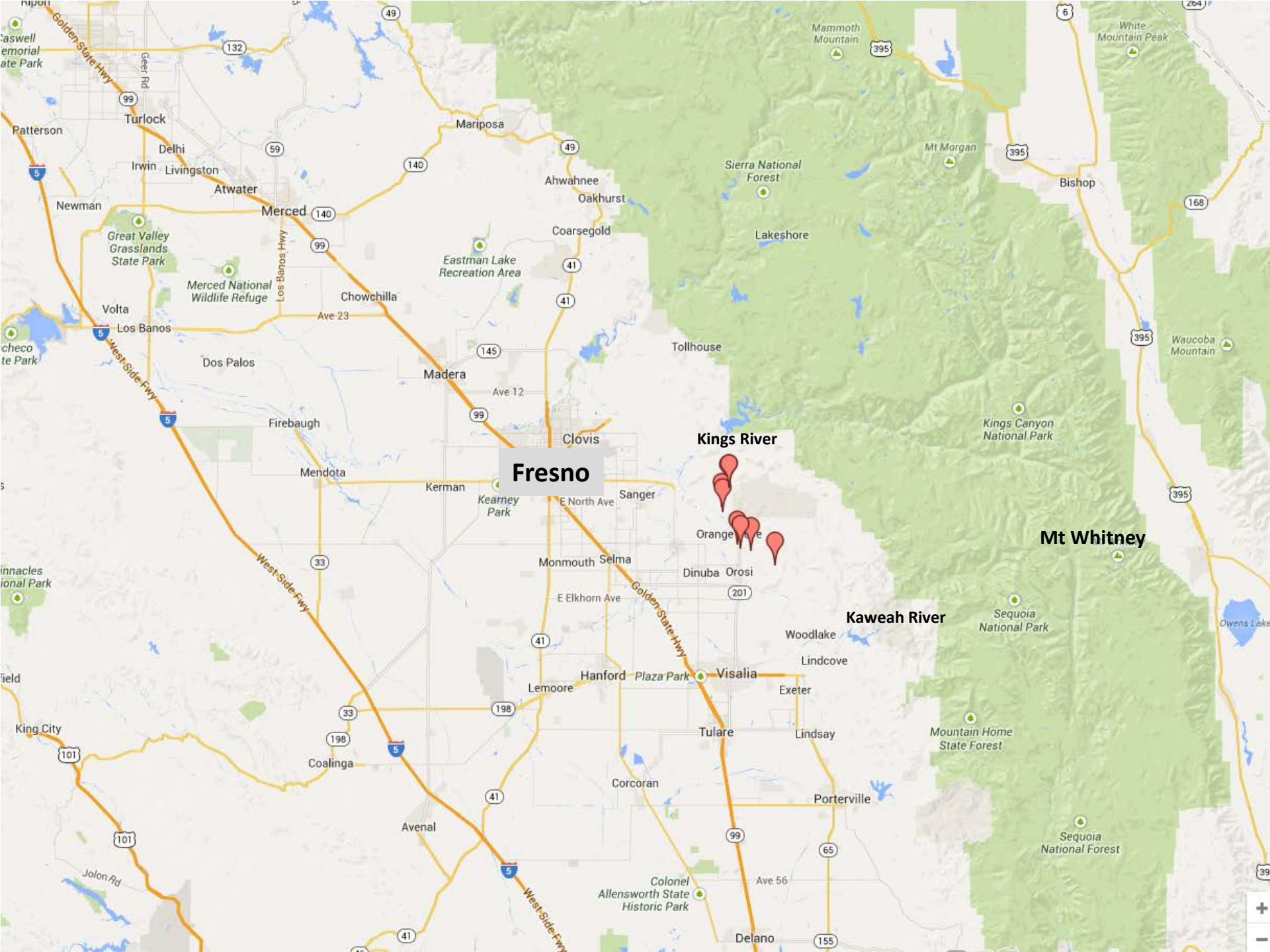
⁴USDA-ARS, Fargo, ND

Where?

western foothills of the southern Sierra Nevada

J.C. Stebbins, C.J. Winchell, and J.V.H. Constable.
2013 *Helianthus winteri* (Asteraceae), a new
perennial species from the southern Sierra Nevada
foothills, California. *Aliso* 31: 19-24.





