Areawide Pest Management Programs

Presented by Gail Wisler, USDA-ARS
with contributions from: John Lydon, Tracy Leskey, Gary Clark; ARS, Beth Stone-Smith, Dave Bartels; APHIS, Beth Grafton-Cardwell; UCR, Michael Rogers, Phil Stansly, Roxanne Connelly; UF

Photo by Reyes Garcia III.

Photo courtesy Susan Ellis

	Mosquitoes	GWSS/PD	BSMB	ACP/HLB
Vector	YES	YES	NO	YES
Pheromone/ attractant	Limited progress	NO	YES	
Effective pesticides	YES, but problematic	YES	YES	
Compensation to growers	Taxes, FEMA	Federal support	NO CAP NEIPM	
Contiguous landscapes	diverse	NO	NO	
County engagement	YES	YES	YES	
Host range	Mammals, birds	Grape, citrus	WIDE!	Citrus and relatives
Public support	Public support of p-cides	YES?	YES?	

Strengths of Effective Areawide Pest Management Programs

- Growers are fully engaged (not just about research)
- Extension IPM component
- County involvement
- Federal and state agencies
- Methods that work! (Reduce reliance on hard chemicals)
- Info-sharing with people on the ground
- Technology transfer to ground operations
- Broad partnerships
- Source of consistent funding
- **Provide affordable and sustainable operational program**

ARS Areawide Pest Management Initiative Implemented 1995

- Codling moth on apples and pears
- Corn rootworms
- Leafy spurge/Midwest
- Stored grain insects/Midwest
- Tephridid fruit flies/Hawaiian Islands
- Fire ants/Southern U.S.
- Russian wheat aphid
- Tarnished plant bug/LA and MS
- Melaleuca/Florida Everglades
- Methyl bromide alternatives
- Medusahead/cheatgrass/Great Basin
- **Asian tiger mosquito/West Nile Virus**
- Navel orangeworm/CA
- Honeybee pests and pathogens/CCD

Photo courtesy Roxanne Connelly

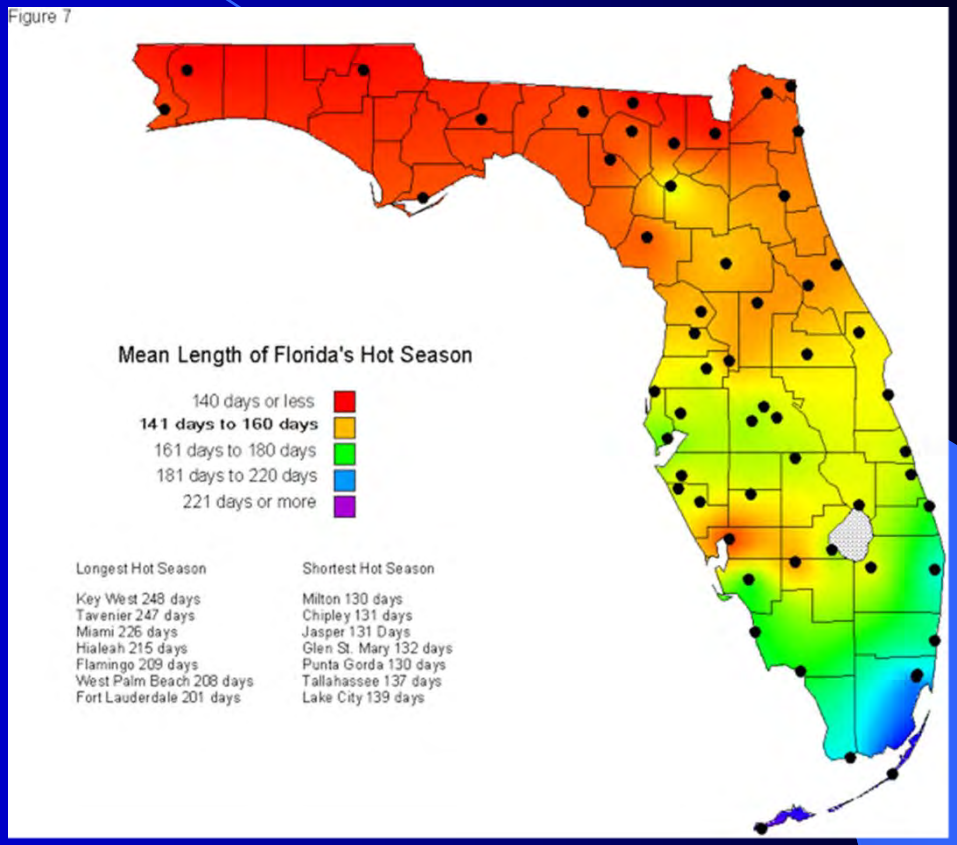
- *Screw worm; eradicated 1982 from U.S. since from Mexico and Puerto Rico*
- *Cattle fever tick (Bovine babesiosus); eradicated 1943*

