

# University of California Statewide IPM Project

## Pheromone Mating Disruption Program in Walnuts - 2005

**Carolyn Pickel, UCIPM Advisor  
and Assoc Director of UCIPM**

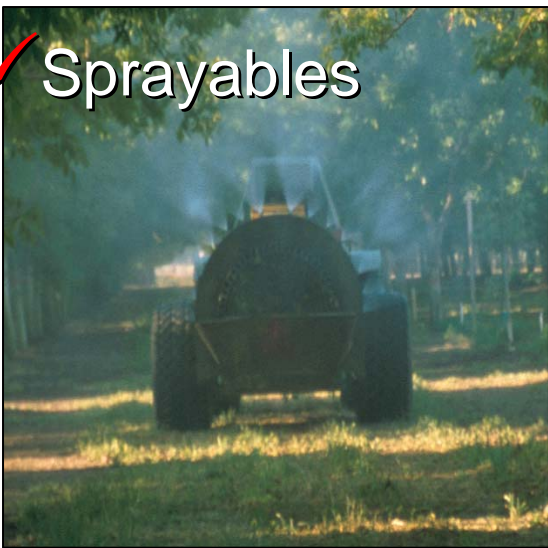


UNIVERSITY of CALIFORNIA  
Agriculture &  
Natural Resources



# Pheromone mating disruption products

✓ Sprayables



✓ "Flakes"



✓ Hand applied dispensers



Early '90s



✓ "Puffers"

# Large scale PUFFER trials

- **San Joaquin County**
  - *4<sup>th</sup> year: 600 acres (22 blocks)*
  - *1<sup>st</sup> year: 540 acres (10 blocks)*
- **Glenn County**
  - *4<sup>th</sup> year*
  - *180 acres (3 blocks)*
- **Butte County**
  - *2<sup>nd</sup> year*
  - *205 acres (2 blocks)*
- **Yolo County**
  - *1<sup>st</sup> year*
  - *180 acres (4 blocks)*
- **Tehama County**
  - *1<sup>st</sup> year*
  - *2 blocks: 120, 160 acres*
- **Kings County**
  - *1<sup>st</sup> year*
  - *160 acres (2 blocks)*



- **Population**
  - *1x trap low*
  - *Combo traps high*
- **Canopy Counts**
  - *End 1<sup>st</sup> and 2<sup>nd</sup> generation*
  - *1000 nuts per block*
- **Harvest damage**
  - *500 nuts*



# San Joaquin County Puffer Trial

Locke Ranch  
564 acres



© 2007 Europa Technologies  
Image © 2007 DigitalGlobe

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# San Joaquin County Puffer Trial