Fresno

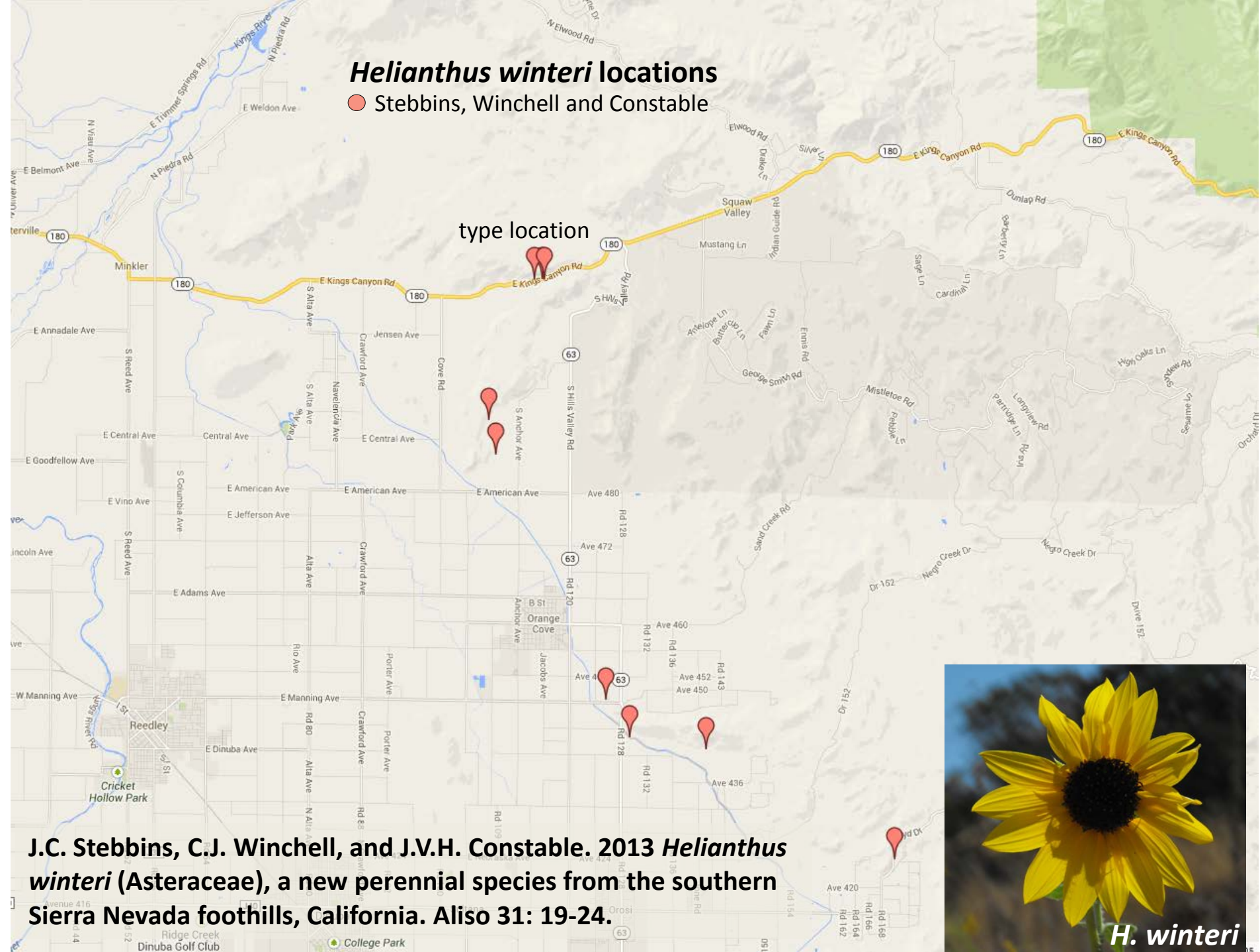
Kings River

Mt Whitney

Kaweah River

Helianthus winteri locations

● Stebbins, Winchell and Constable



J.C. Stebbins, C.J. Winchell, and J.V.H. Constable. 2013 *Helianthus winteri* (Asteraceae), a new perennial species from the southern Sierra Nevada foothills, California. *Aliso* 31: 19-24.



H. winteri

perennial:

- 1. flowers throughout the year**
- 2. woody stems with apparent “rings”**
- 3. plants live more than one season**

Genetic Resources Conservation

An aerial photograph of a farm. In the foreground, there is a large, neat stack of yellow hay bales. To the left, a green cornfield is visible. In the center, a road crosses a field. To the right, there are several rows of sunflower plants in various stages of growth. In the background, there are several large, light-colored farm buildings and more fields.