Mosquito Abatement: Best Example of Areawide IPM

- Effective
- Integration of methods that work (Bt, OP)
- Minimal impact on non-targets
- Transparency
- Made Florida habitable!
- Public is supportive
- 1920's; Malaria a leading cause of death in U.S.
- Virtually eradicated by 1950's
- Areawide programs responsible

Mosquito Control in Florida

- 80 mosquito species
- $151 M spent annually
- Florida Keys Mosquito Control District: $9.1 M annual budget
- ~61 organized programs within the 67 counties
- Pest/nuisance and disease control



Slide courtesy Roxanne Connelly, UF/IFAS

Area-Wide Management of the Asian Tiger Mosquito

4th of 5 year program

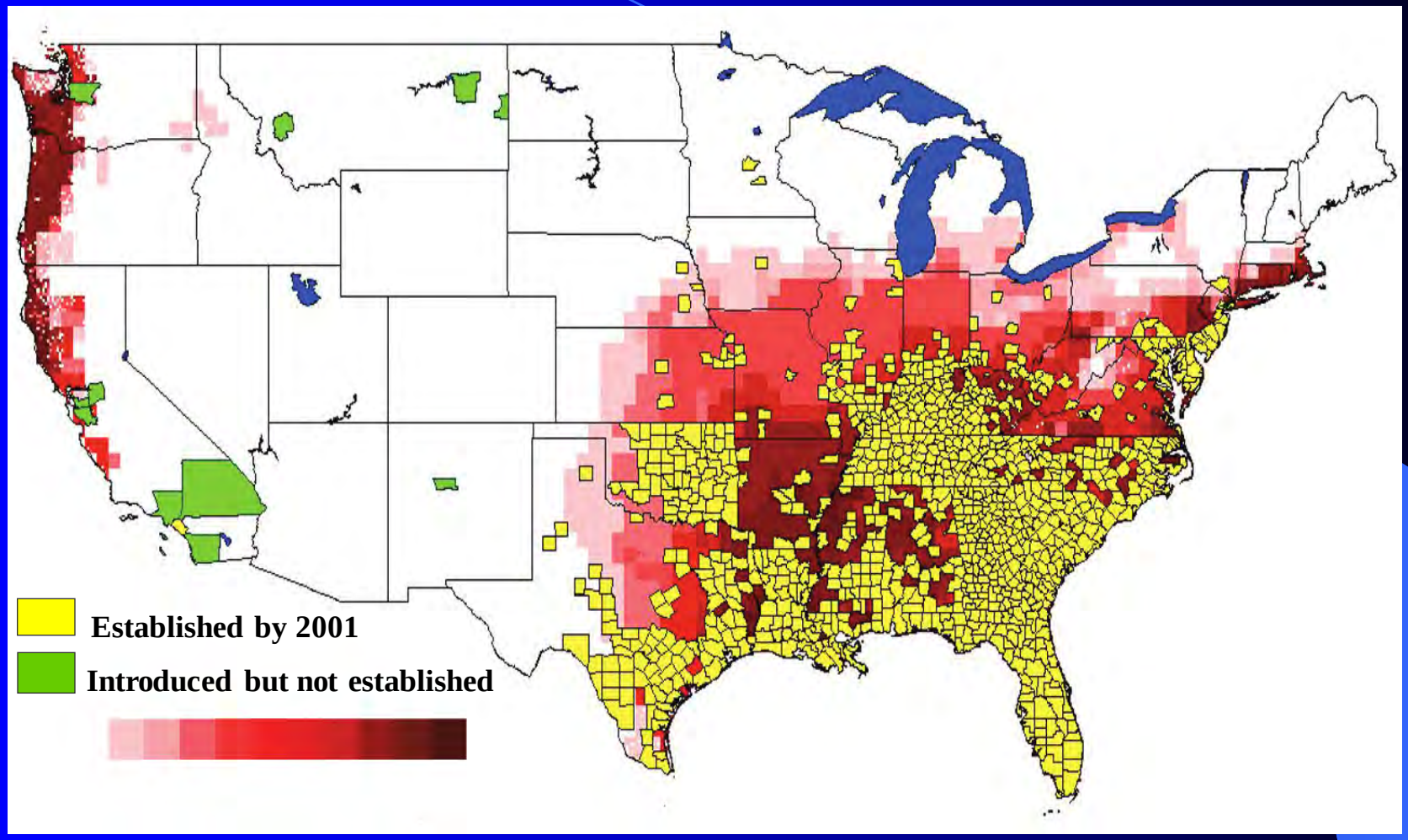
Gary G. Clark,[+] Dina M. Fonseca,[#] Randy Gaugler,[#] Daniel A. Strickman,[+] and Daniel L. Kline[+]