Locke Ranch

600 acres

Puffers added in 2007

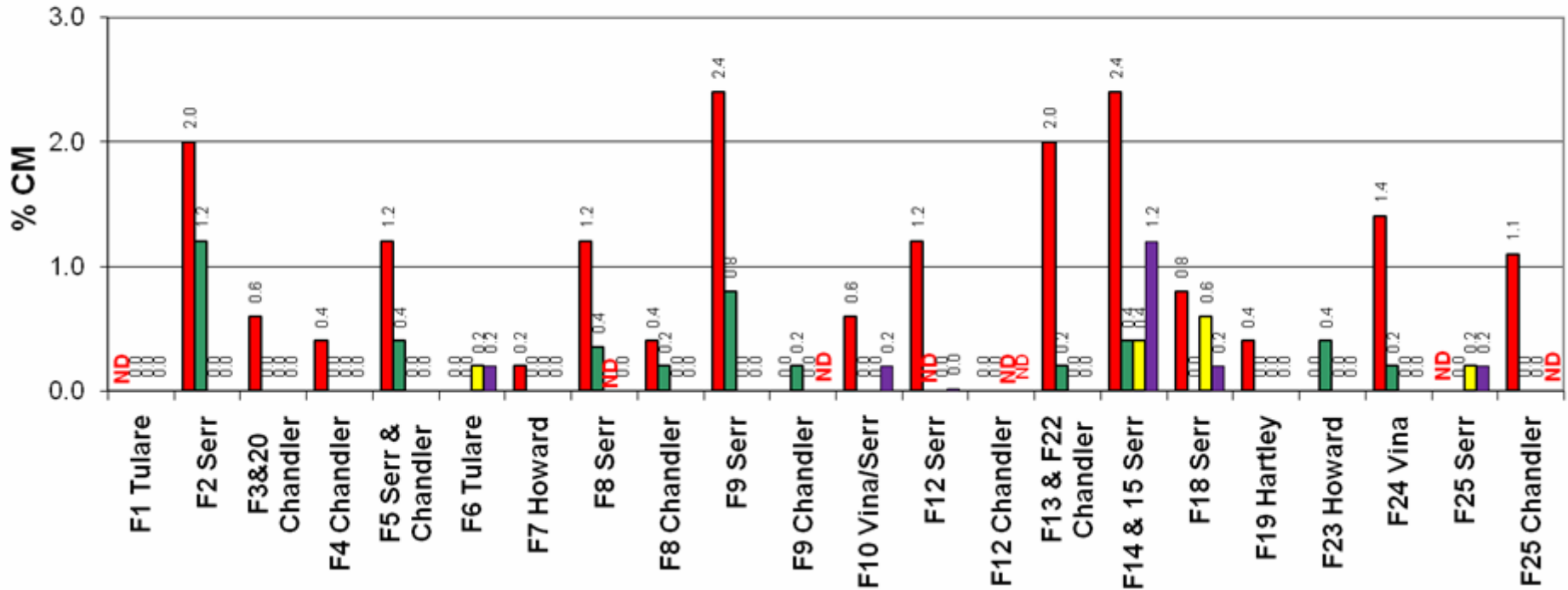


# Codling moth damage at harvest



## Locke Ranch Puffer Trial

■ 2005 ■ 2006 ■ 2007 ■ 2008

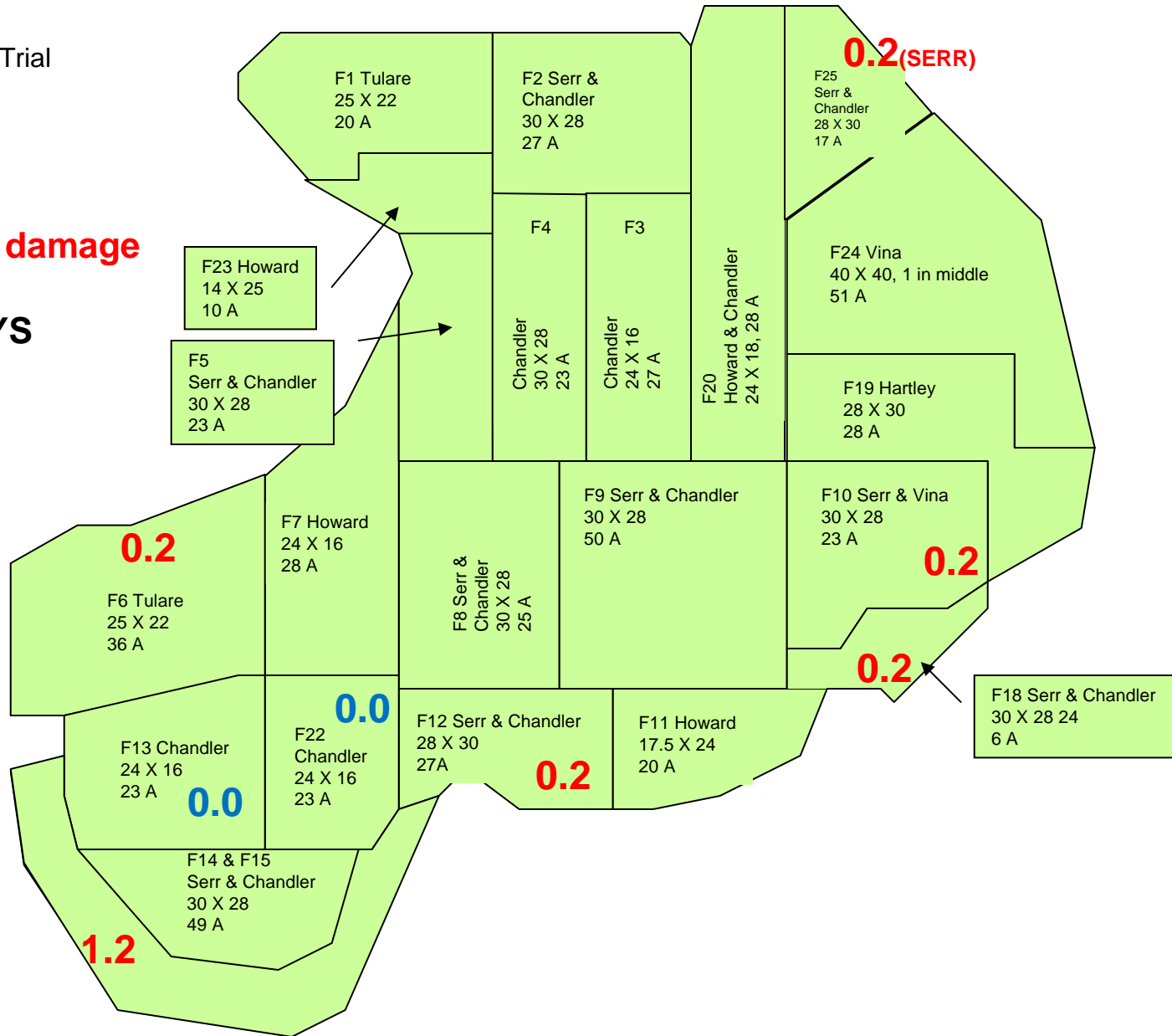


# 2008: 0% CM all blocks except at edges of some blocks

Locke Ranch Puffer Trial  
 San Joaquin County  
 T4N R7E

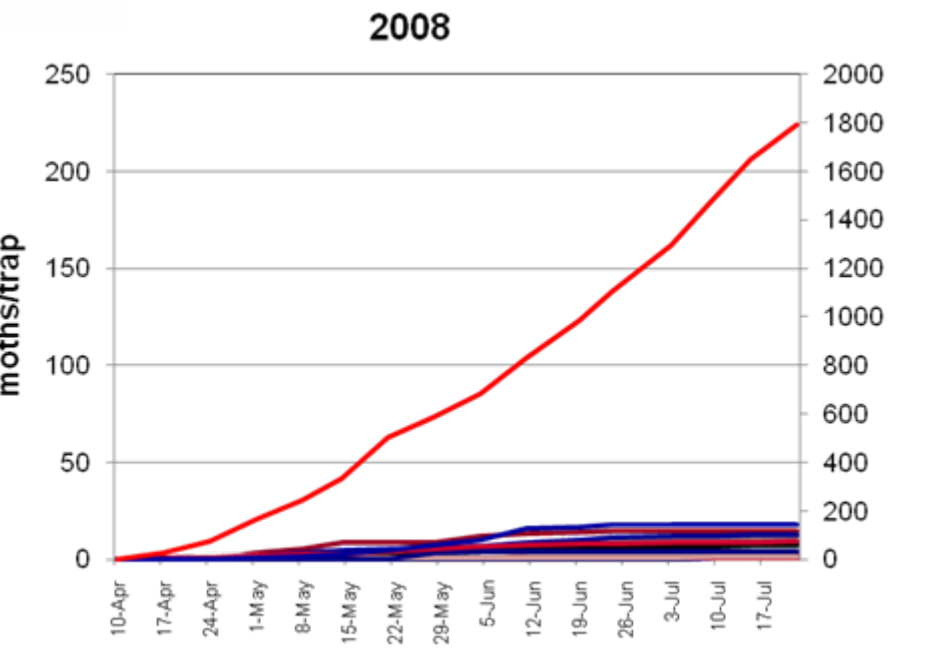
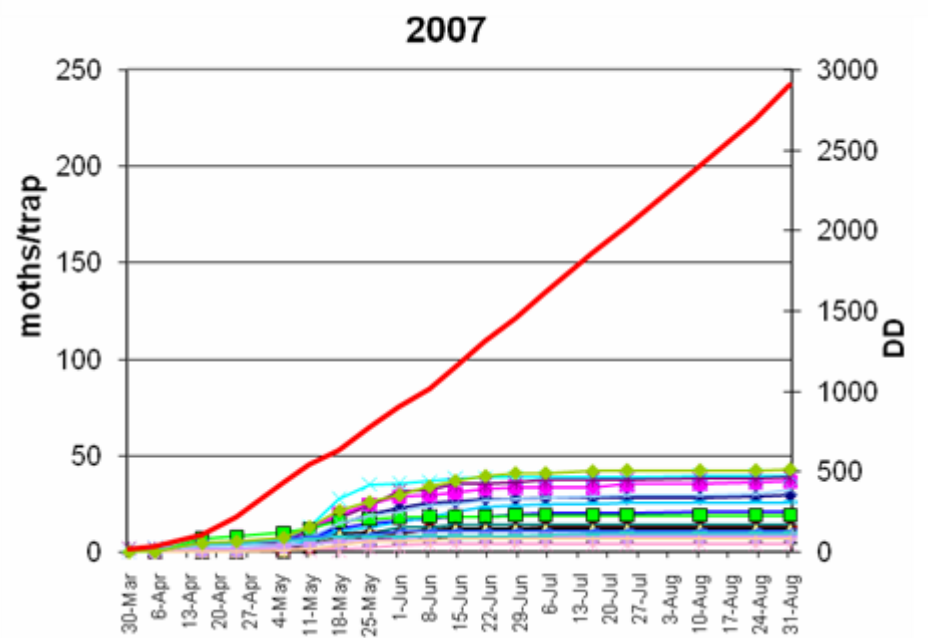
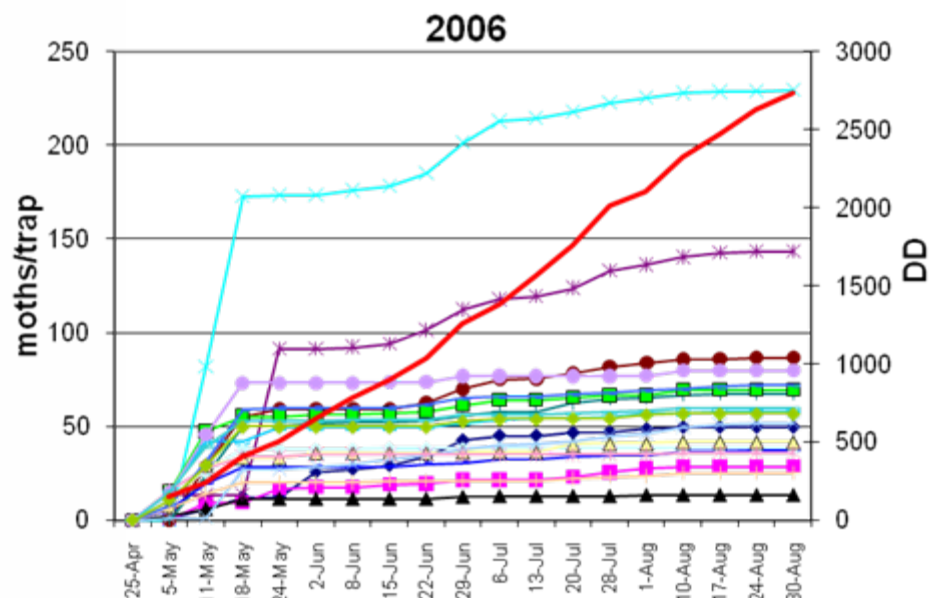
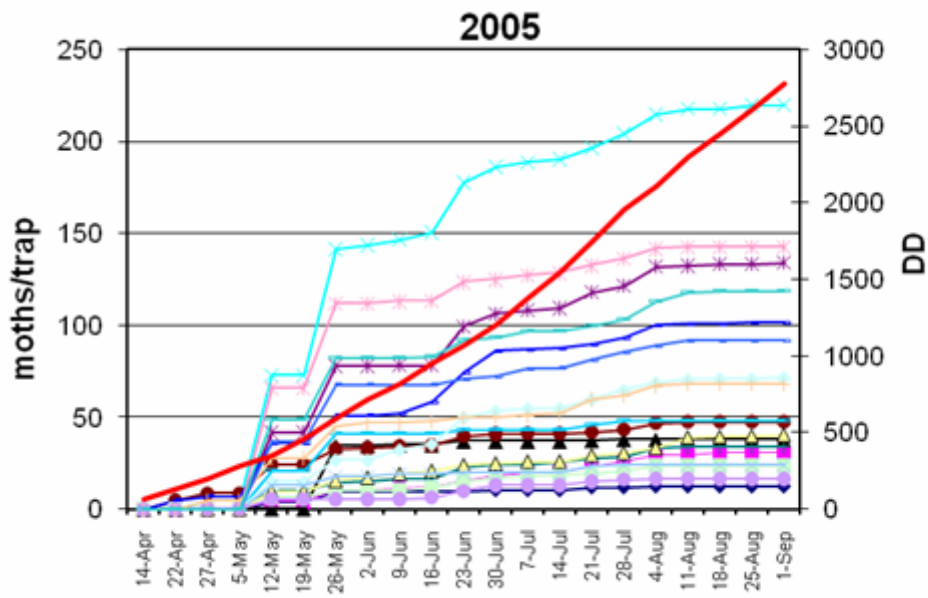
2008  
 Harvest % CM damage