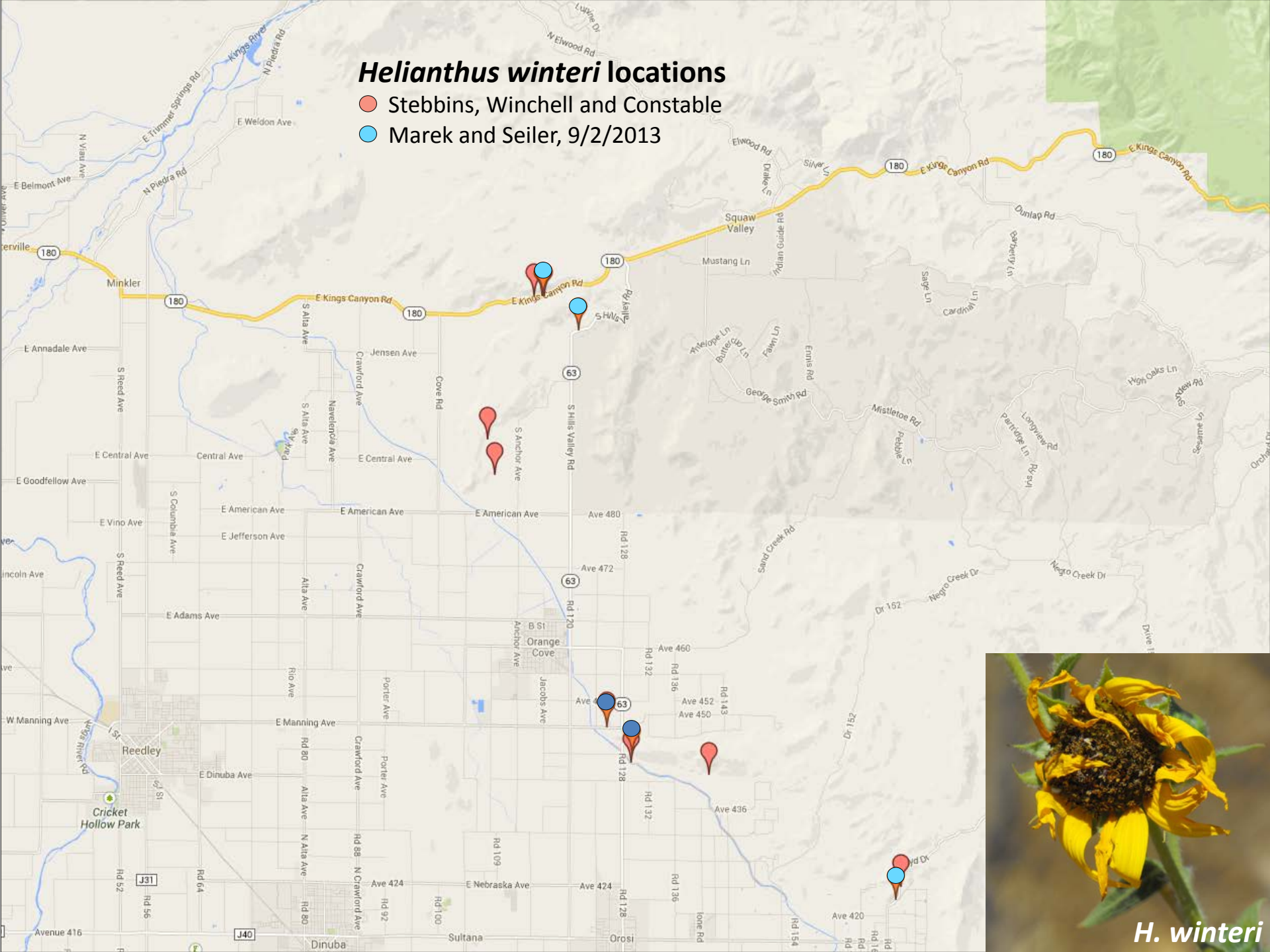
2013 Plant Exploration in the western United States to collect sunflower germplasm for crop improvement

funded by: the Plant Exchange Office Unit, National Germplasm Resources Laboratory, USDA-ARS, Beltsville, MD

