

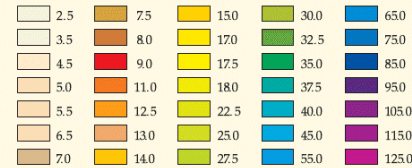
# Managing Weed Invaders on Your Ranch: New Invasive Plants in the County

Ryan O'Dell  
Natural Resource Specialist  
Bureau of Land Management  
Central Coast Field Office  
[rodell@blm.gov](mailto:rodell@blm.gov)

Sahara mustard



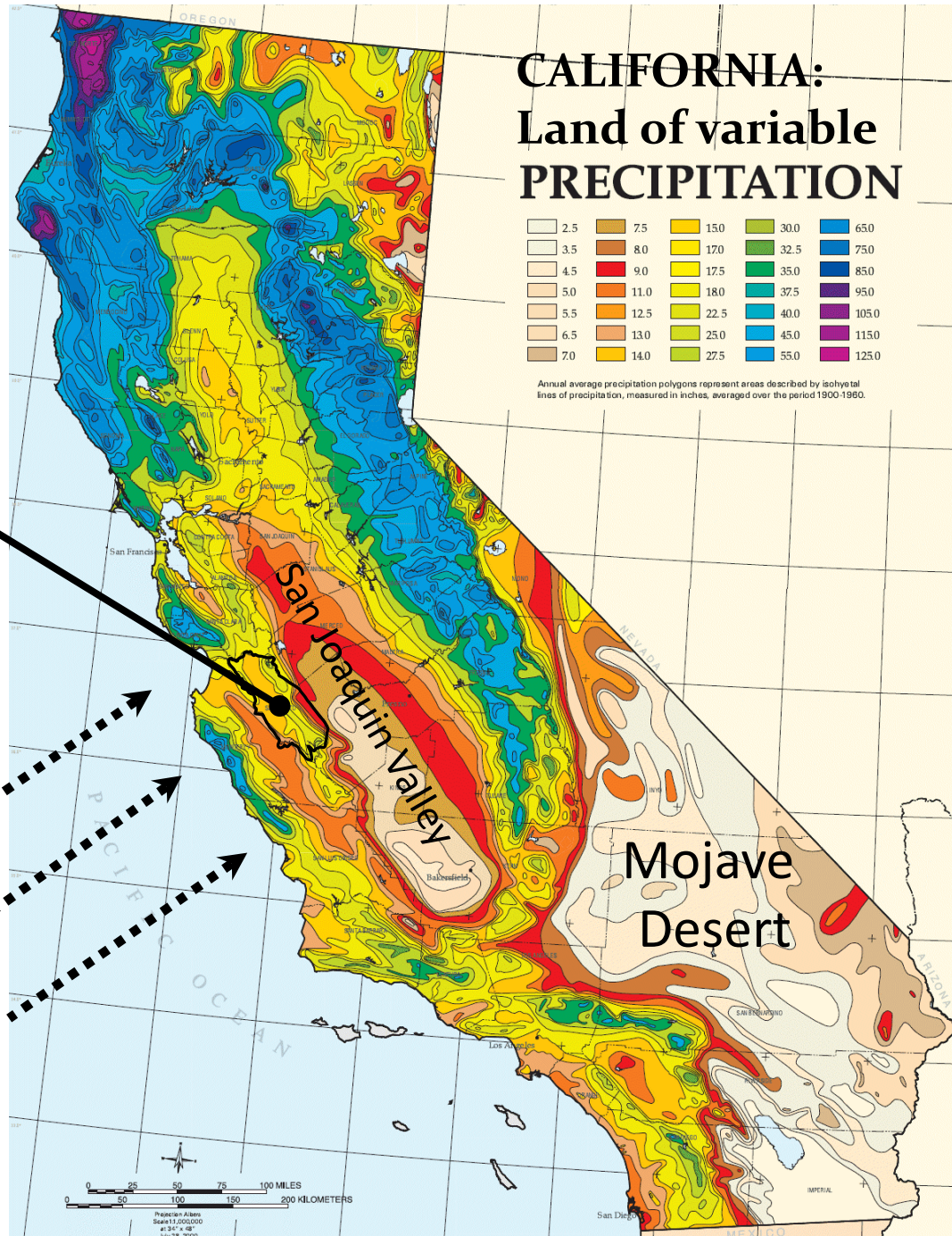
# CALIFORNIA: Land of variable PRECIPITATION