NO CM SPRAYS



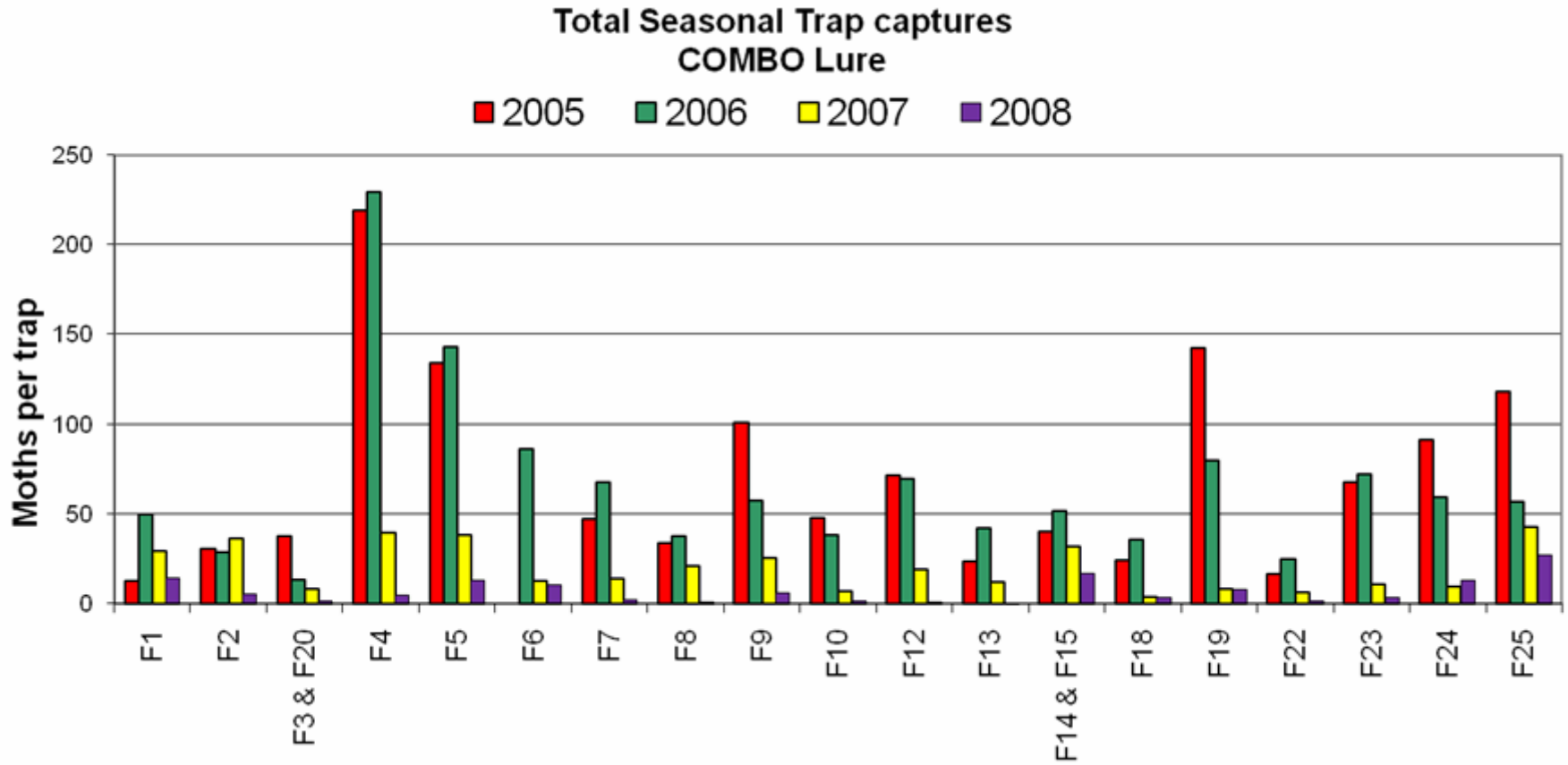


# Locke Ranch Puffer Trial, Seasonal Trap Captures, CM-DA Lure



# Population decline over time

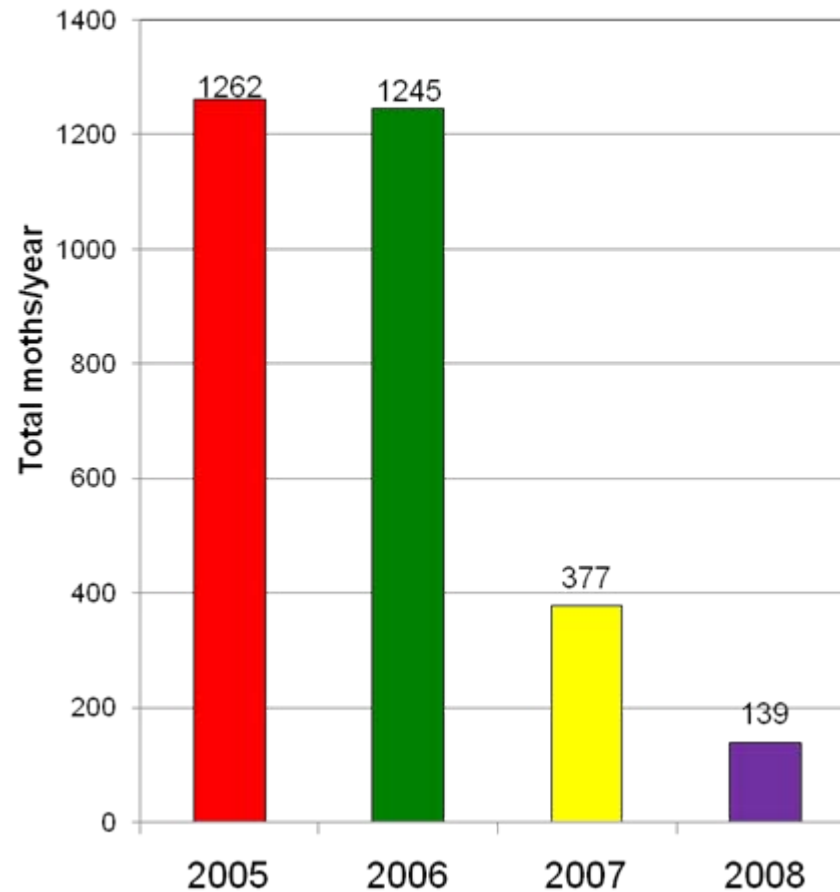
Locke Ranch, 2005-2008



# Population decline over time

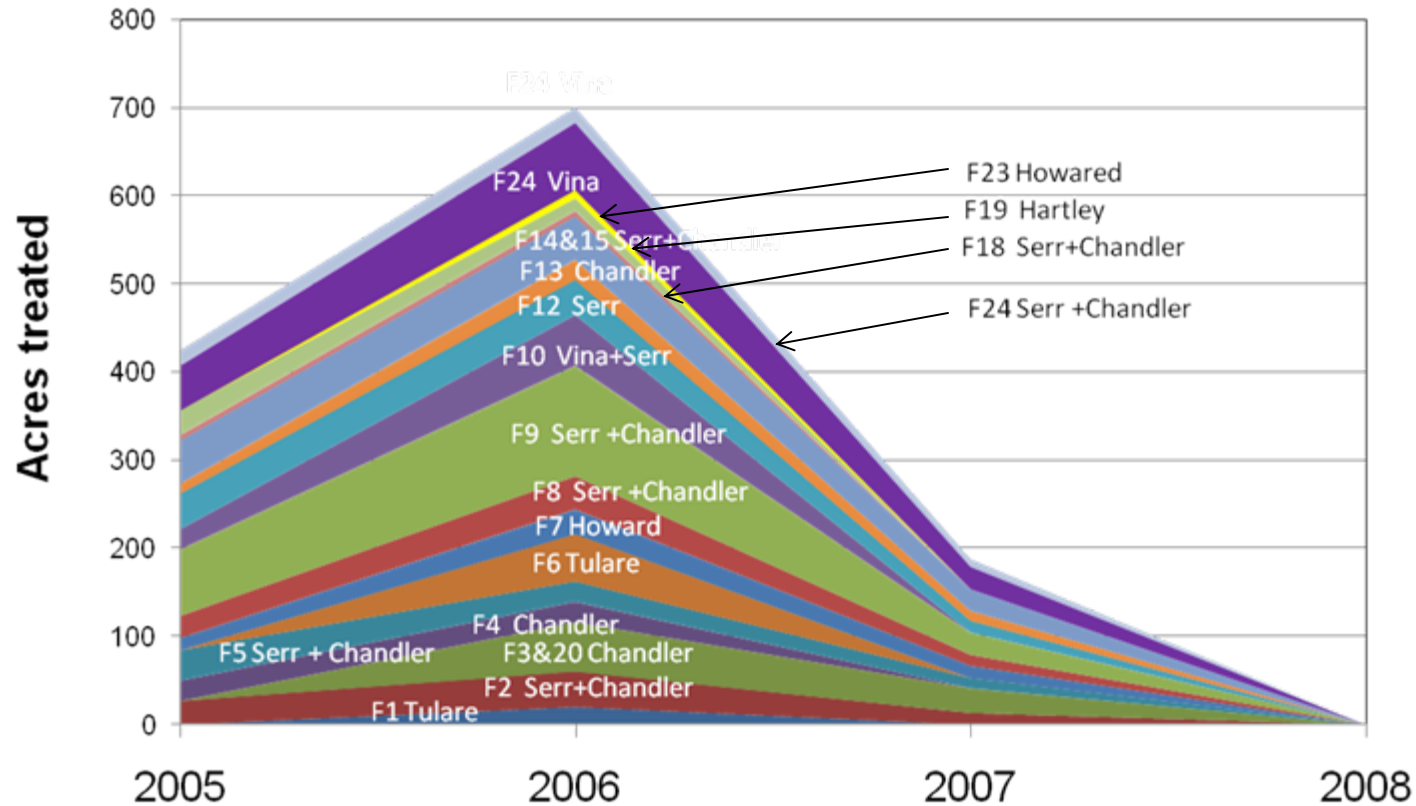
Locke Ranch, 2005-2008

Total COMBO captures - all farm



# Need for supplemental sprays declines over time

**CM "treated acres"**  
 Locke Ranch, Lockeford, Calif.



\*Acres in block X CM treatments/block  
 CM treatments counted as 1.0  
 Multi-target as 0.5