**National Plant Germplasm System sunflower collection
NCRPIS: USDA-ARS/Iowa State University, Ames IA USA**

Helianthus winteri locations

- Stebbins, Winchell and Constable
- Marek and Seiler, 9/2/2013



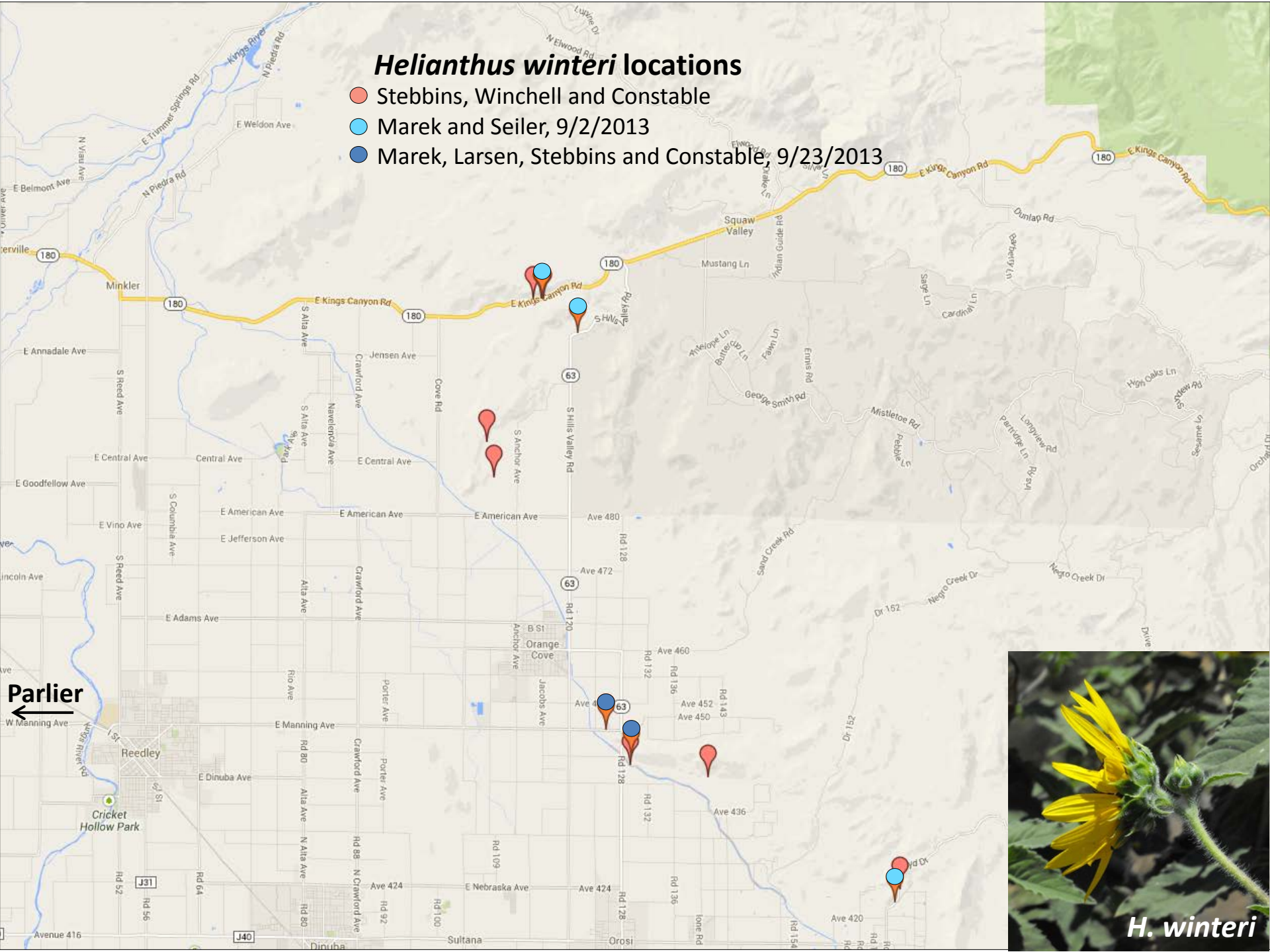
