

**Contra Costa County IPM Committee Meeting
March 5, 2014**

**Evaluation of Water
Quality Impacts &
Costs for Weed
Control in Drainage
Facilities**

*2nd Annual Regional IPM
Conference, Oakland, CA*



*Blankinship & Associates, Inc.
Agricultural & Environmental
Consultants*

*June 14, 2005
Michael Blankinship*

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Today's Talk

- **Background**
- **2003 Study**
 - Methods
 - Results (Impacts, Costs, & Risks)
- **Questions**

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Background: Drainage Facilities

- **Its All About Flow**
 - Maintain It
 - Protect Infrastructure
 - Maintain Aesthetics
 - Protect Water Quality

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Maintain Flow



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Protect Infrastructure



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Maintain Aesthetics



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Protect Water Quality

- TMDLs
- Habitat
- Beneficial Uses



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2003 Study

- Rationale:
 - Part of DeltaKeeper v. SWRCB Settlement
 - Used to Revise Aquatic Pesticide Permit
- Evaluated:
 - Water Quality
 - Efficacy
 - Cost Effectiveness

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Locations


- Contra Costa County
 - Rodeo Creek: **Manual**
 - Bettencourt Basin: **Goats**
- Sacramento County
 - Reclamation District 999: **Mechanical & Chemical/Mechanical**

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Parameters Measured

- Chemical/Physical Properties
 - Turbidity
 - N & P
 - TDS
 - Coliform & E. Coli
 - Dissolved Oxygen
 - Petroleum Hydrocarbons
 - Regrowth



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Parameters Measured

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

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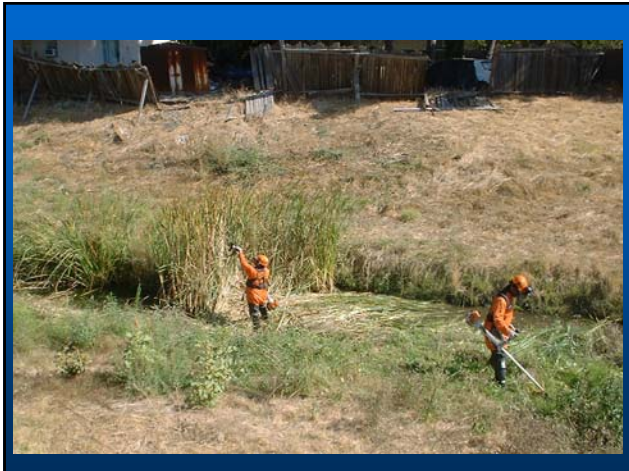
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Target Weeds

- Terrestrial (blackberry)
- Emergent (Cattails)
- Aquatic (Primrose)

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Results



- Water Quality Impact
- Ecological Risk
- Costs

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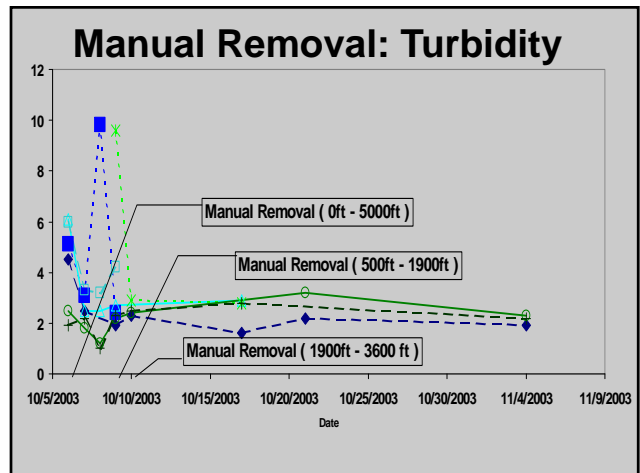
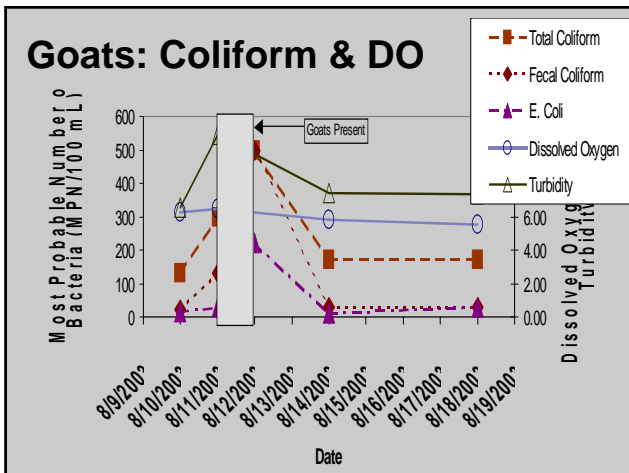
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Results