# San Joaquin County "Expansion" Puffer Trial



2008 Expansion Area  
540 A

Locke Ranch  
2005-2008  
600 A

38°10'01.00" N 121°09'19.44" W

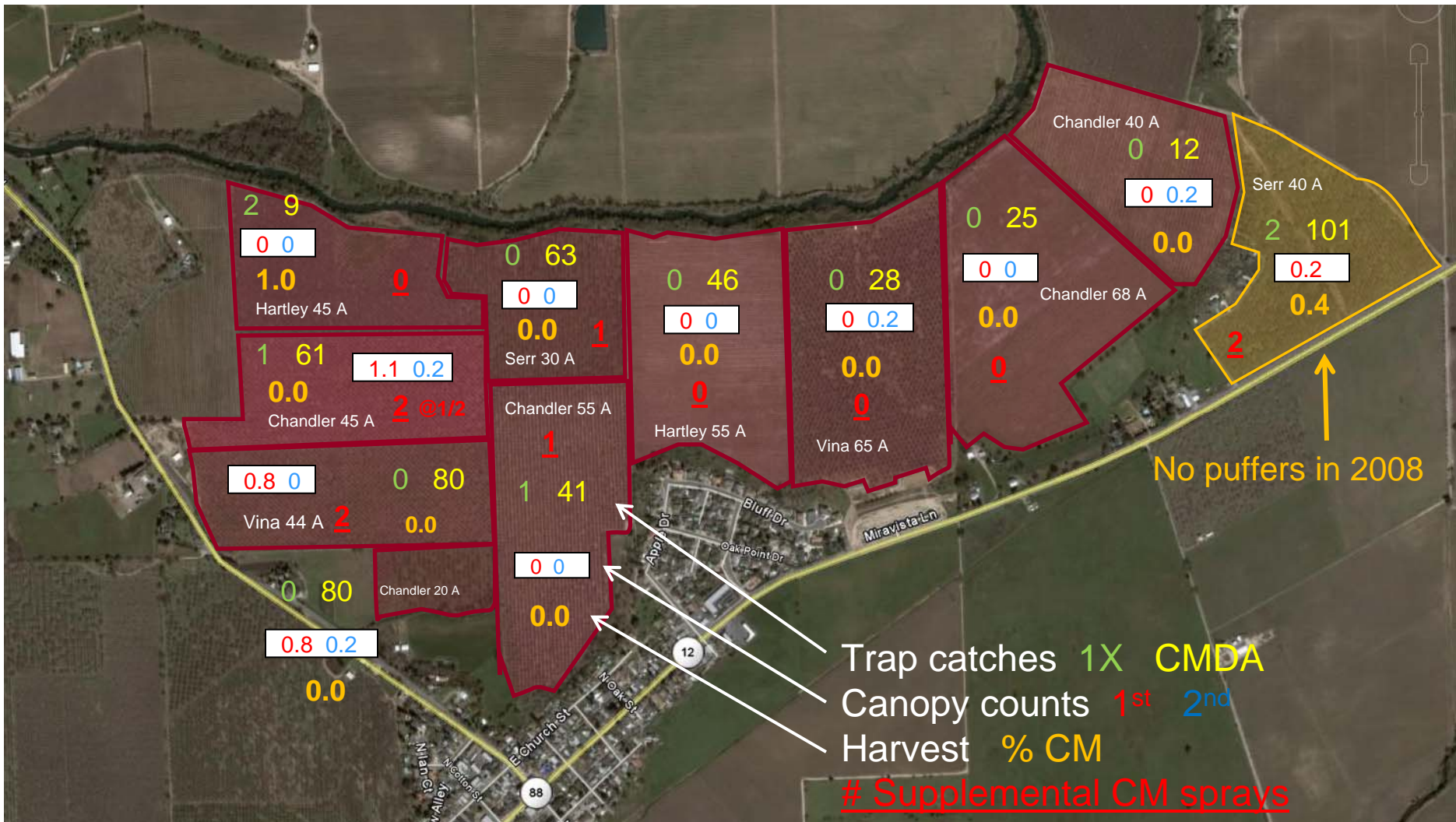
Image © 2008 DigitalGlobe

© 2008 Tele Atlas  
Locke  
elev. 77 ft

© 2008 Google

Mar 20, 2006

Eye alt 15218 ft



# Glenn County Puffer Trial

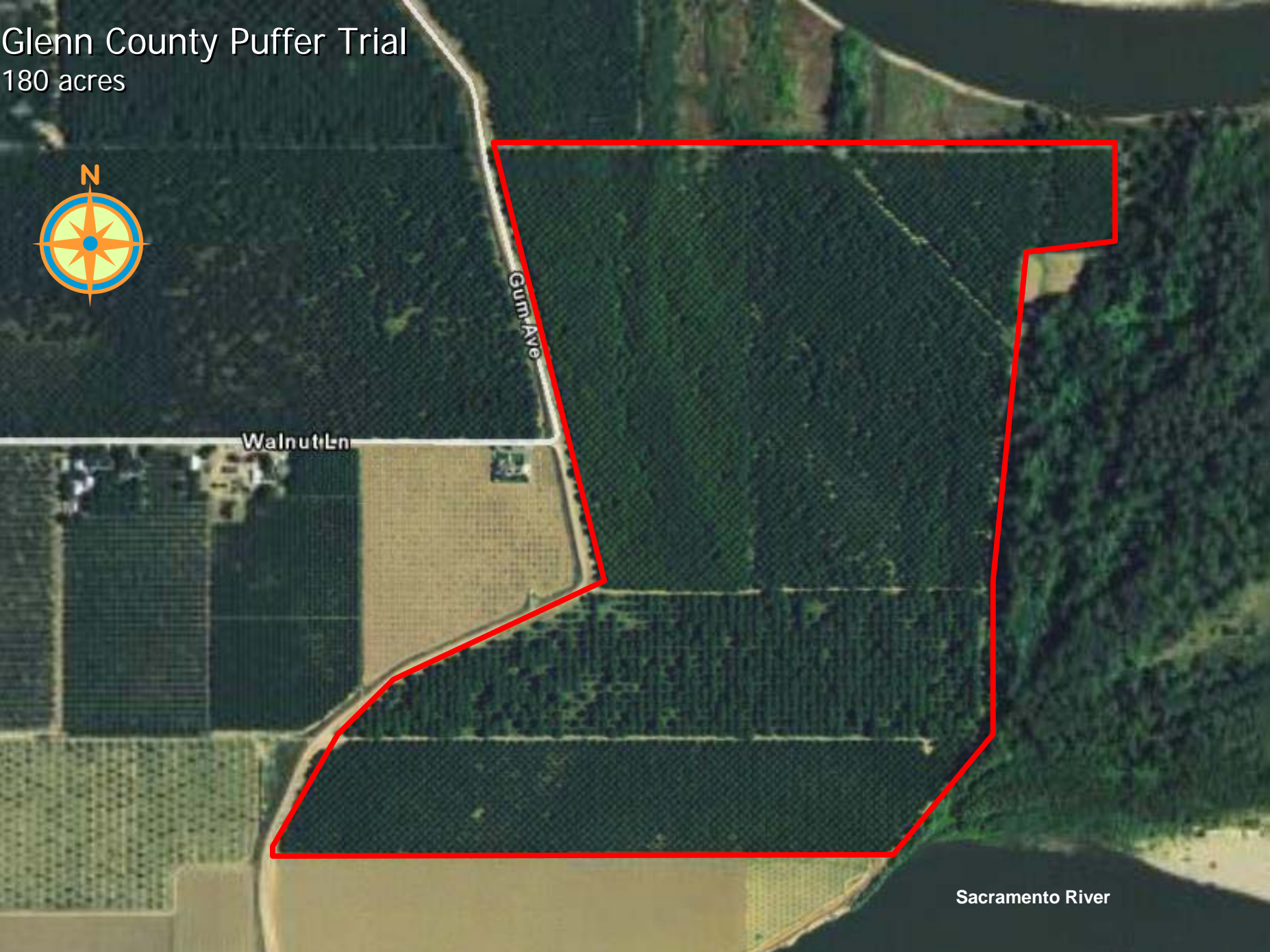
180 acres



Gum Ave

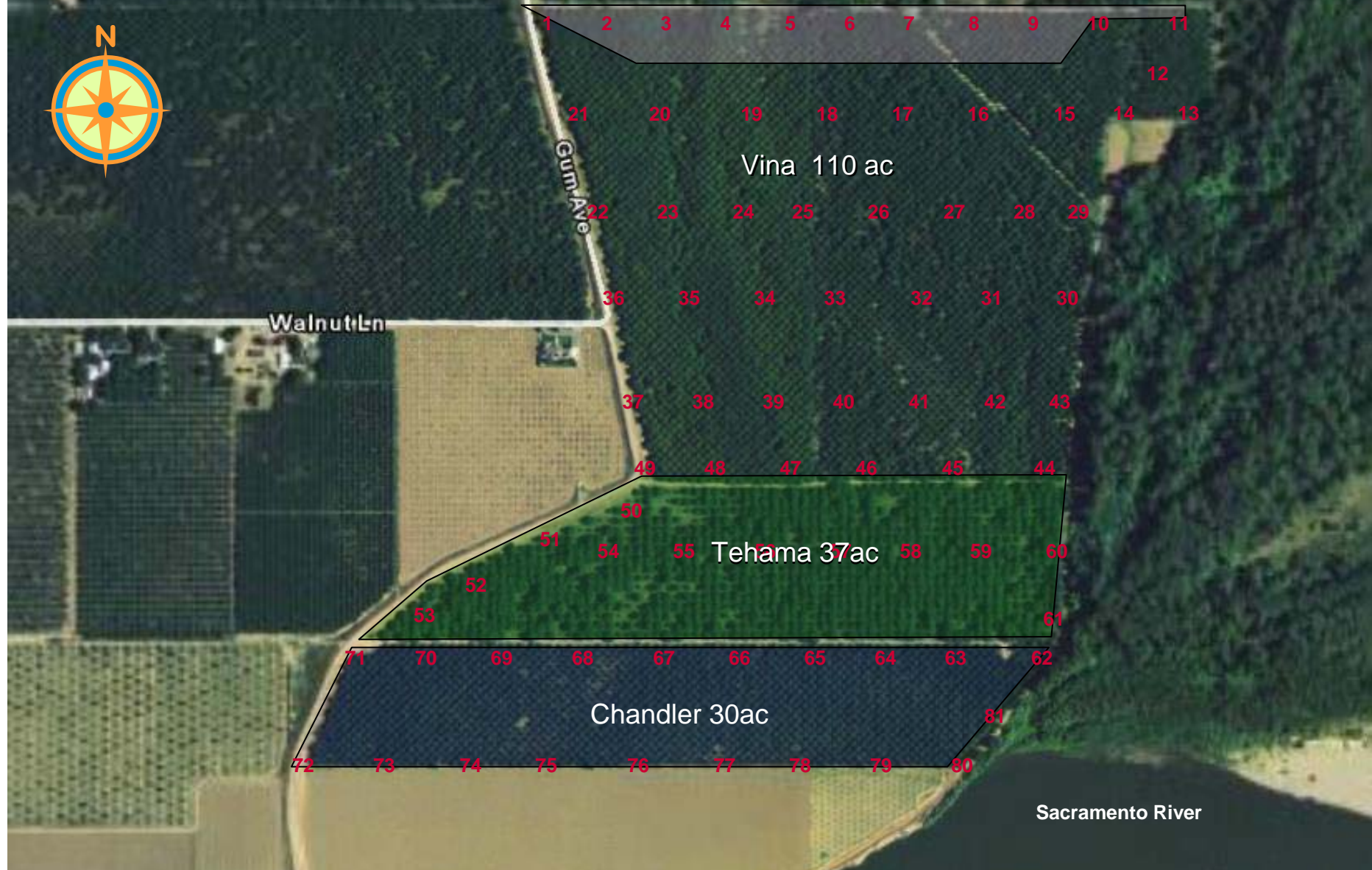
Walnut Ln

Sacramento River



# Glenn County Puffer Trial

180 acres





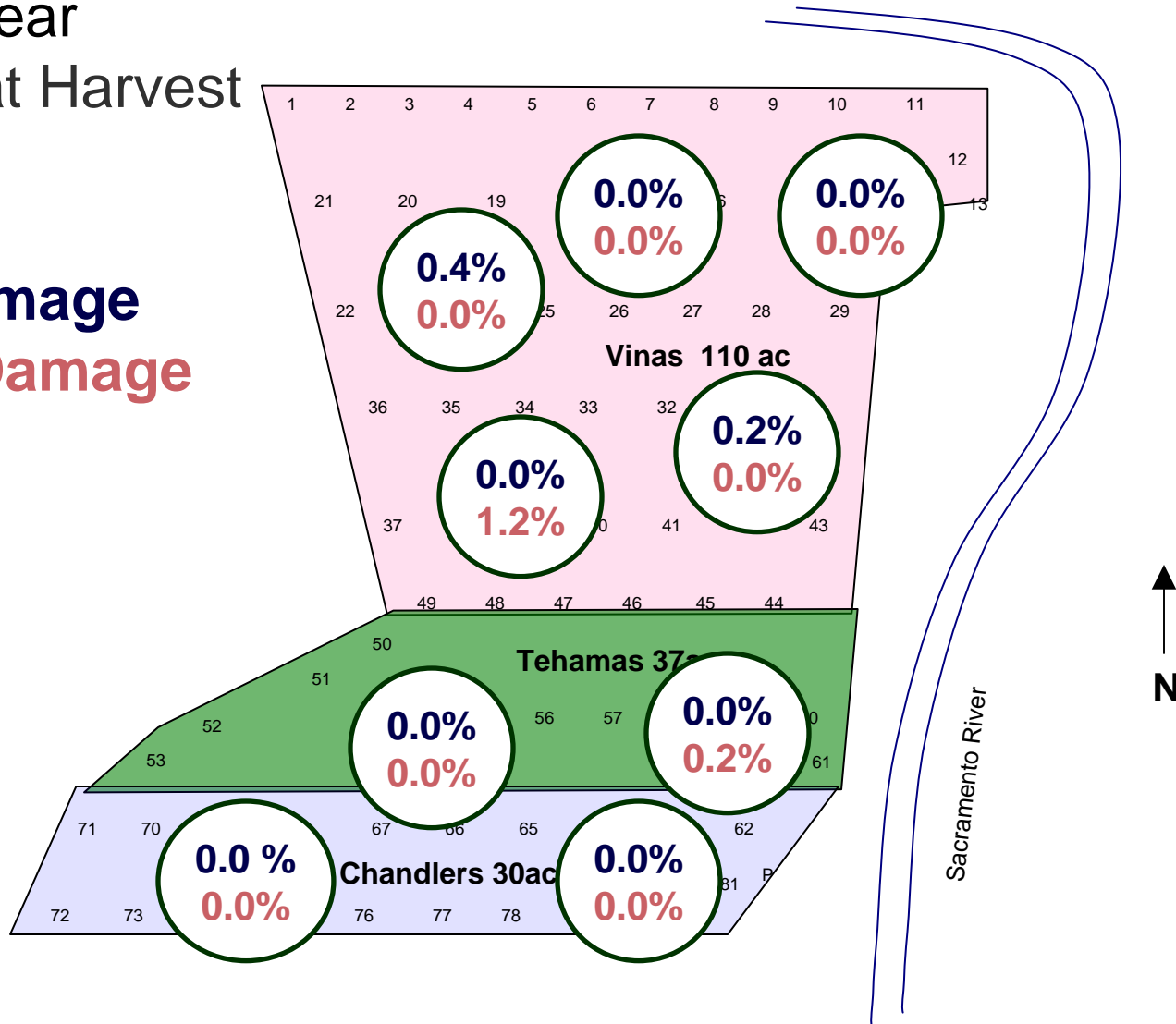
# Glenn CM Puffers

2008 4<sup>th</sup> year