H. winteri

Hwy 180 type location



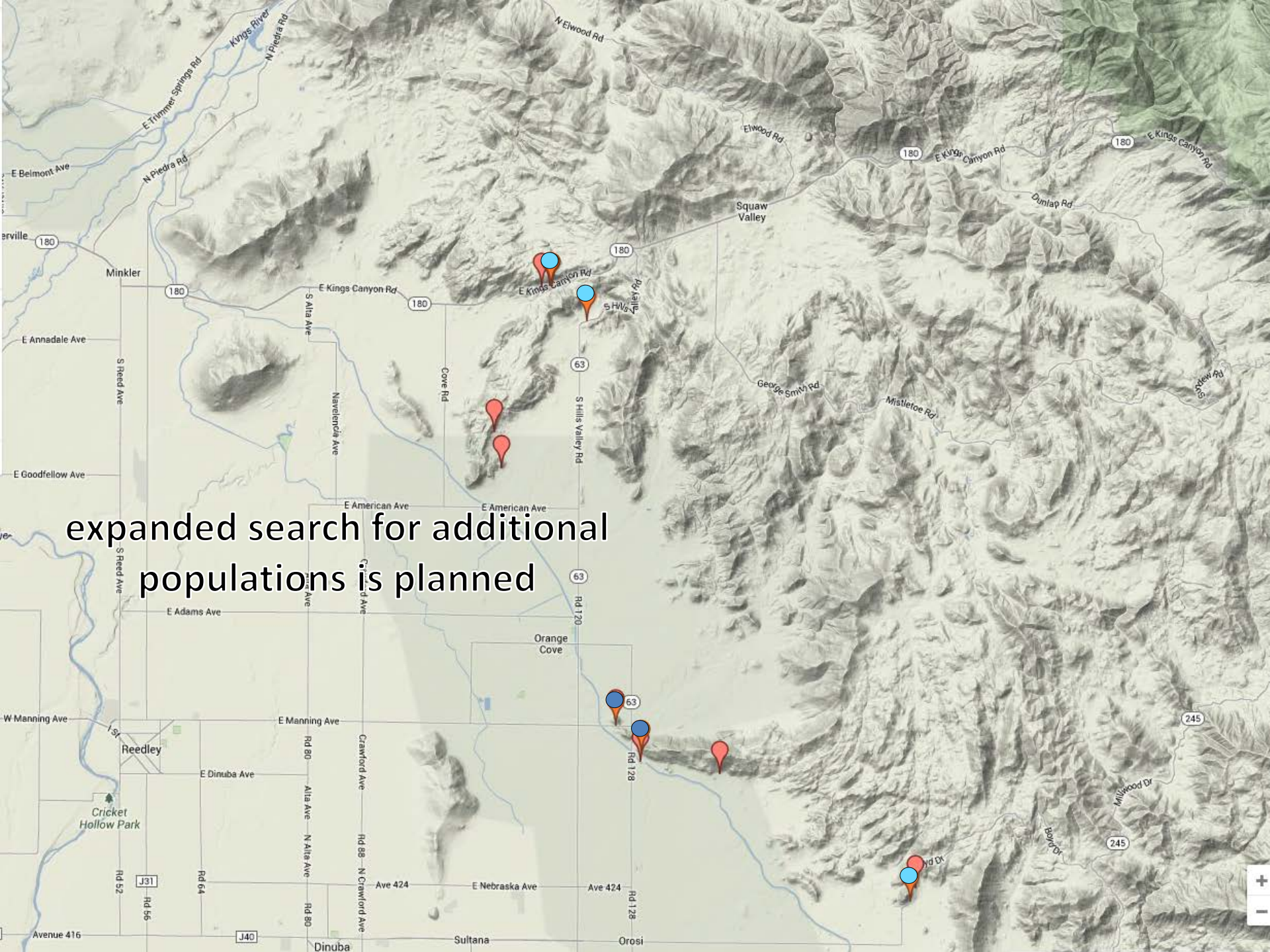
Helianthus winteri locations

- Stebbins, Winchell and Constable
- Marek and Seiler, 9/2/2013
- Marek, Larsen, Stebbins and Constable, 9/23/2013