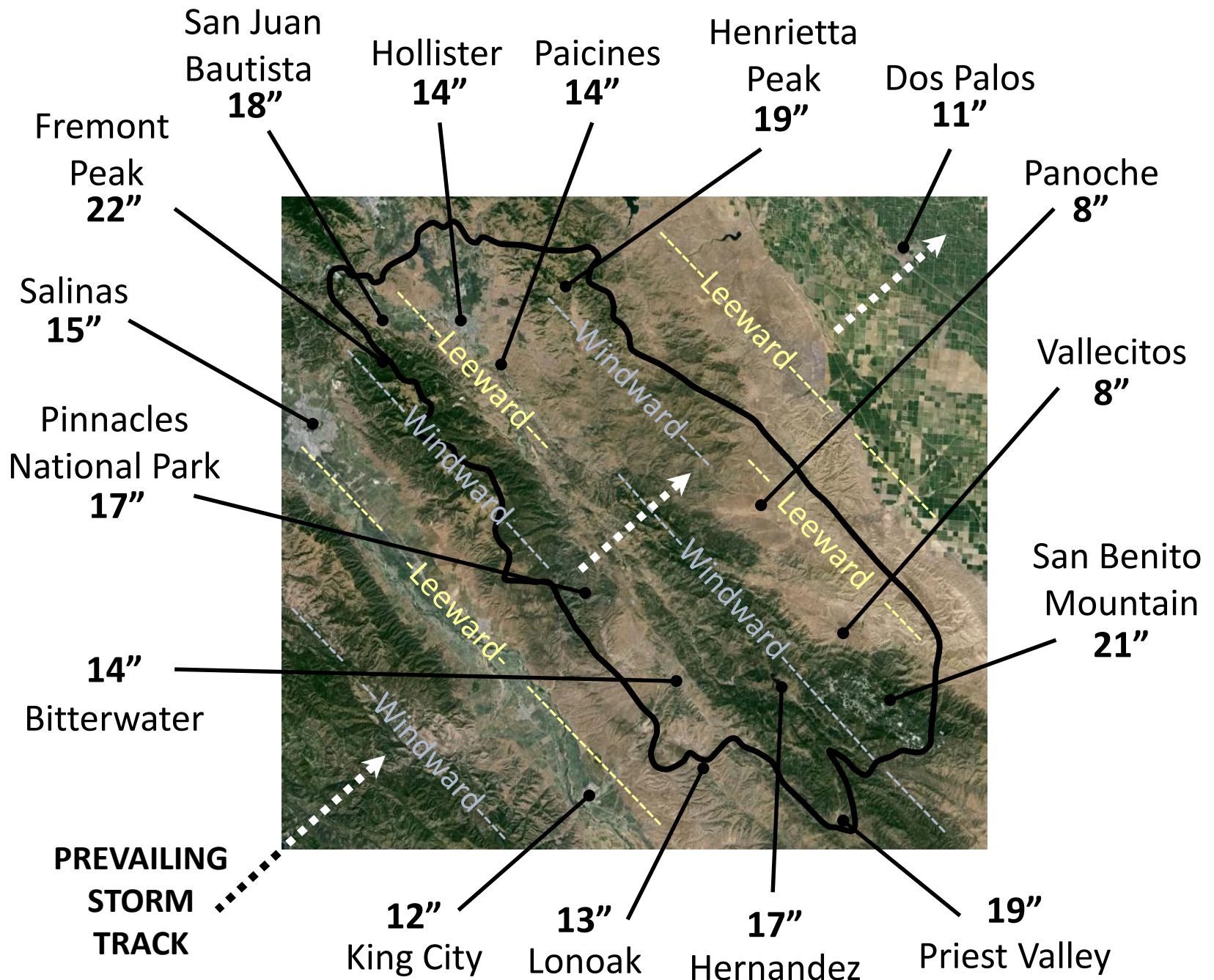
Annual average precipitation polygons represent areas described by isohyetal lines of precipitation, measured in inches, averaged over the period 1900-1960.

San Benito  
County  
**8" – 22"**  
average  
annual  
precipitation

PREVAILING  
STORM  
TRACK  
DIRECTION







# Non-native mustards of San Benito County

**New**

## **Sahara mustard**

*Brassica tournefortii*

- desert climate

February - April



## **Black mustard**

*Brassica nigra*

- temperate climate

April - June



## **London rocket**

*Sisymbrium irio*

- temperate climate

February - April



## **Summer mustard**

*Hirschfeldia incana*

- mediterranean climate

May - August





# Kettleman Hills

(Coalinga)

March 2017

Sahara mustard

A photograph of the Kettleman Hills in Coalinga, California. The foreground features a dirt path and patches of green vegetation, including a large clump of Sahara mustard. The background shows rolling hills under a blue sky with scattered clouds.