- Water Quality Impact
- Ecological Risk
- Costs

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Results



- Water Quality Impact
- Ecological Risk
- Costs

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Ecological Risk

- Risk = Exposure & Toxicity
- Toxicity
- Exposure

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Ecological Risk

- Example:
 - AquaMaster® and Cygnet Plus®
 - Apply at Maximum label rates
 - What are the resulting water concentrations?

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Ecological Risk

- Risk = Exposure & Toxicity
- Toxicity = ?
- Exposure = ?

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Glyphosate Aquatic Toxicity

Organism	LC ₅₀ (mg/L)	USEPA Classification
Fathead Minnow	97	Slightly Toxic
Juvenile Pink Salmon	14	Slightly Toxic
Juvenile Coho Salmon	27	Slightly Toxic
Rainbow Trout	140	Practically Non-Toxic
Water Flea	750	Practically Non-Toxic

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Adjuvant Aquatic Toxicity

Surfactant	LC ₅₀ (mg/L)	LC ₅₀ (mg/L)
	(48 Hr Daphnia)	(96 Hr Rainbow Trout)
Kinetic®	61	14
DyneAmic®	60	23
Cygnnet Plus®	31	45

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Resulting Water Concentrations

Assume: 3 inches of water and 50 % Plant uptake

Chemical	Resulting water concentration (mg/L)
AquaMaster®	4
Cygnnet Plus®	1.3

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Risk: The Last Step

- We know the toxicity
- We now know the exposure
- What is the risk?

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Risk: The Last Step

- Use the “Hazard Quotient”
 - HQ = $\frac{\text{Expected Concentration}}{\text{LC}_{50}}$
 - If HQ < 1, not likely a problem
 - If HQ > 1, maybe a problem

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Risk: The Last Step

Pesticide	HQ
AquaMaster [®]	$4/750 = 0.005$
Cygnat Plus [®]	$1.3/38 = 0.03$

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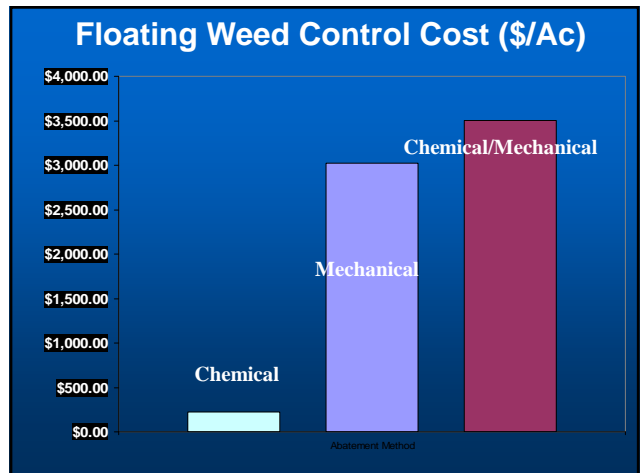
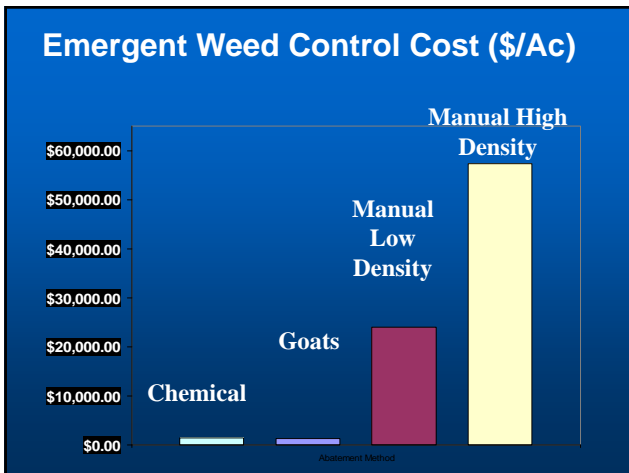
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Results