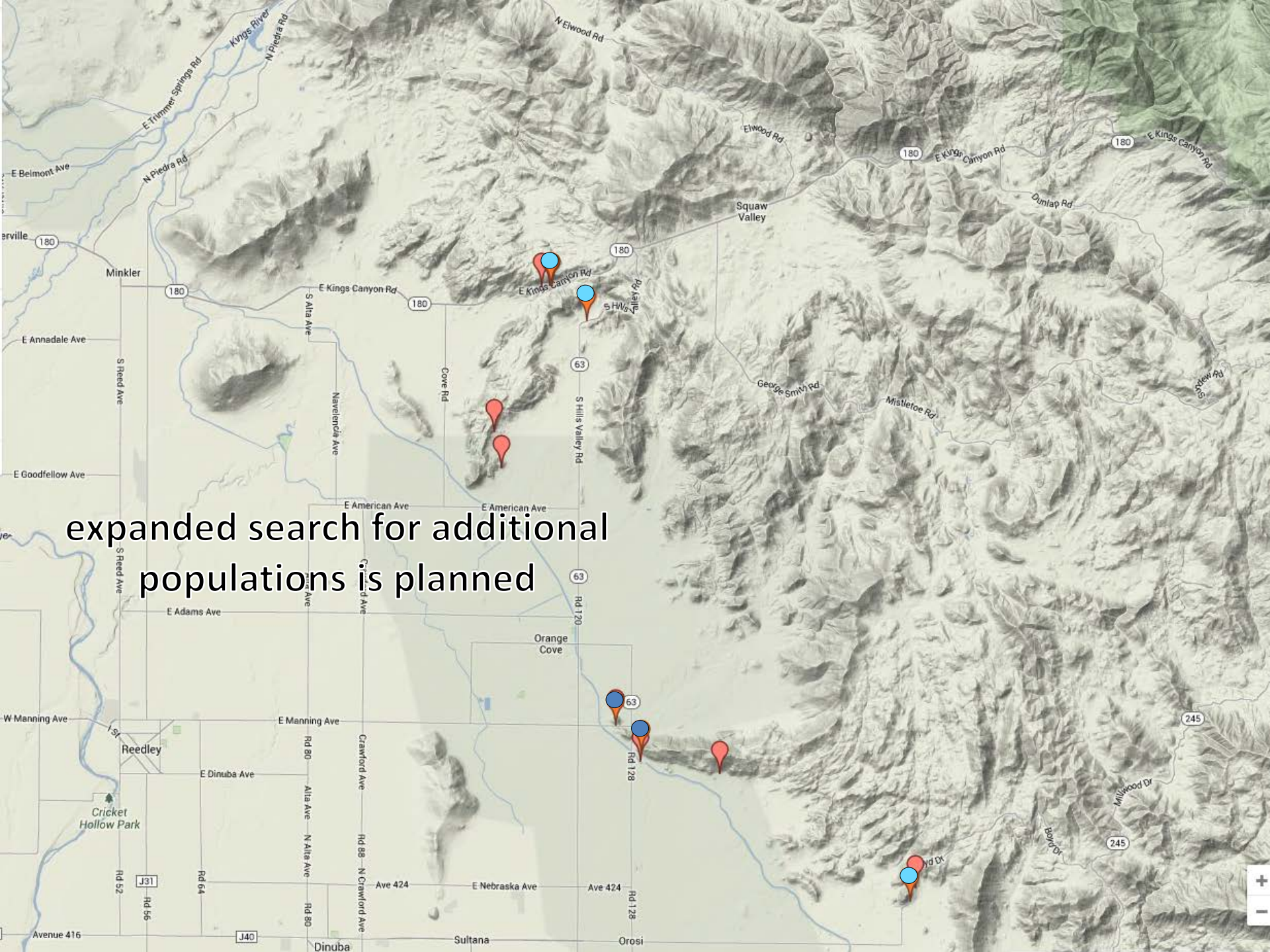




Found in a region of intensive agriculture.



expanded search for additional
populations is planned



Oil Analysis

(Oxford 4000)

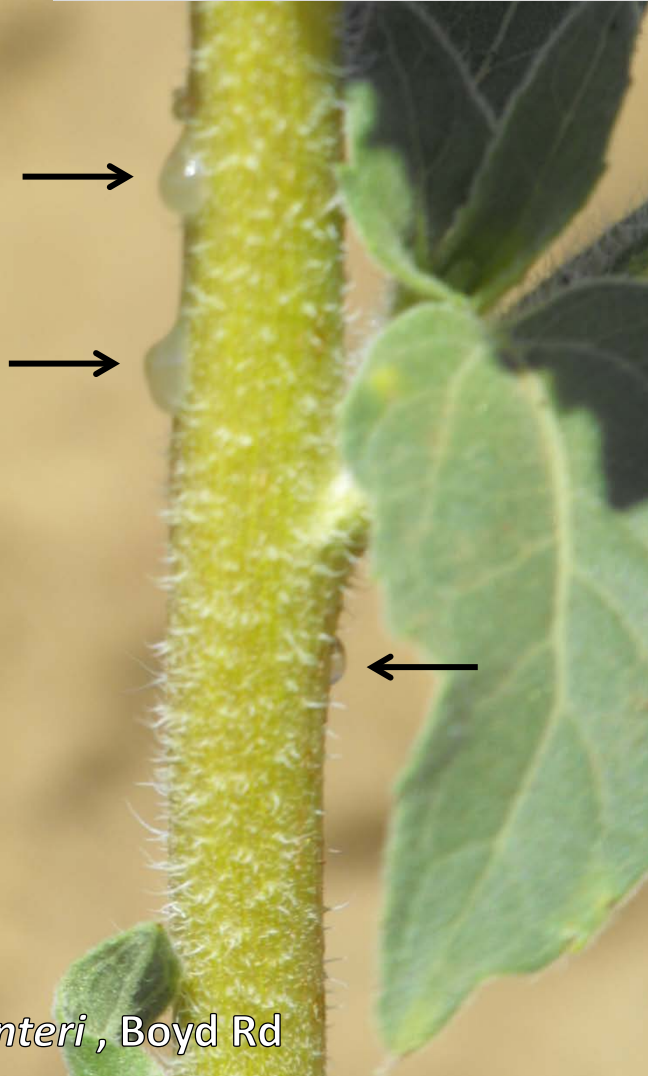
ID	taxon	NMR oil content g kg ⁻¹	Fatty Acid profile, % total oil						
			palmitic	stearic	oleic	linoleic	arachidic	behenic	lignoceric
2796	<i>H. winterii</i>	250	6.40	2.50	55.90	34.50	0.20	0.30	.
2796	<i>H. winterii</i>	249	6.30	2.50	52.20	38.00	0.20	0.40	0.20
	<i>H. argophyllus</i>	225	7.80	7.30	40.10	44.30	na	na	na
	wild <i>H. annuus</i>	225	5.00	2.70	23.30	68.30	na	na	na
Hybrid 894	cultivated <i>H. annuus</i>	440	7.00	5.00	16.00	70.00	na	na	na
HA 89	cultivated <i>H. annuus</i>	440	6.00	4.10	21.10	69.70	na	na	na
NuSun	cultivated <i>H. annuus</i>	416	4.43	3.74	62.90	26.56	na	na	na