[+] USDA-ARS; Gainesville; [#] New Jersey Agricultural Experiment Station, Rutgers University

Aedes albopictus: The current situation

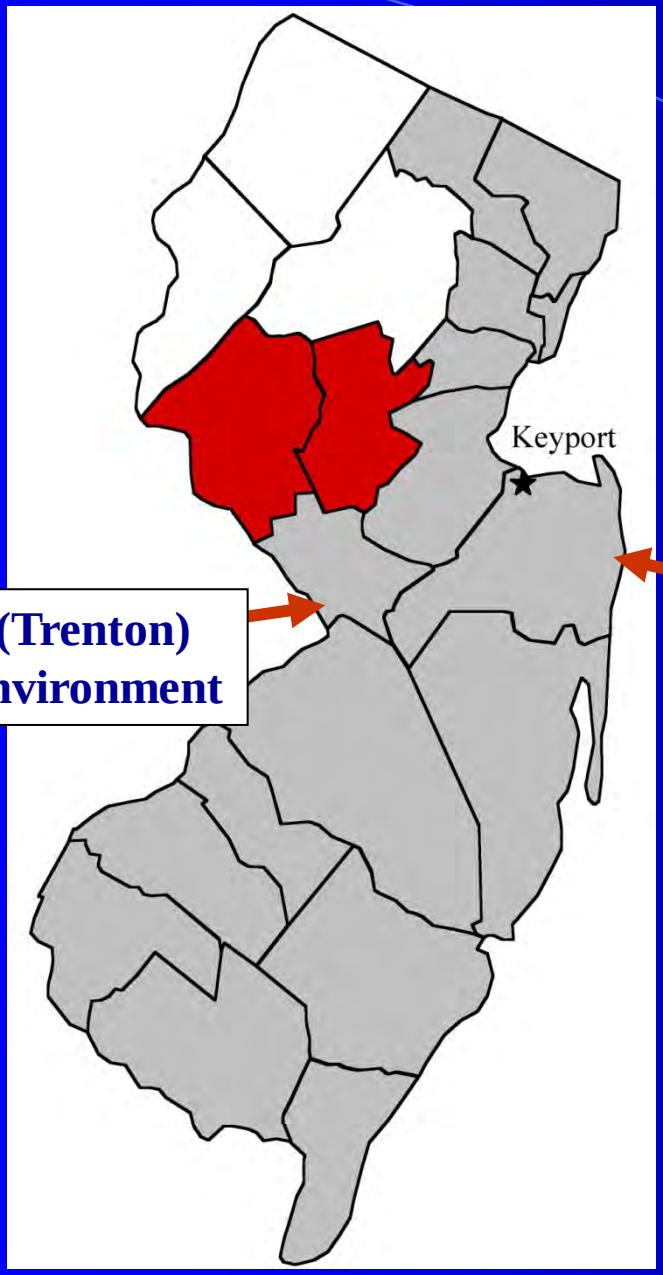
- **Detected in the U.S. in the mid-1980s**; eggs arrived here via international commerce in used tires
- **Rapidly spread** to many states via domestic commerce of used tires; now found in 30 states
- Has become the **most important daytime biting mosquito** in many urban areas
- **Naturally infected with several arboviruses** (e.g., West Nile Virus [USA], dengue and chikungunya)