# Kettleman Hills

March 2017

Sahara mustard





# Mojave Desert



Sahara mustard



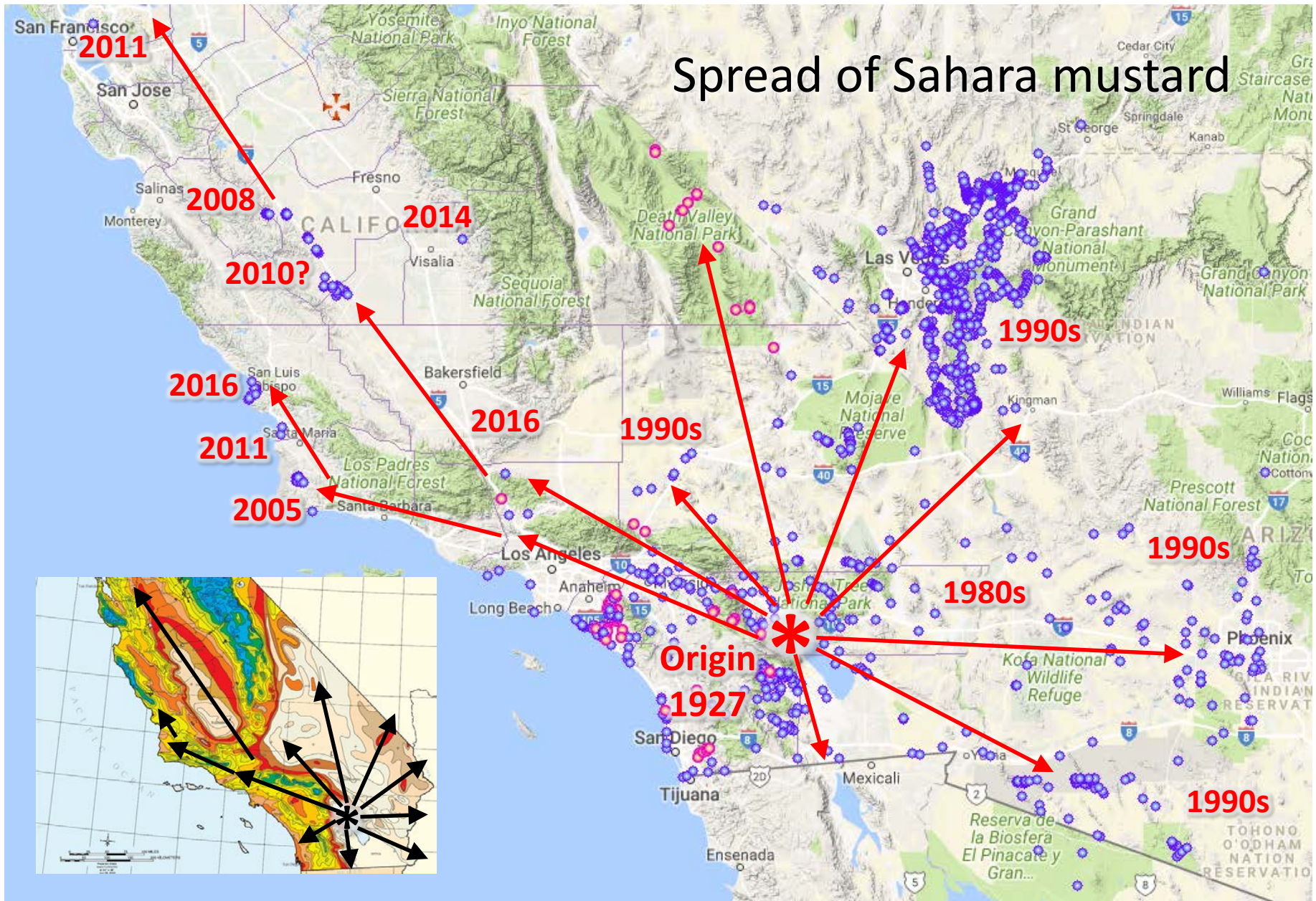
# Sahara mustard seeds



- produce thousands of tiny seeds
- plants break free and tumble with wind
- dispersed seeds are very sticky when wet
- seeds stick to tires and disperse further
- seed longevity > 50 years!

