

**Cal-IPC  
Visalia, CA  
October 9, 2009**

# **SAME 2009 Water Conference**

Sacramento, CA  
October 28, 2009

Weed  
Management in  
Flood Control  
Facilities: Costs &  
Water Quality  
Impacts

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## **Today's Talk**

- Weeds...Why Bother?
- Types of Weeds
- Available Tools
- Regulatory Constraints
- Costs
- Water Quality Impacts

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## Why Bother? ....Maintain Flow



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## Why Bother ?....Protect Infrastructure



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## *Emergent*

- Cattails
- Tules
- Bulrush
- Ex. Flood Control District

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## *Terrestrial (that may become aquatic)*

- Pampas Grass
- Ex. Urban Creek
- Blackberries
- Ex. Flood Control

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## Floating

- Primrose
- Ex: Laguna de Santa Rosa



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## *Tools for Control*

- Biological
- Mechanical
- Chemical

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## *Biological Control*

- Ex. Goats for Emergent and Terrestrial Weeds

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## ***Mechanical Control***

- Hand Cutting for Emergent Weeds
- Harvesters for Floating Weeds

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## Chemical Control

- The California "10"



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### Chemicals

Triclopyr

Diquat Dibromide

Glyphosate

Fluridone

Na<sub>2</sub>CO<sub>3</sub> Peroxyhydrate

Non-Ionic Surfactants

2,4-D

Imazapyr

Endothall

Acrolein \*

Copper \*

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## Regulatory Constraints


- NPDES Aquatic Pesticide Permit
- Two Injunctions
  - 2006 Red Legged Frog
  - 2009 Goby 11



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## NPDES Permit




Chemical	WQO (ug/L)
Triclopyr	N/A, monitoring required
Diquat Dibromide	20
Glyphosate	700
Fluridone	560
Na <sub>2</sub> CO <sub>3</sub> Peroxyhydrate	Pending
Non-Ionic Surfactant (nonylphenol)	6.6
2,4-D	70
Imazapyr	N/A, monitoring required
Endothall	100
Acrolein	320
Copper	3-52 (Hardness Dependent)

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## *Red Legged Frog*

- 2006 Injunction
- 4 aquatic pesticides:
  - Imazapyr
  - Glyphosate
  - 2,4-D
  - Triclopyr
- 62 terrestrial pesticides
- 40K acres & 33 counties



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## RLF Habitat Restrictions

- No applications
  - Ground: < 60' of habitat
  - Aerial: < 200' of habitat
  - Spot treatment >15' away OK
- Exceptions:
  - Public Health Vector Control
  - Invasive Species & Noxious Weeds



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## “Goby 11”

- 2009 Injunction
- 11 Species
  - Tiger salamander
  - SJ Kit Fox
  - Alameda Whip Snake
  - SF Garter Snake
  - Salt Marsh Harvest Mouse
  - CA Clapper Rail
  - CA Freshwater Shrimp
  - Bay Checkerspot Butterfly
  - VELB
  - Tidewater Goby
  - Delta Smelt



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## “Goby 11”

- 3 Aquatic Pesticides
  - 2,4-D
  - Acrolein
  - Diquat
- 8 Bay Area Counties
- No use within habitat
- Must use 100 - 400 ft. buffer Zones



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## Regulatory Costs

- NPDES Aquatic Pesticide Permit **\$2K-15K/Year**
- Injunctions
  - 2006 Red Legged Frog **\$0 to ??**
  - 2009 Goby 11 **\$0 to ??**

**?? = scouting, legal defense, etc**

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## 2003 Cost & Water Quality Study

- Contra Costa County
  - Rodeo Creek:
  - Bettencourt Basin:
- Sacramento County
  - Reclamation District 999:

### Techniques

**Manual  
Goats**

**Mechanical &  
Chemical/  
Mechanical**

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## Chemical/Physical Properties Measured

- Turbidity
- N & P
- TDS
- Coliform & E. Coli
- Dissolved Oxygen
- Petroleum Hydrocarbons
- Regrowth