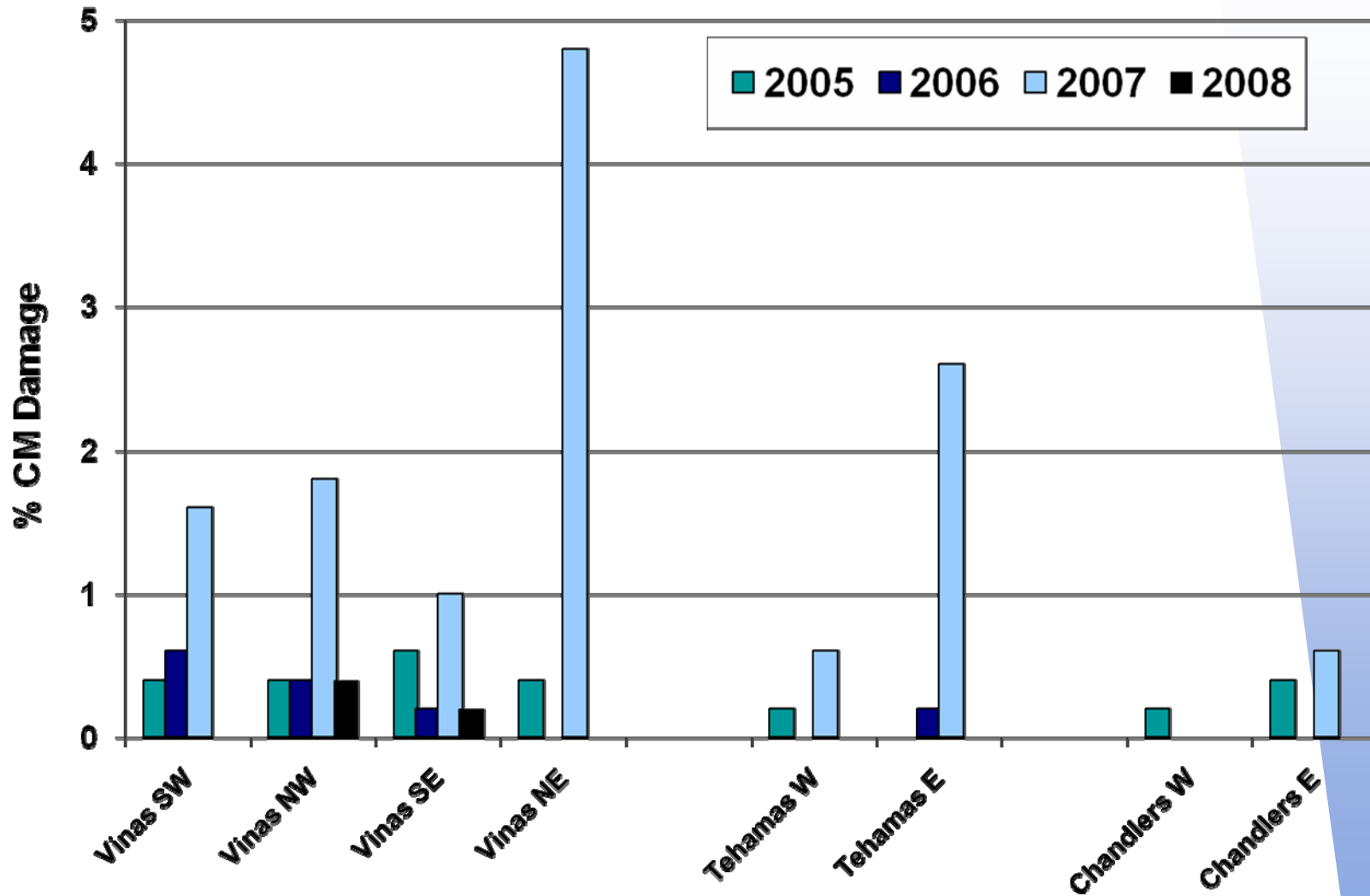
Damage at Harvest

**% CM Damage**

**% NOW Damage**



## Glenn 2005-2008 CM Damage at Harvest



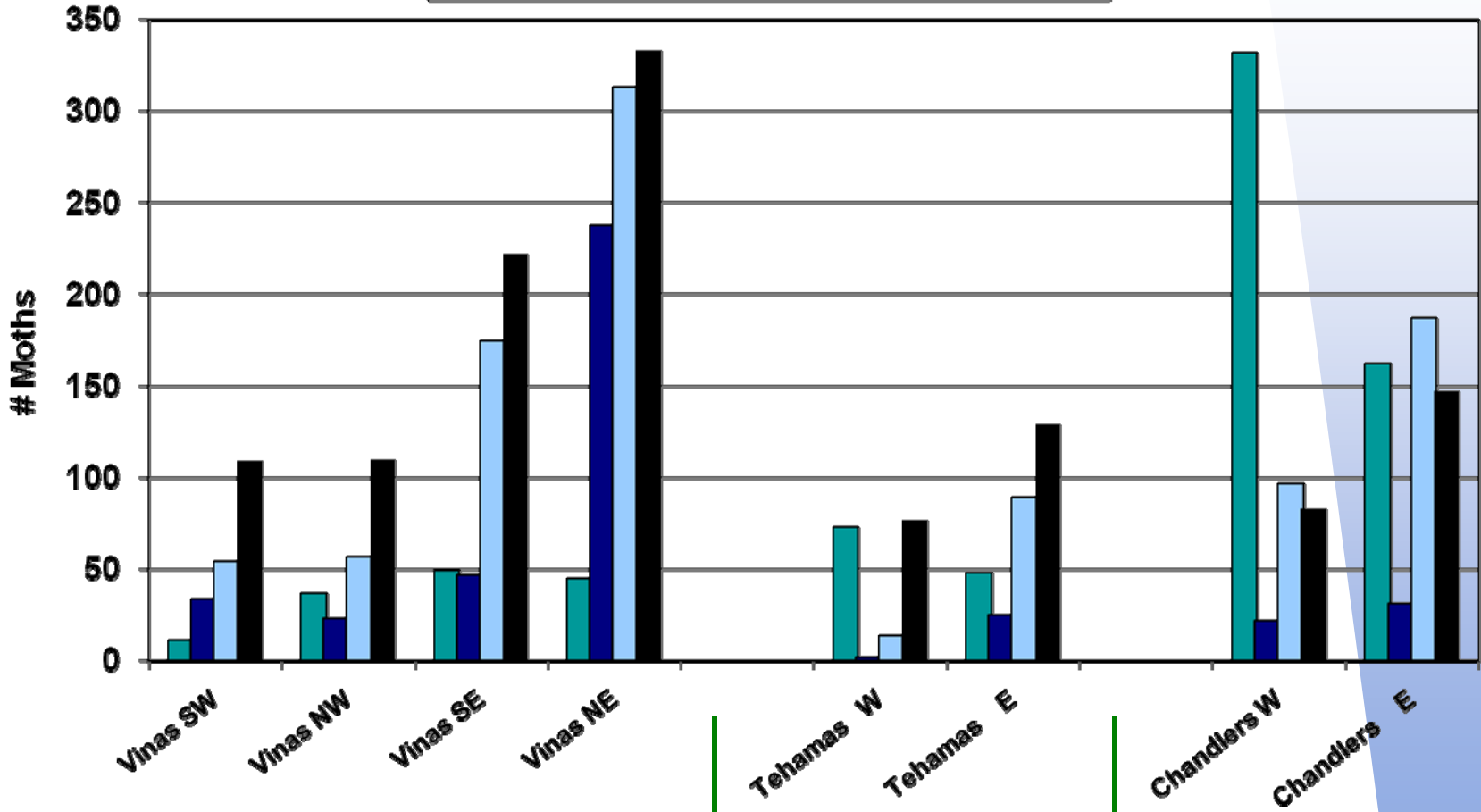


# Glenn 2005-2008

## Total CM Trap Catches, Combo lure



■ 2005   
 ■ 2006   
 ■ 2007   
 ■ 2008



VINA

TEHAMA

CHANDLER



# Butte puffers

2008 2<sup>nd</sup> year

Combo Lure Trap Totals

Trap Total 2008  
Trap Total 2007

139  
67

59  
30

77  
18

144  
22

31  
49

352  
103

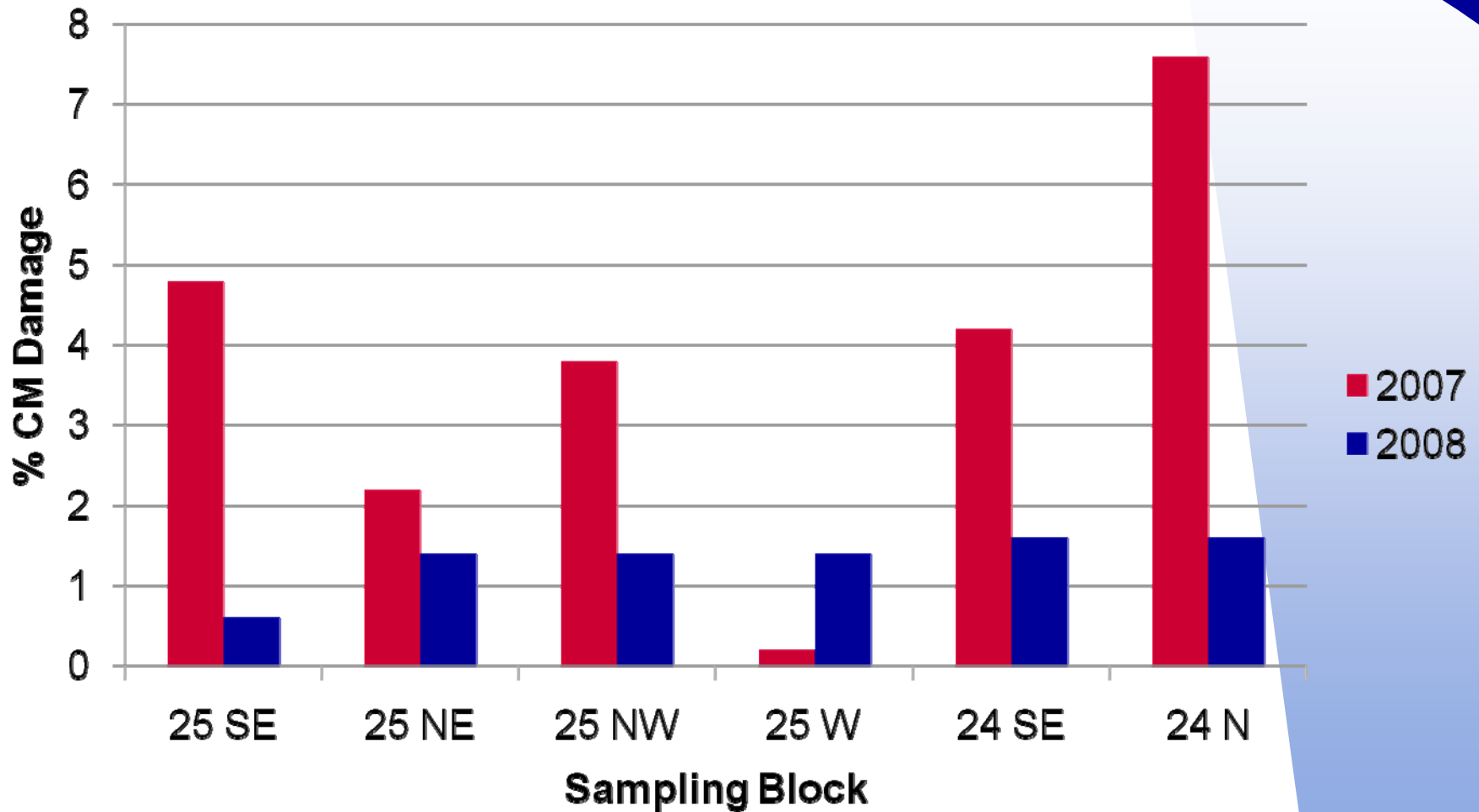
2008 Sprays  
•Surround  
•GF-120 (WHF)