Distribution of *Aedes albopictus* in 2005 and predicted suitable range*



* Spread of the Tiger: Global Risk of Invasion by the Mosquito *Aedes albopictus*. Benedict, Levine, Hawley, and Lounibos. Vector-Borne and Zoonotic Diseases (2007) 7:76-85.

Aedes albopictus in New Jersey, 2007



Mercer*(Trenton)
Urban environment

Monmouth* (near Manhattan)
Suburban environment

Goal: to reduce *A.a.* pops by 95% in 2 areas ca. 4km^2 in size.

Established populations

Collected in the past

Not collected

* Pilot project counties

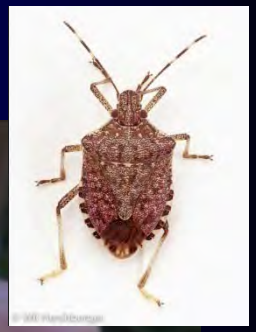
Potential benefits of ATM project

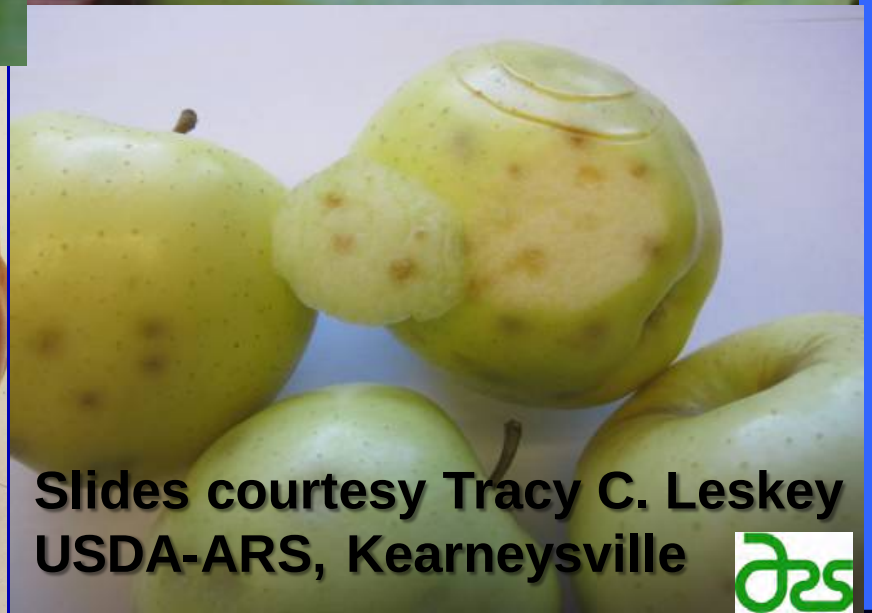
- **Reduced threat to livestock** of domestic and certain invasive mosquito-borne viral pathogens
- **Reduced threat to humans** of these arboviruses (dengue and chikungunya)
- **Improved quality of life** for agricultural workers active in areas where these viruses are transmitted
- **Establishment of methods** applicable to area-wide management of other mosquito species