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## Economic Parameters Measured

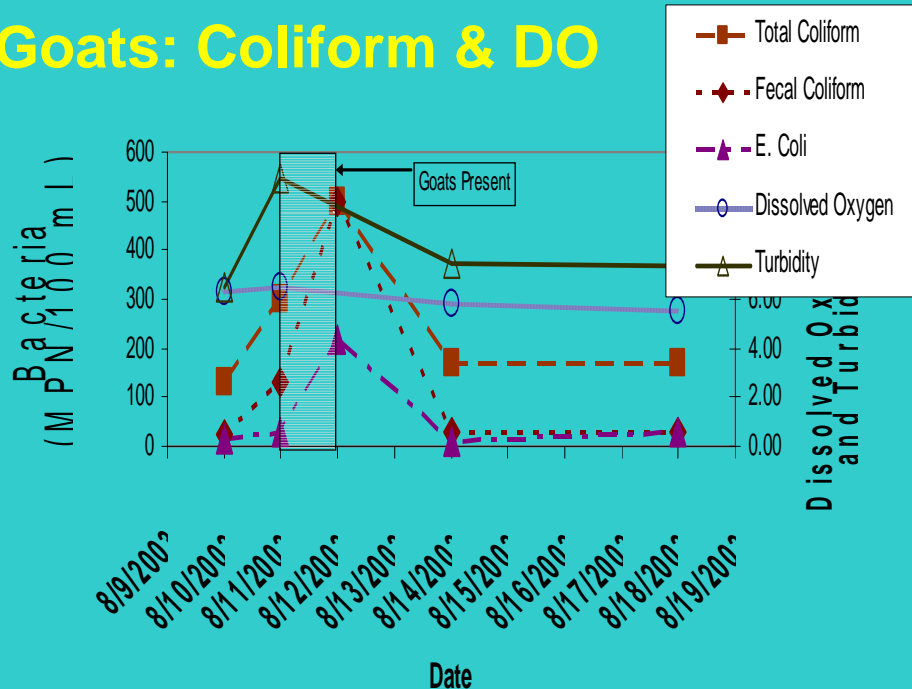
- Manpower
- Equipment
- Workers Compensation Claim Costs
- Normalized to \$/Acre Treated