2008 Sprays  
•Surround  
•Lorsban (WHF)  
•Perm-up

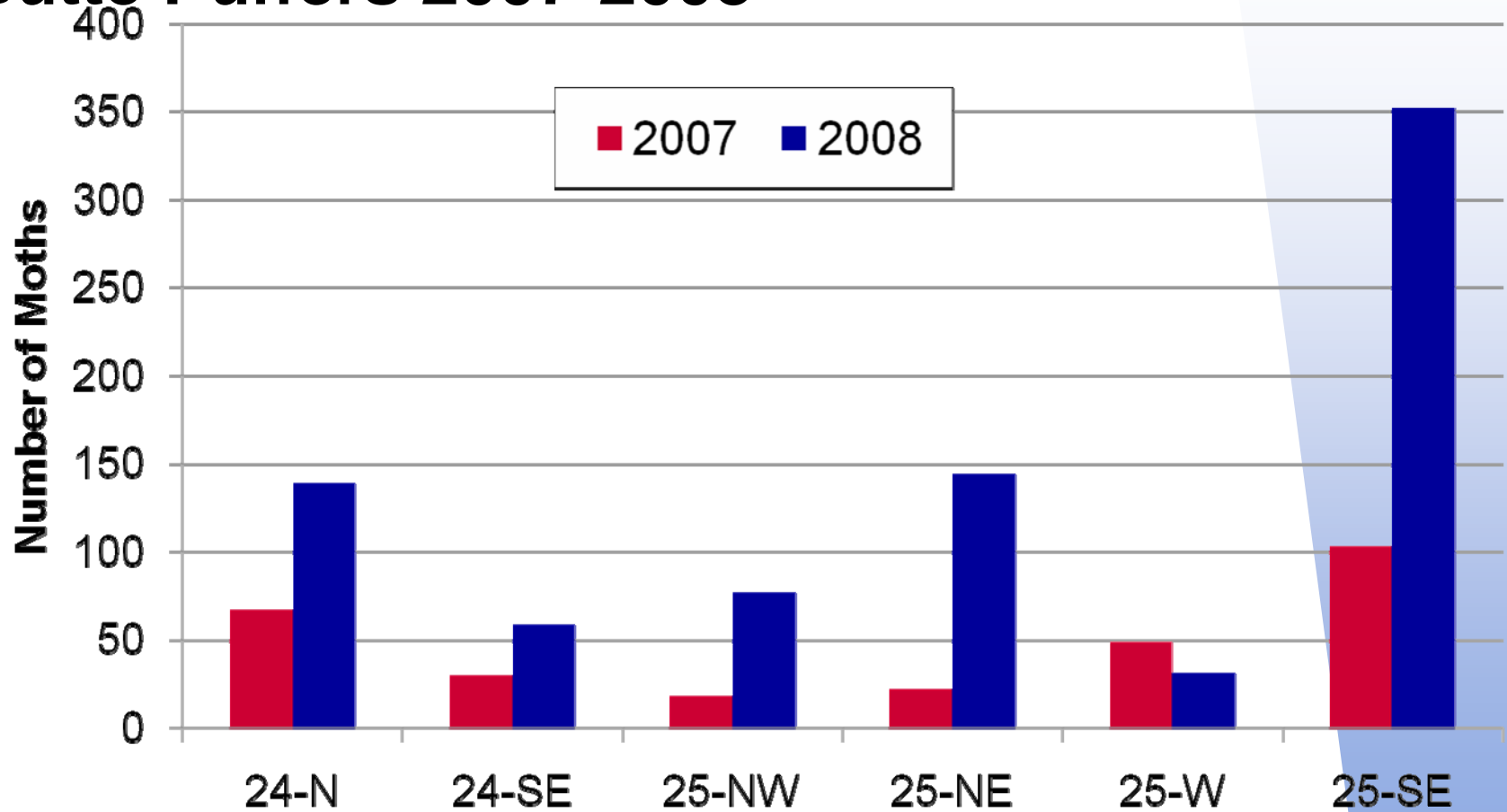
2007  
•NO INSECTICIDE !