Area-wide approaches for ATM management that work

1. Identify and focus on **county-wide hot spots**
2. **Degree-day model** to predict onset of active season
3. **Education – active** more than passive [Americorps, street captains]
4. Door-to-door **source reduction** – more in urban than suburban (night applications)
5. **Hot-spot** treatments – early season approach
6. **Area-wide ULV/LV urban larvicidal** applications – early season (Bti)
7. **Night-time adulticiding** – late season/emergency measure, short-term effect

Brown Marmorated Stink Bug, a Serious New Pest of Agriculture





Slides courtesy Tracy C. Leskey
USDA-ARS, Kearneysville

USDA-NIFA SCRI CAP

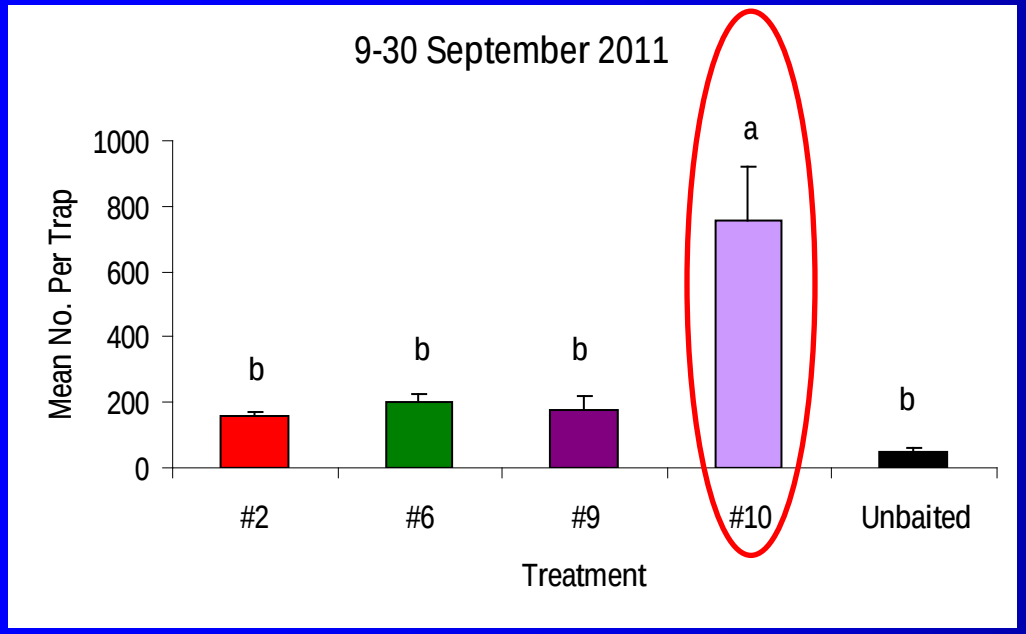
Biology, Ecology, and Management of Brown Marmorated Stink Bug in Orchard Crops, Small Fruit, Grapes, Vegetables, and Ornamentals

- **Written as a 5-Year Coordinated Agricultural Project.**
- **Funded for 3 years with opportunity for renewal.**
- **Total Federal Award $5,739,966.**
- **Matching Funds $ 7,325,637.**