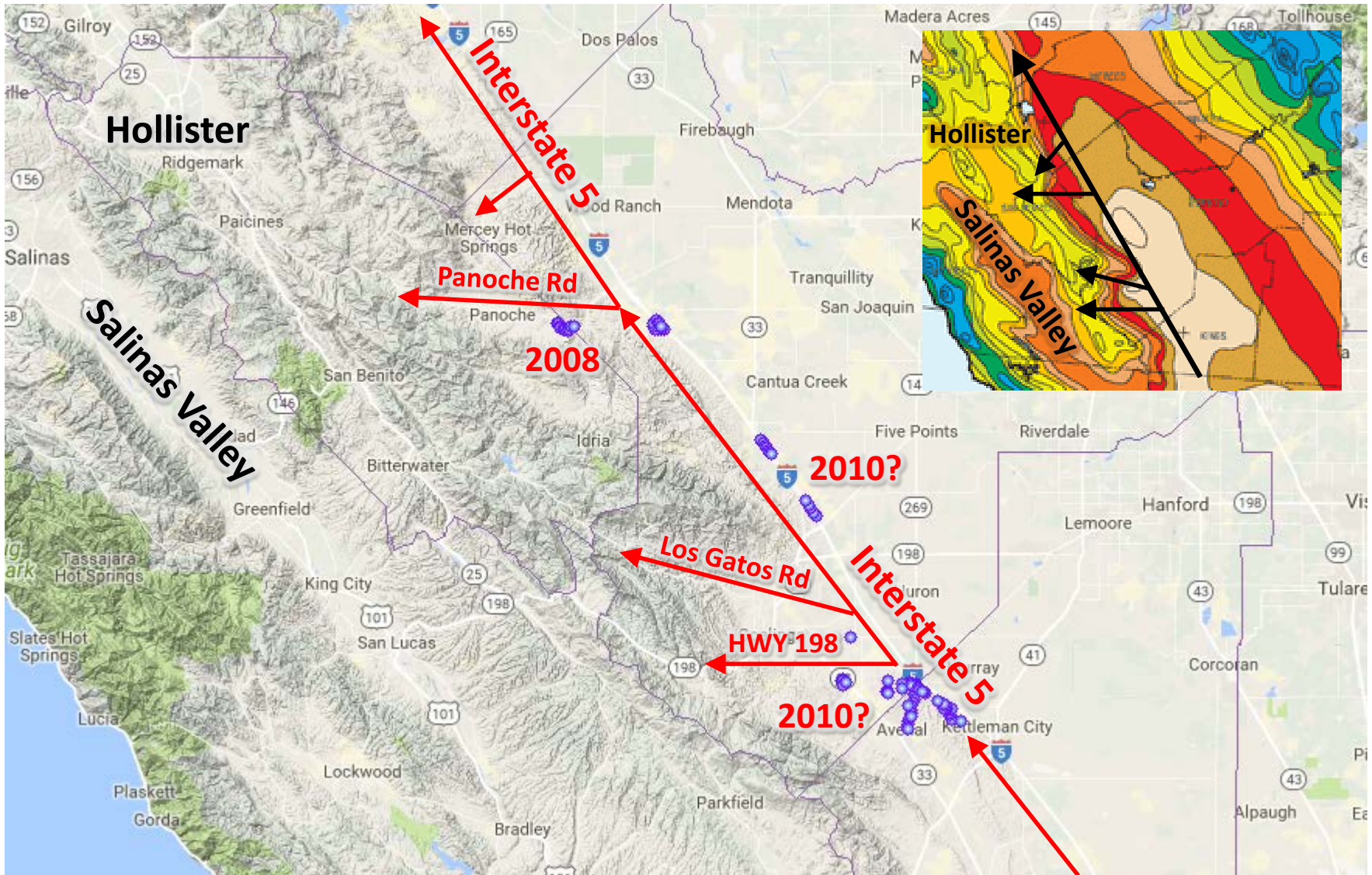


# Spread of Sahara mustard



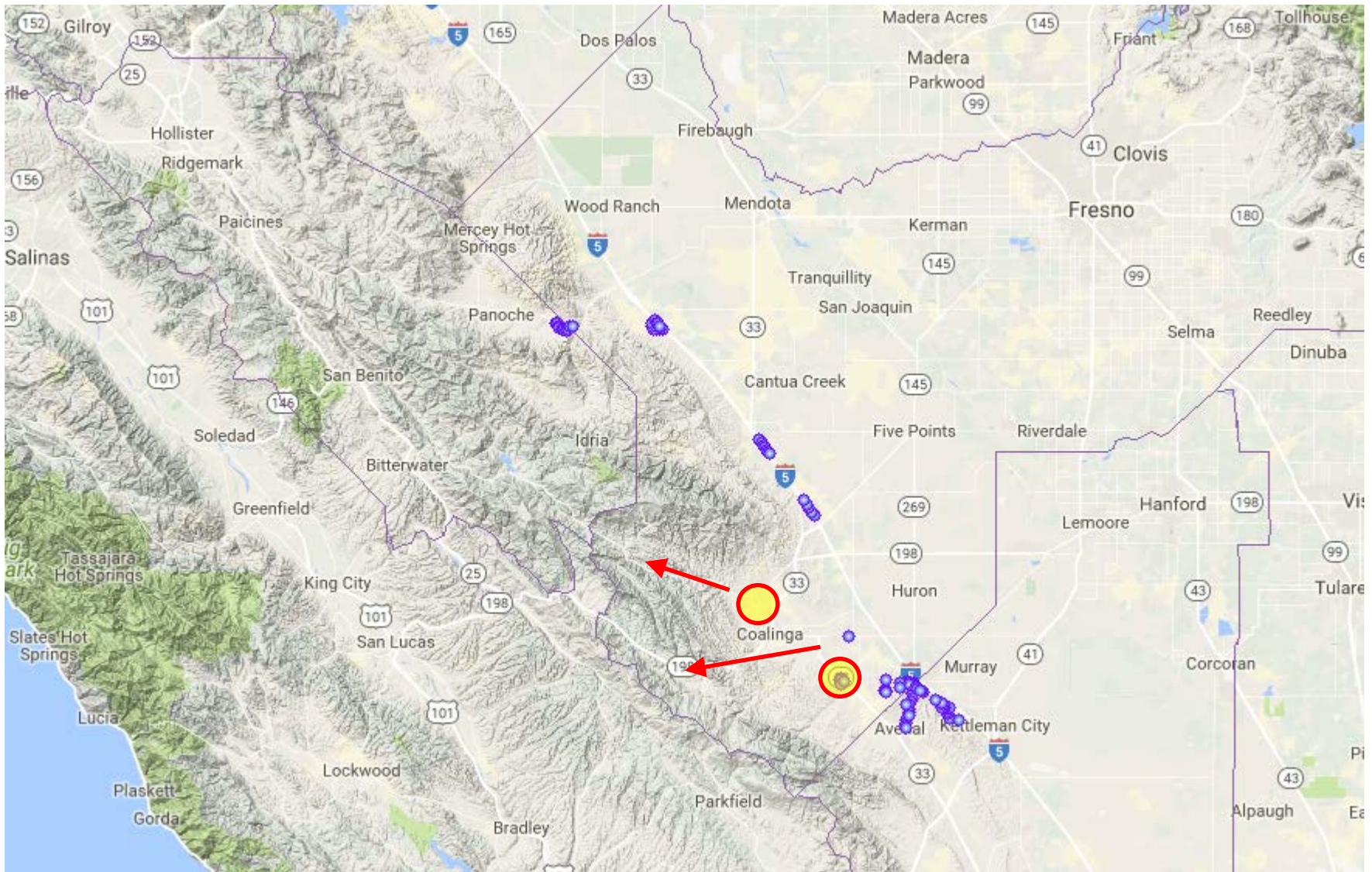


# Spread of Sahara mustard





## Beware of aggregate quarries





# Stinkwort is rapidly expanding its range in California

by Rachel Brownsey, Guy B. Kyser and Joseph M. DiTomaso

*Stinkwort (Dittrichia graveolens) is a Mediterranean native that has become a weed in areas of Europe as well as in Australia. This strongly aromatic weed was first reported in California in 1984 in Santa Clara County, and it had spread to 36 of the 58 California counties by 2012. Stinkwort is not palatable to animals, and can be poisonous to livestock and cause contact allergic dermatitis in humans. In California, this weed is found primarily along roadsides. However, the biology of this annual plant suggests that it could also invade open riparian areas and overgrazed rangelands. Stinkwort has an unusual life cycle among annual plants: Unlike most summer or late-season winter annuals, stinkwort flowers and produces seeds from September to December. Such basic biological information is critical to developing timely and effective control strategies for this rapidly expanding weed.*

*Dittrichia graveolens* (L.) Grueter, commonly known as stinkwort, is a member of the Asteraceae, or sunflower, family. This plant is native to the Mediterranean region of Europe, occurring as far east as Turkey, Afghanistan and Pakistan (Brullo and de Marco 2000; Qaiser and Abid 2005). Stinkwort is an erect, fall-flowering annual that can grow about 2.5 feet tall. Its foliage has sticky glandular hairs covered in resin. The resin emits a strong aromatic odor that resembles the smell of tarweeds. The flowerheads are 0.2 to 0.3 inch (5 to 7 millimeters) in diameter and consist of short yellow ray flowers on the outer edge and yellow to reddish disk flowers in the center. Stinkwort is closely related to fleabanes, horseweed (*Erigeron*; formerly *Conyza*), goldenasters and telegraphweed (*Heterotheca*), but it also closely resembles the tarweeds (*Centromadia* spp., *Hemizonia* spp. and *Holocarpha* spp.). From a distance, stinkwort can