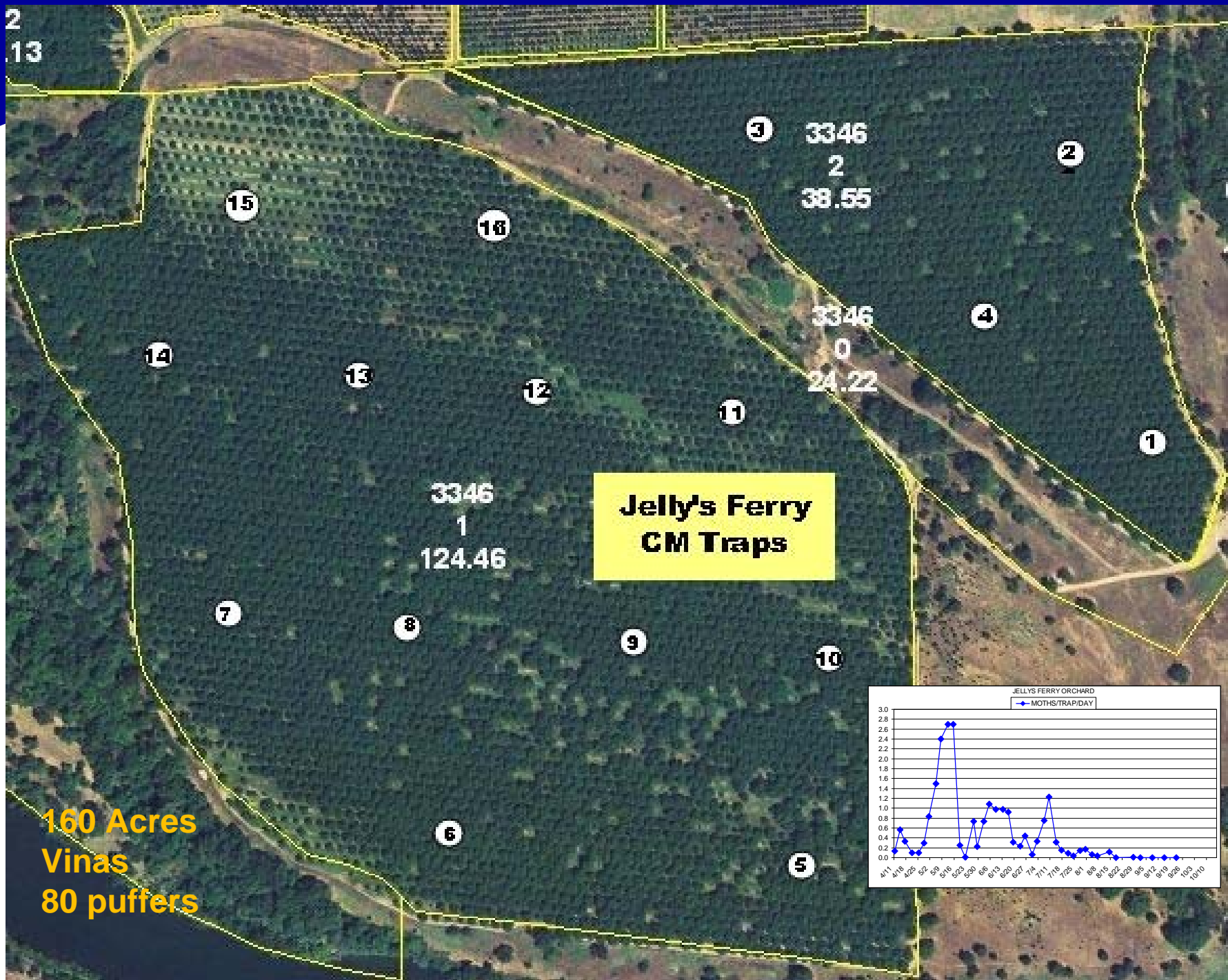
## Butte Puffers 2007-2008

### % CM Damage at Harvest, 1<sup>st</sup> shake

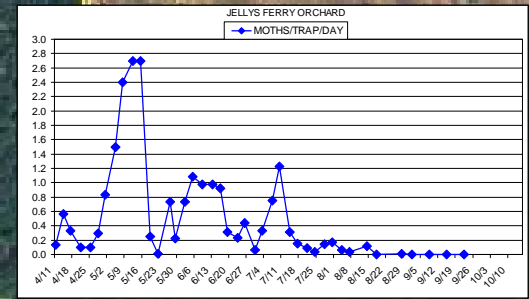


# Combo Lure CM Trap Totals Butte Puffers 2007-2008

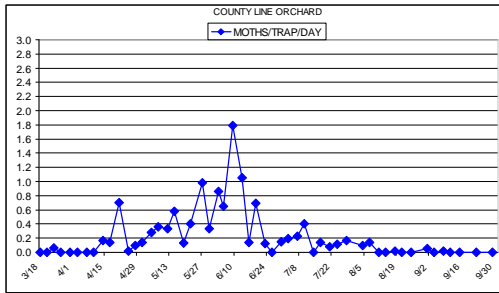




160 Acres  
Vinas  
80 puffers





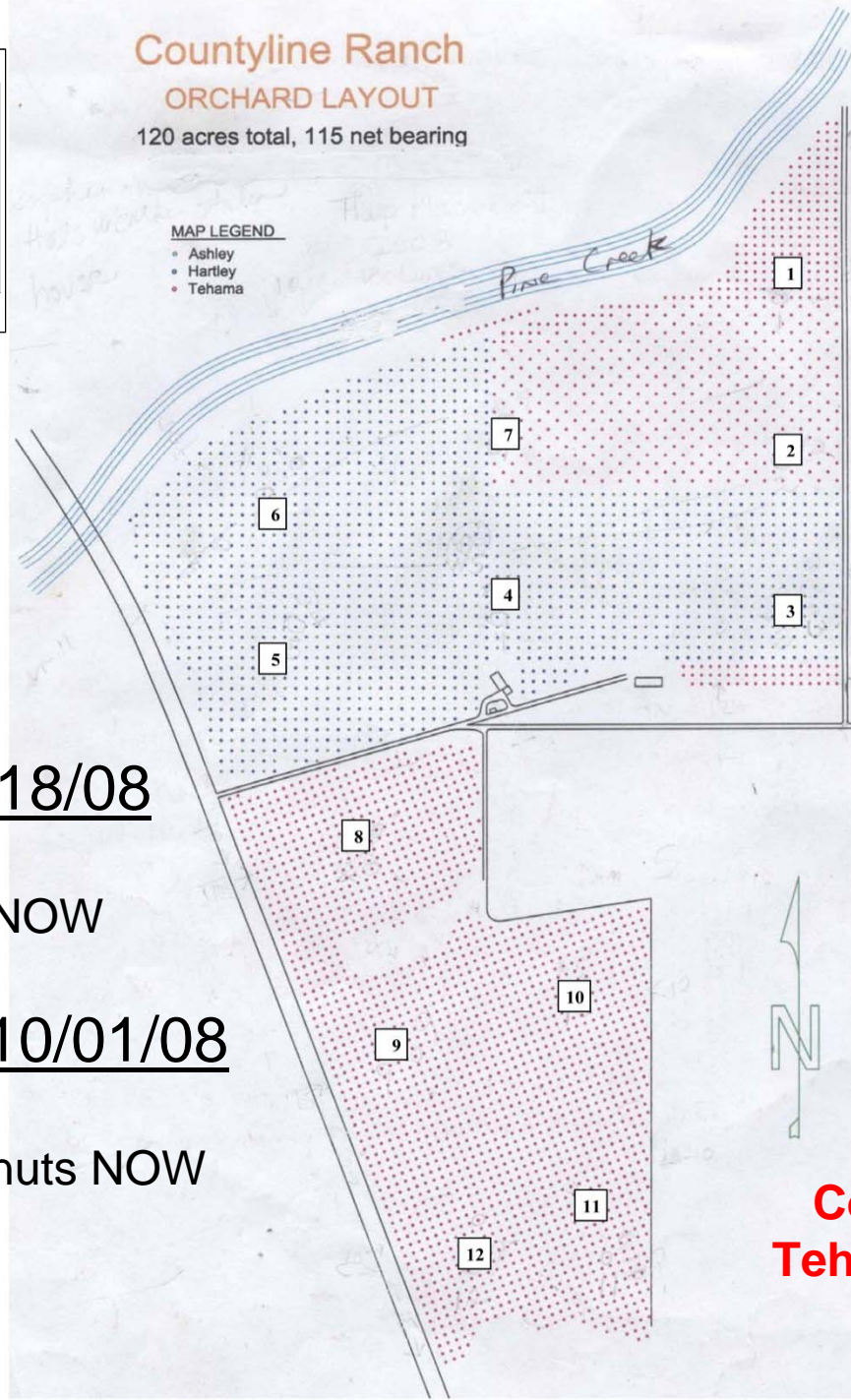


## Countyline Ranch ORCHARD LAYOUT

120 acres total, 115 net bearing

### MAP LEGEND

- Ashley
- Hartley
- Tehama



## Ashley Harvest 9/18/08

1000 nut sample

No codling moth, .01% NOW

## Tehama Harvest 10/01/08

1000 nut sample

No codling moth, .01% nuts NOW

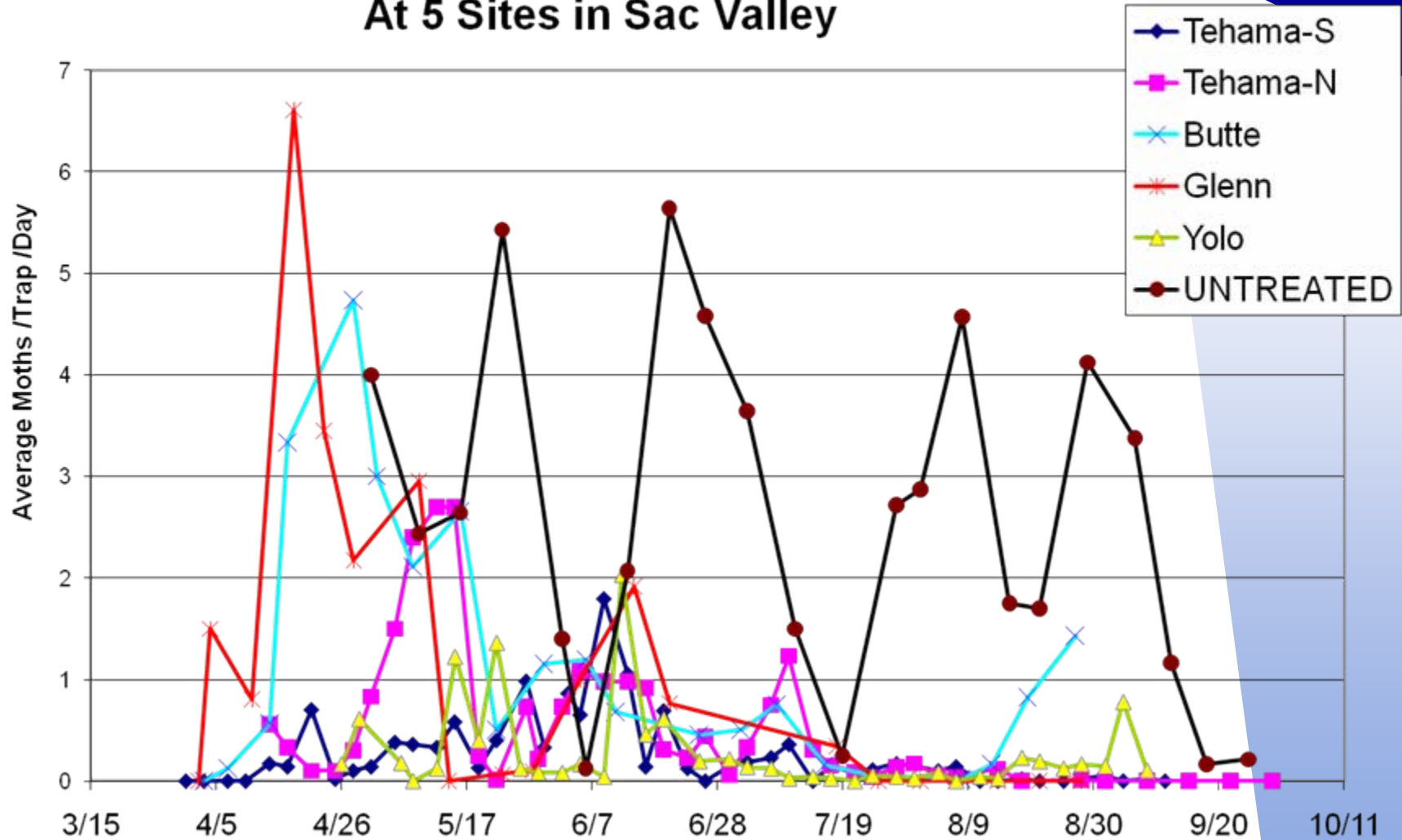
**County Line -120 A  
Tehama/Ashley/Hartley  
60 puffers**



# Canopy Counts County Line 2008

Location	Low	High	Total %
7/16/08			
North	1/1500 (.06)	1/1214 (.08)	.07
South	9/1900 (.47)	6/1370 (.43)	.45
7/25/08			
North	12/2909 (.41)	8/2839 (.28)	.34
South	14/1466 (.95)	—	.95

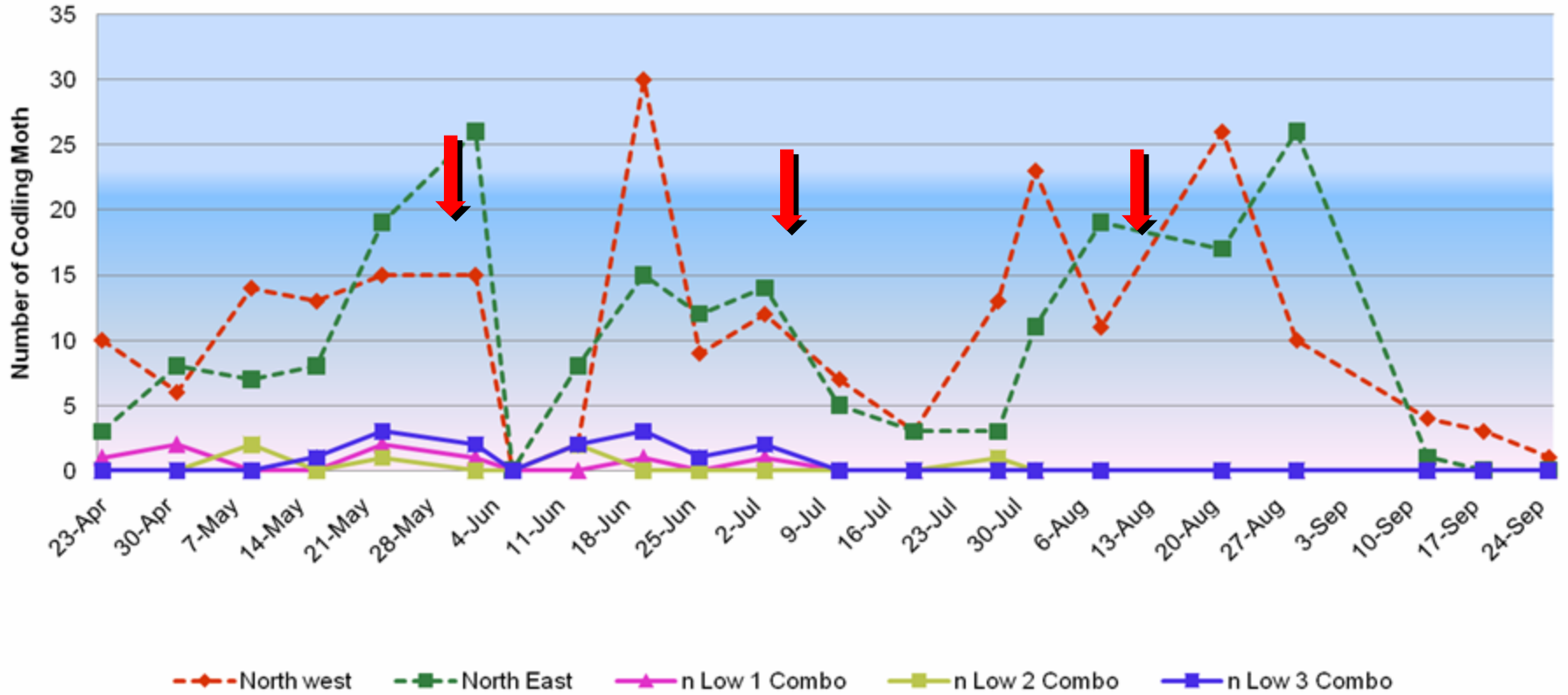
## CM Puffers 2008 Trap Catches with Combo Lure At 5 Sites in Sac Valley