We can see the stems are different from other sunflowers.

Why are they different?

Can the components causing the differences be useful?



H. winteri , Boyd Rd



H. winteri , Hwy 180



Helianthus argophyllus

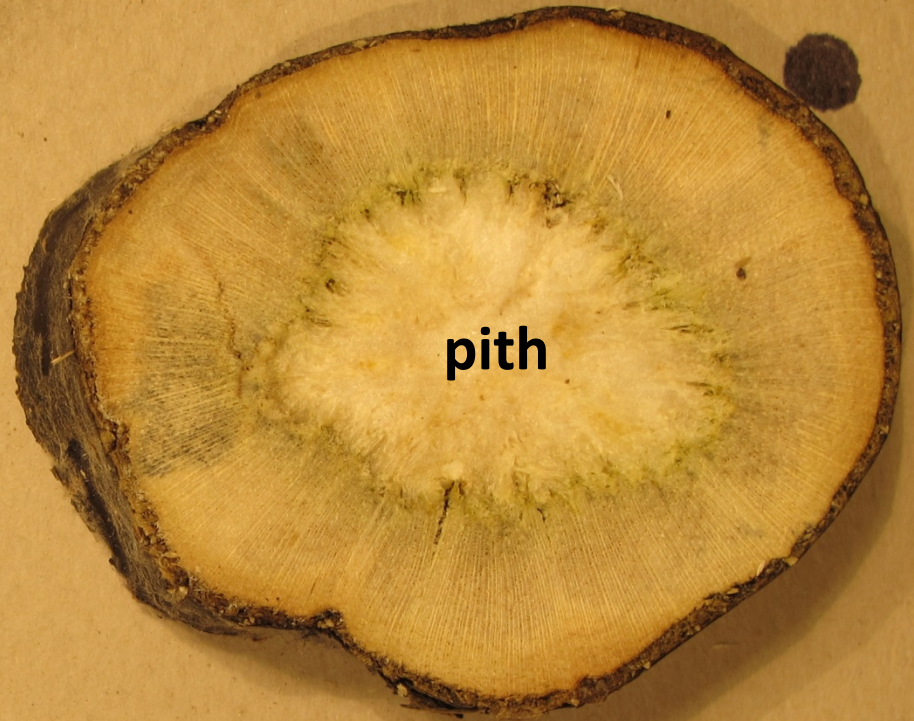


Helianthus winteri

H. winteri



H. argophyllus

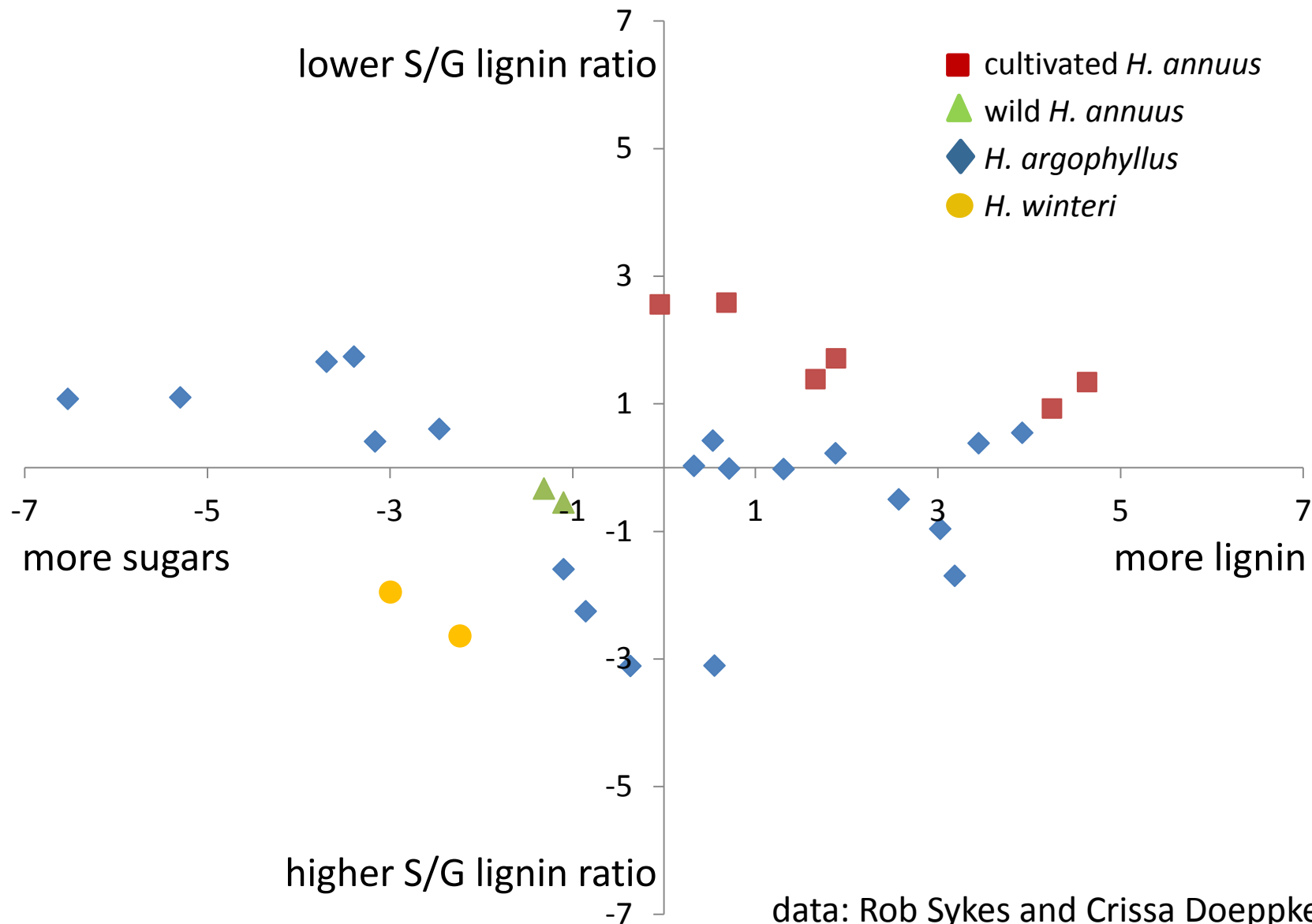


“S” lignin units are more easily digested than “G” lignin

Species	S/G Lignin
wild <i>H. annuus</i>	1.38
cultivated <i>H. annuus</i>	1.50
<i>H. winteri</i>	1.80
<i>H. argophyllus</i>	1.74
poplar	1.74
aspen	1.40
switchgrass	0.44
<i>Miscanthus</i>	0.84
corn stover	1.74
wheat straw	0.94
sorghum	1.10

Wood chemistry of three sunflower species

PCA based on PYMBMS peak intensity



data: Rob Sykes and Crissa Doeppke
National Renewable Energy Laboratory

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January 2014



NCRPIS farm greenhouse 3



Potentially useful traits from a new wild sunflower species

flower structure differences

stem resistance to pests

woody biomass

grows in a low rainfall environment

genetics close to annuus; less genetic drag

fewer genomic rearrangements than *H. argophyllus*

Brook T. Moyers and Loren H. Rieseberg. 2013. Divergence in gene expression is uncoupled from divergence in coding sequence in a secondarily woody sunflower. *Int. J. Plant Sci.* 174: 1079-1089



Thank you!

collaborators:

Glenn Cole

John Stebbins

Rob Sykes

Irv Larsen

Brook Moyers

Greg Baute

Ed Stover