Stinkwort is related to fleabanes and goldenasters and grows to about 2.5 feet tall. In California, this rapidly invading weed most often occurs in disturbed and wasteland sites.

resemble Russian-thistle (*Salsola tragus* L.), also called tumbleweed. Because it is fairly unattractive and nondescript in appearance, stinkwort initially passed unnoticed by many botanists and weed managers, and it was not included in the 1993 edition of *The Jepson Manual of California flora* (Hickman 1993).

In its native range and some introduced regions, stinkwort inhabits riparian woodlands, margins of tidal marshes, vernal pools and alluvial floodplains, although it has not yet invaded these wetland areas in California. In California and other introduced areas of the world, stinkwort is most often found in disturbed places, such as overgrazed rangelands, roadsides, pastures, wastelands, vineyard edges, gravel mines, levees, washes and mining sites, although in California it is seldom found in rangelands or pastures (DiTomaso and Healy 2007; Higuera et al. 2003). Stinkwort grows best on well-drained, sandy or gravelly soils and thrives in areas with hot, dry summers but can also do well along the margins of wetlands. In addition, this plant tolerates

a variety of soil types and survives under a range of soil conditions, temperatures and precipitation regimes (Preston 1997). When adequate moisture is available, stinkwort can even survive on serpentine or saline soils. In Europe, this plant was shown to tolerate and to possibly hyperaccumulate heavy metals, including mercury, zinc and copper (Higuera et al. 2003; Shallari et al. 1998).