# Hang Combo traps high



# High vs low-hung Combo Lure Traps in Pheromone Orchard

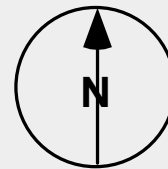


Sprayed  
↓

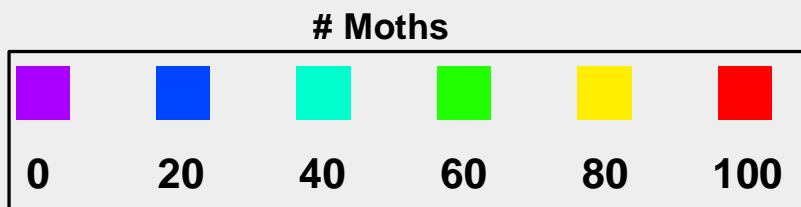
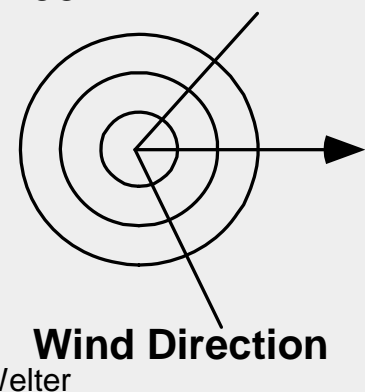
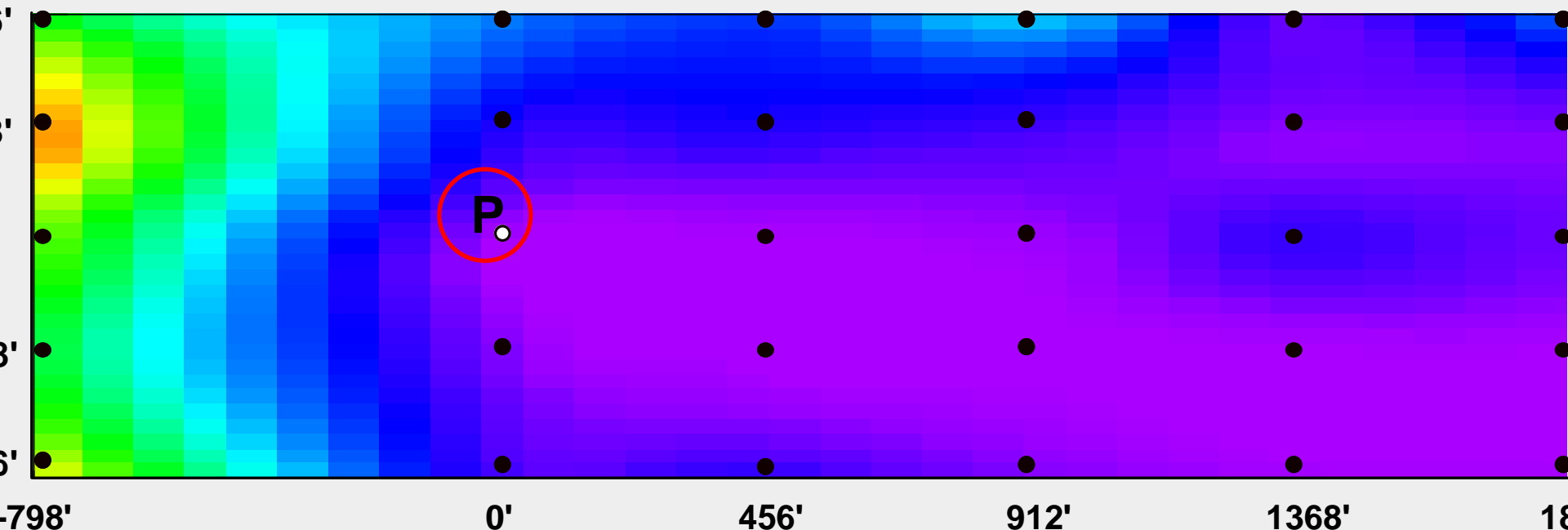
# Colombini Walnut Orchard

## Single Puffer "on" Period, 12-hour Cycle

### 5-Day Cummulative Trap Catch Totals

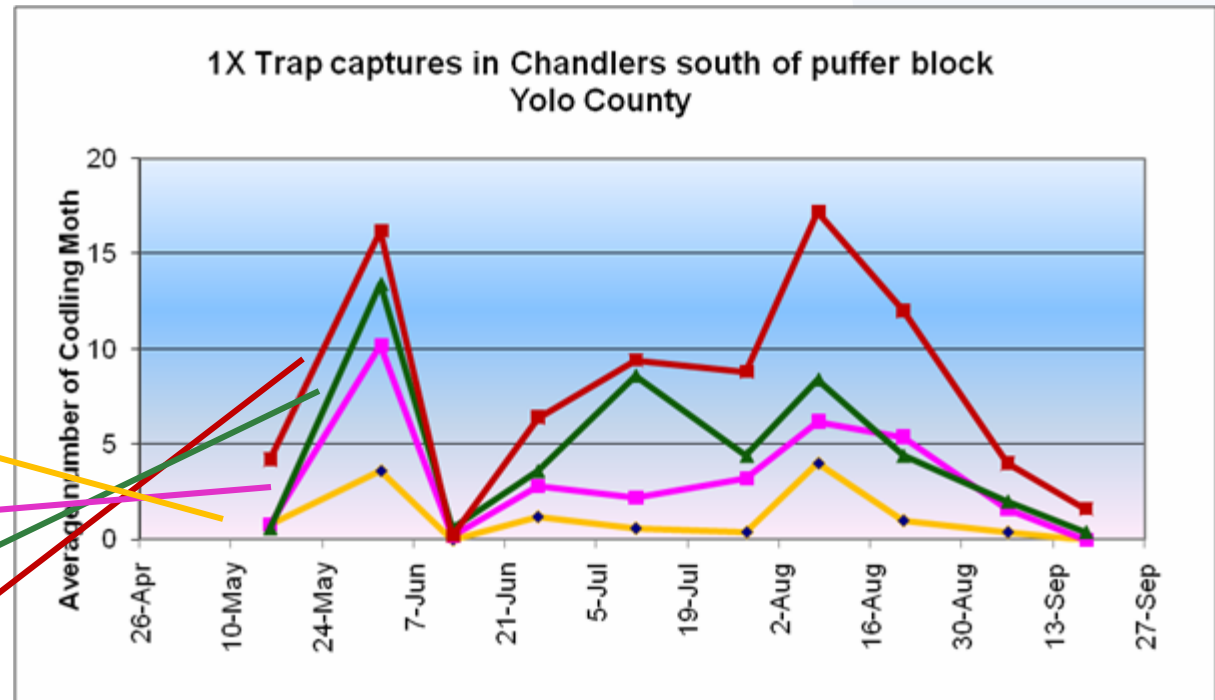


1000 Sterile Marked Codling Moths Released at Each Black Dot



- Trap Location
- P** Puffer Location

## Movement of pheromones out of puffer treated orchards



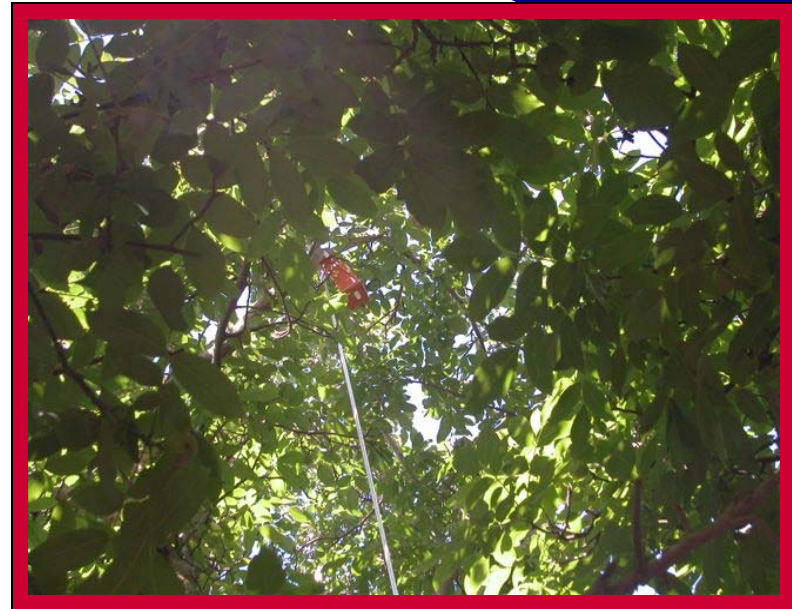
## PUFFERS: WHAT WE KNOW. . .

- ❖ Few to no mechanical failures
- ❖ Population suppression achievable in 2-3 years
- ❖ Puffers CANS installed before moths fly (3/15 to 4/1)
- ❖ Not necessarily a stand-alone program
  - ❖ *Bring populations down with sprays as needed even in non susceptible varieties*
- ❖ Orchard edges (Double puffers on edges)
- ❖ Best suited to large blocks (>40 acres??)
- ❖ Use COMBO traps (hung high) for monitoring
- ❖ Monitor in-season damage
- ❖ Trap Catches do not relate to harvest damage but indicate CM population levels
- ❖ Watch other pests, especially Walnut Husk Fly
- ❖ “Good Neighbor Program”



## Estimated Costs

- ❖ Yearly Per acre cost: \$65 to \$70
- ❖ Steve Wulfert, Suterra



# “Medium density” dispensers under test



# Acknowledgments

-  **Joe Grant, UCCE San Joaquin**
-  **Rick Buchner, UCCE Tehama**
-  **Carolyn Debuse, UCCE Yolo**
-  **Steve Welter, UCB**
-  **Sara Goldman Smith, UCIPM, SRA**
-  **Cindy Gilles, Tehama Field Asst.**
-  **Steve Wulfert, Suterra**
-  **Grower cooperators**