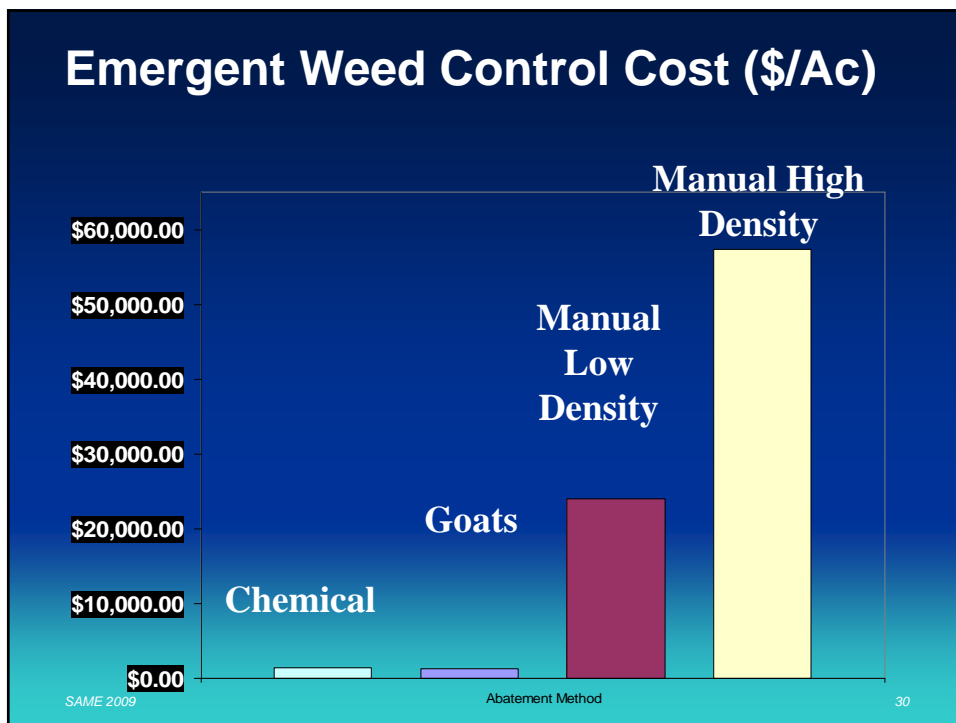
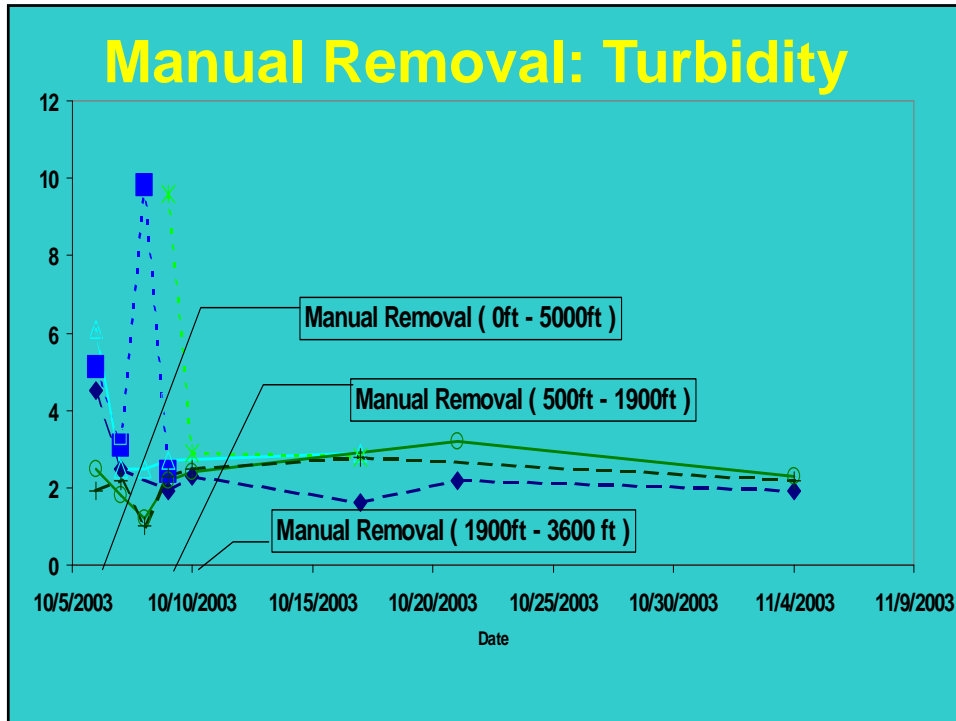
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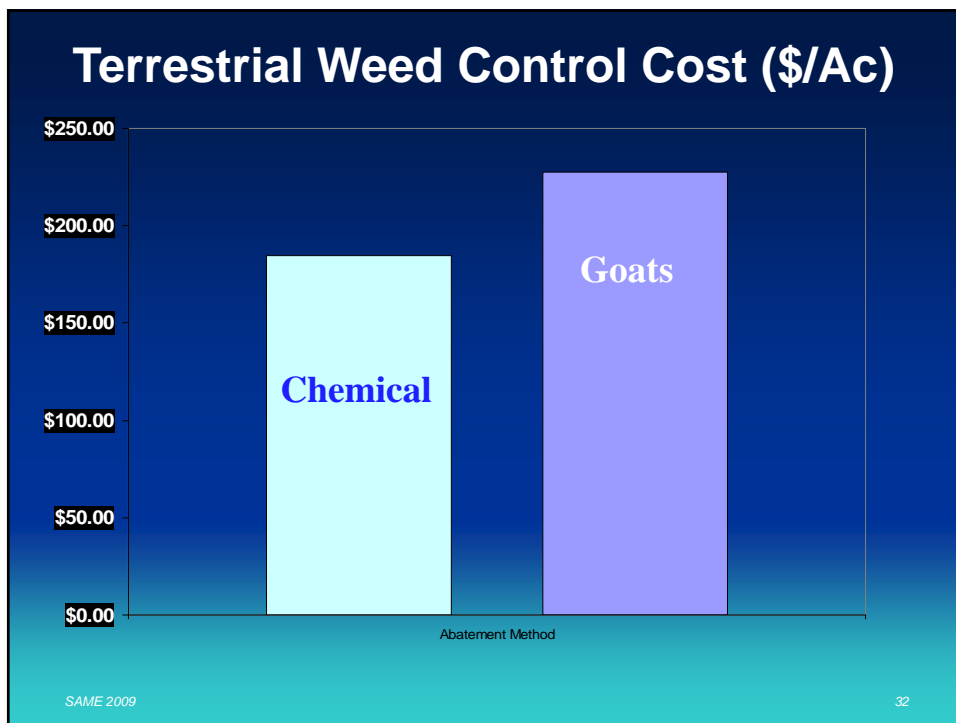