## Worldwide invasion

While stinkwort is native to the Mediterranean region, including Egypt and other areas of North Africa, this species has also been introduced to several European countries where it is not native. Within the last two decades, this weed has been spreading rapidly along the highways of Central Europe. In summer 2008, stinkwort was detected for the first time in Slovenia and Austria (Frajman and Kaligarić 2009). Outside of

Online: <http://californiaagriculture.ucanr.edu/landingpage.cfm?article=cav06/n02p110&fulltext=yes>  
doi: 10.3733/cav06/n02p110

California Agriculture 67(2):110-115  
April 2013

land areas in California. In California and other introduced areas of the world, stinkwort is most often found in disturbed places, such as overgrazed rangelands, roadsides, pastures, wastelands, vineyard edges, gravel mines, levees, washes and mining sites, although in California it is seldom found in rangelands or pastures



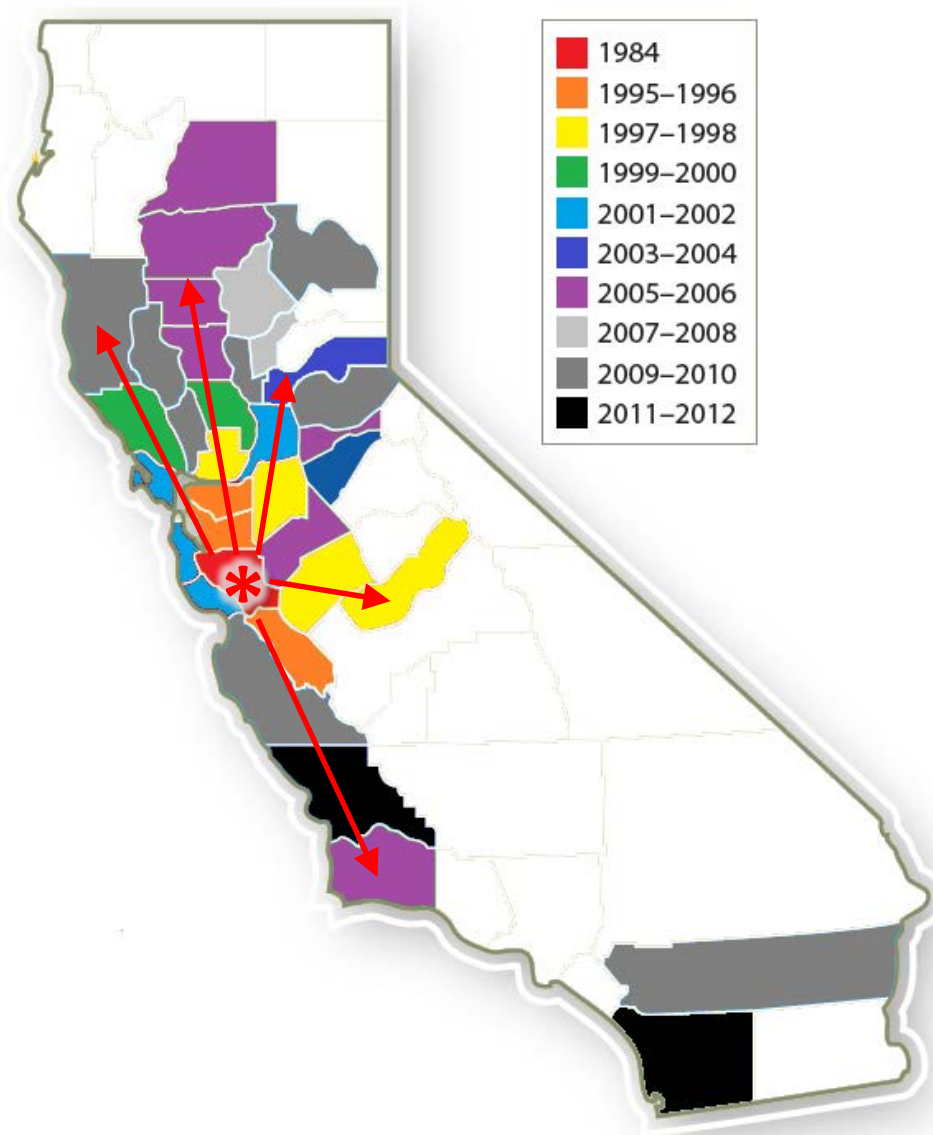