Photo Courtesy of Chris Bergh

Broad Validation in Multi-State Trial

BMSB Aggregation Pheromone



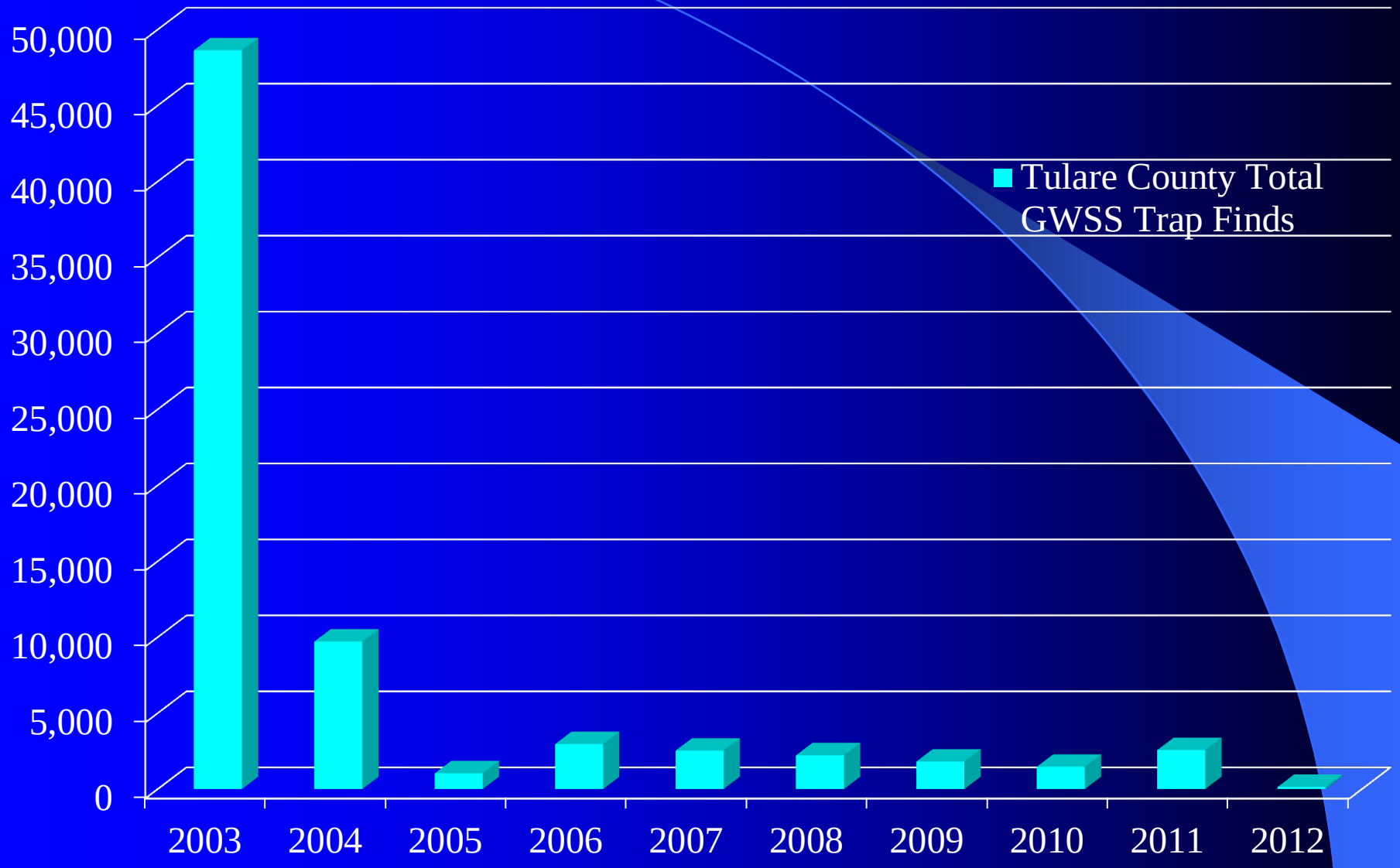
Effective season-long

GWSS Area-wide Program – Tulare County

Beth Stone-Smith
USDA APHIS PPQ WR
GWSS Program Director
EGVM Field Program Manager
Sacramento, CA

Temecula, California

Tulare County Total GWSS Trapped by Year



Challenges to GWSS Management

- Diverse agricultural systems
- GWSS has MANY hosts! Citrus critical
- Challenge existing IPM strategies
- Organic treatments not very effective and are very expensive
- Urban interface; diverse landscapes
- Funding, support to growers

The Team

Growers
Treatment Coordinators
County Departments of Ag
Industry Groups
UCCE
CDFA
USDA APHIS

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Host range	Mammals, birds	Grape, citrus	WIDE!	Citrus and relatives
Greatest challenges	Public support of p-cides	Continued support		

Current Efforts in U.S. ACP Detection/Suppression

- Florida CHMAs: Michael Rogers, Phil Stansly
- Texas: David Bartels, Mamoudou Setamou
- California: Beth Grafton-Cardwell, Joe Morse

Photos courtesy David Hall