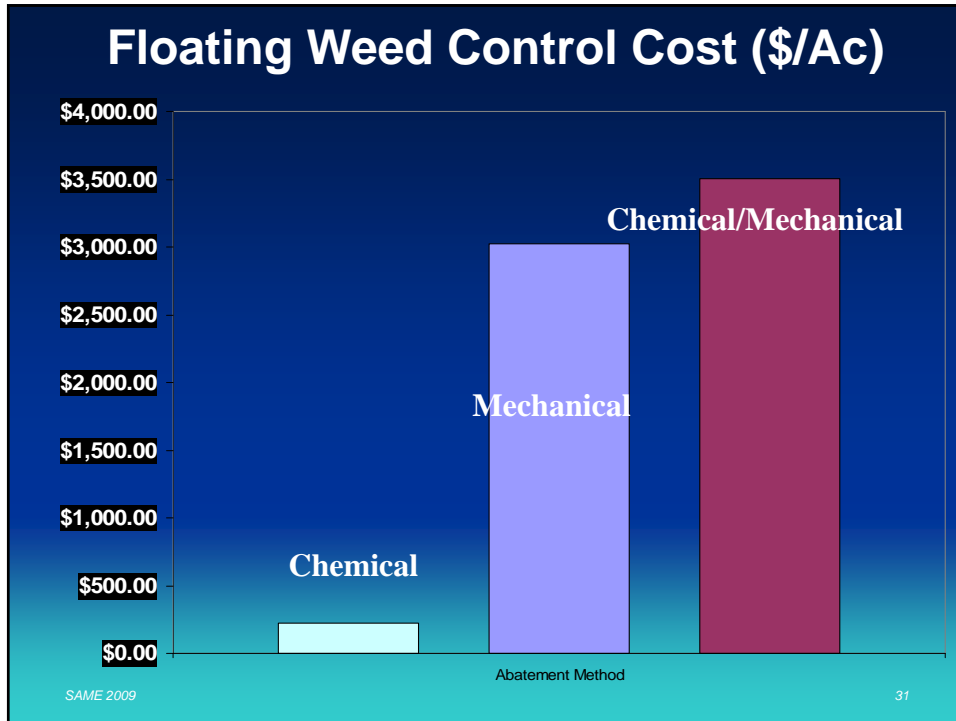
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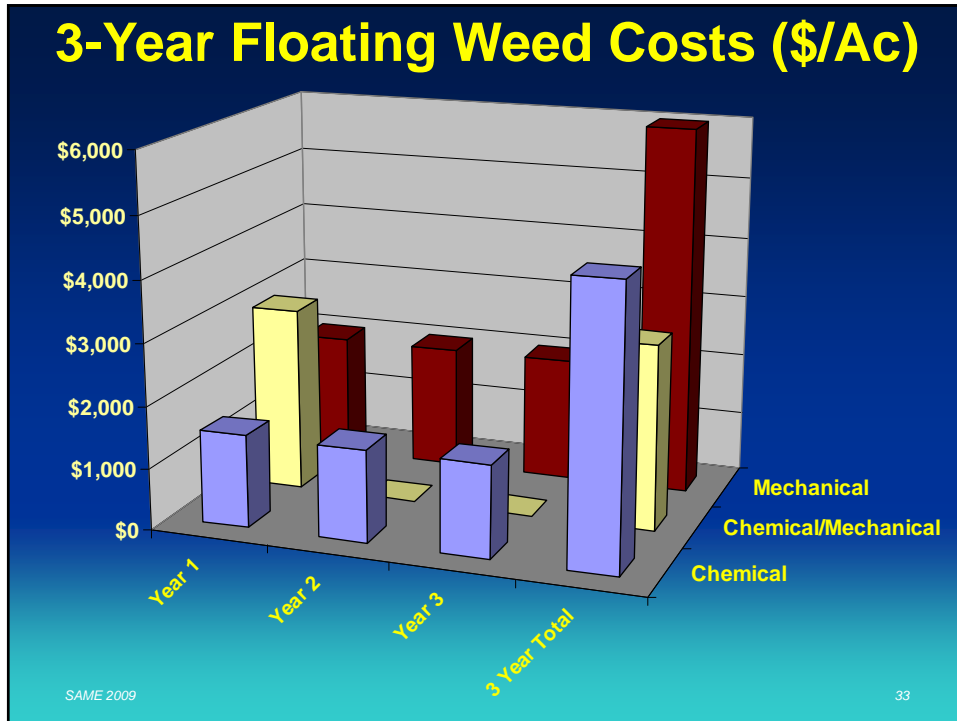
## Goats: Coliform & DO