HWY 101 near HWY 25

Stinkwort



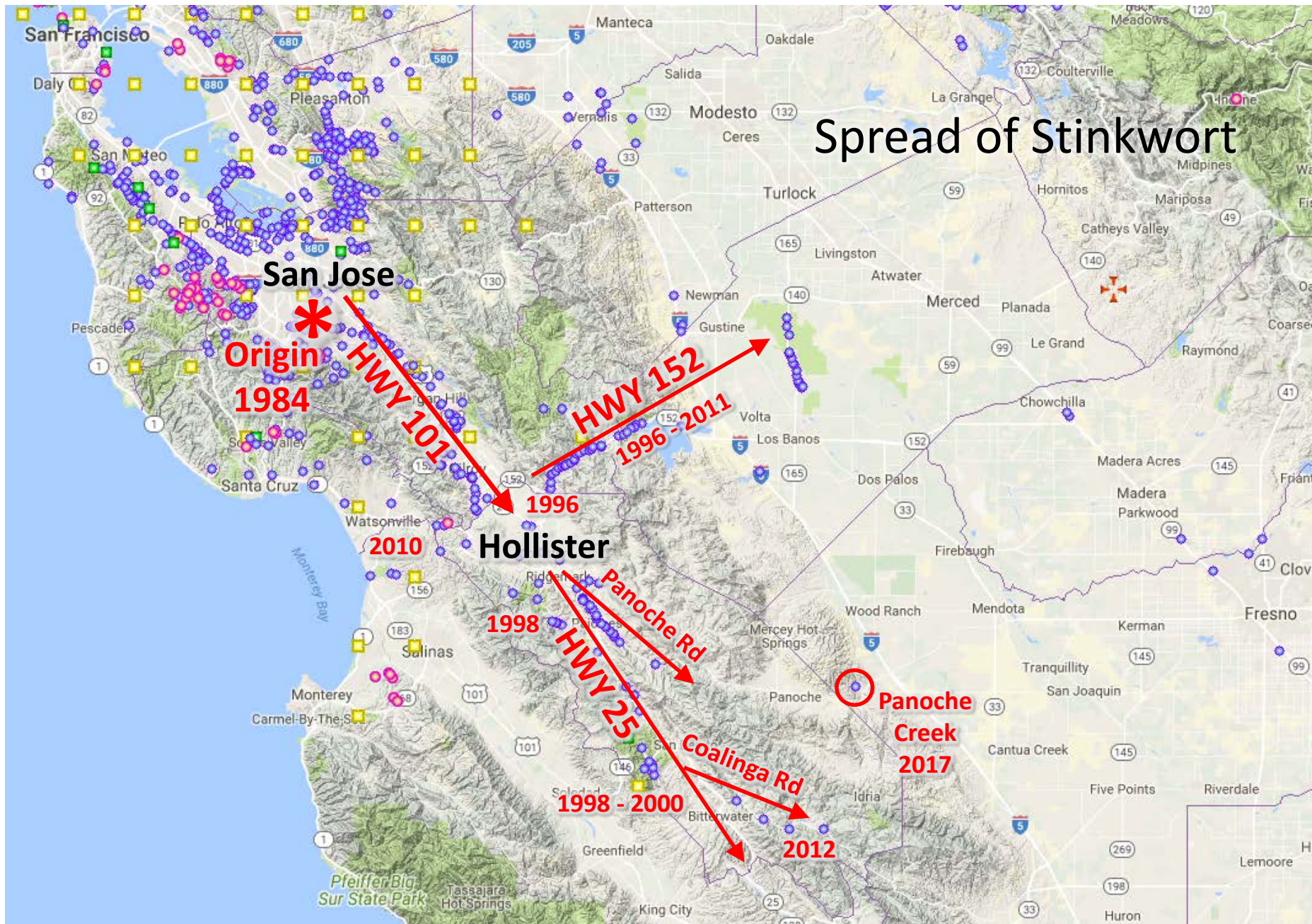


# Spread of Stinkwort in California



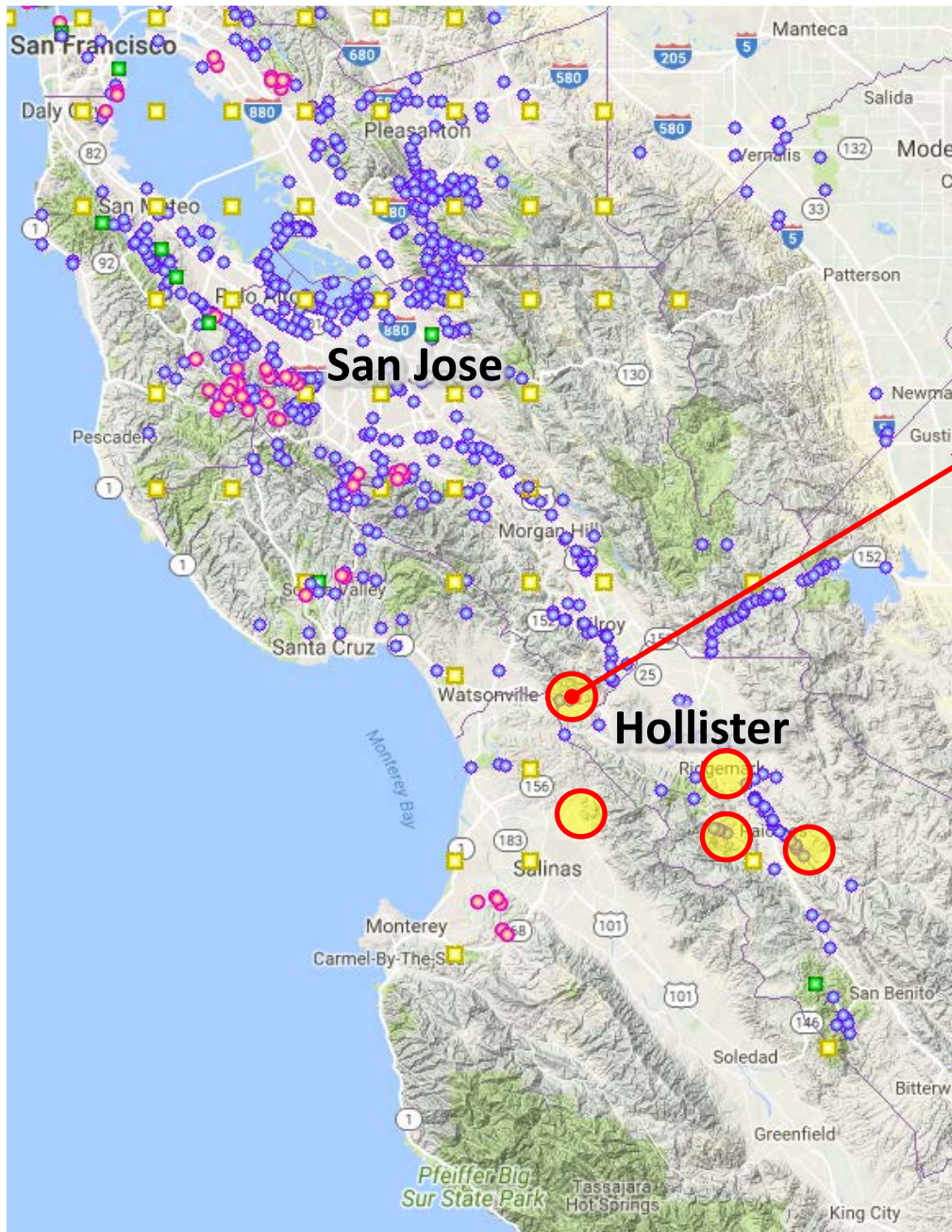


# Spread of Stinkwort





## Beware of aggregate quarries





# Effective treatments to control Stinkwort

TABLE 1. Effect of postemergence herbicides and mowing on the control of *Dittrichia graveolens*

Treatment	Product trade name	Ounce product/acre	Ounce acid equivalent (a.e.)/acre	Late postemergence treatment* June 24, 2009	
				% cover	Vigor†
Glyphosate	Roundup Pro	16	6	7.3abcd‡	6.8cd
Glyphosate	Roundup Pro	32	12	5.0ab	4.5b
Aminopyralid	Milestone	3.5	0.875	16.3de	9.8d
Aminopyralid	Milestone	7	1.75	15.0cde	9.0d
Aminocyclopyrachlor	—	4	2	10.0bcd	6.5bc
Aminocyclopyrachlor	—	8	4	7.3abcd	6.5bc
Triclopyr amine	Garlon 3A	32	12	3.0ab	8.5cd
Triclopyr amine	Garlon 3A	64	24	0a	0a
Mowing	—	—	—	5.3abc	10.0d
Untreated	—	—	—	23.8e	10.0d




\* All late postemergence treatments were made prior to flowering.

† Vigor ratings based on a 0 to 10 scale with 0 = dead plants and 10 = healthy plants.

‡ Numbers in the same column with different letters are significantly different at 5% confidence level.



# Effective treatment timing to control Stinkwort

A. Stinkwort	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Germination	Germination							Germination				
Growth				Rosette		Moderate growth		Exponential canopy growth	Too late— seed has dispersed			
Reproduction	Generally too early to see or identify			Optimal treatment interval					Flowering			
									Seed production			
Dispersal									Dispersal			
												



A wide-angle photograph of a field. The foreground is filled with dense, low-lying green plants covered in small white flowers. To the left, there are taller, dry, golden-brown grasses. In the background, a flat expanse of land leads to a line of parked vehicles, including several white vans. Beyond the vehicles, a range of rolling hills or mountains is visible under a clear blue sky.

Questions?