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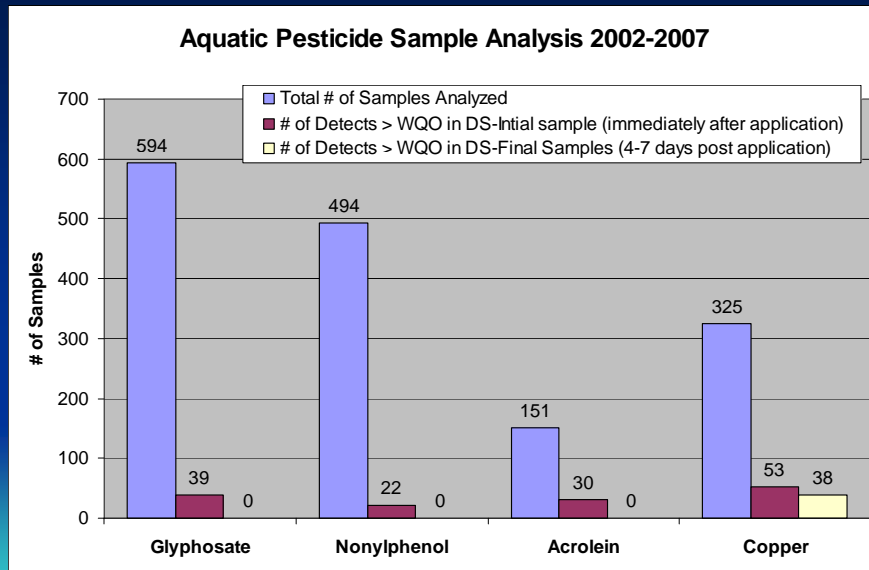
## Summary

- Mechanical Techniques Alone Are Expensive & Are Required Annually
- Goats Work Well
- Water Quality Impacts Transitory
- Chemical then Mechanical is Best
- Risk of aquatic pesticides is minimal

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## Water Quality Impacts



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