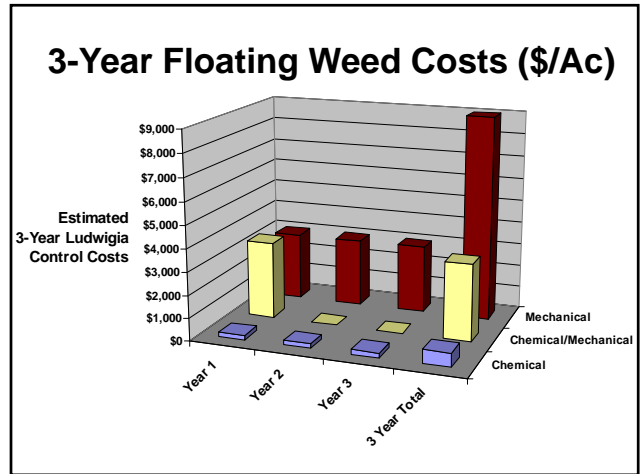
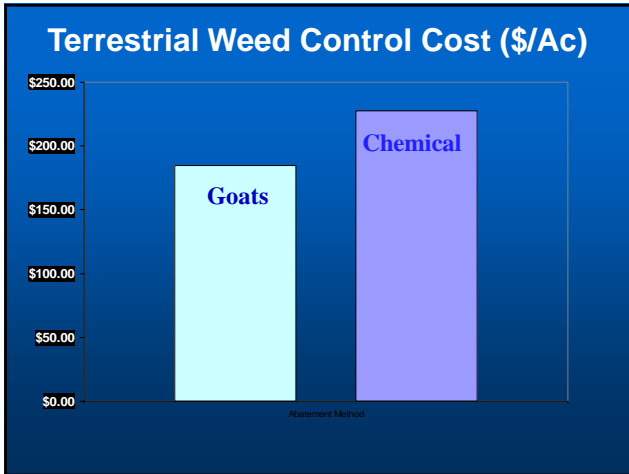
- Water Quality Impact
- Ecological Risk
- Costs

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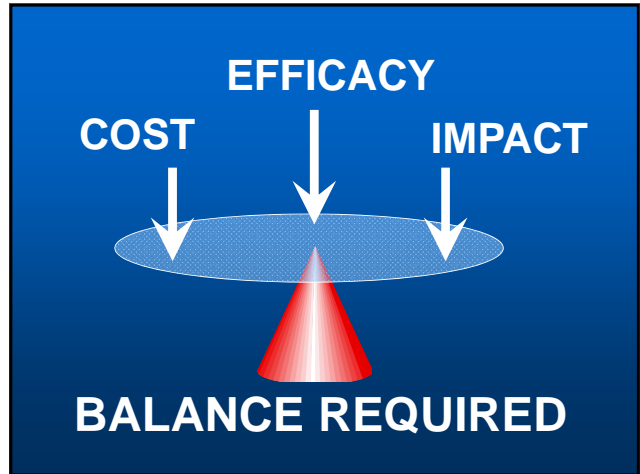
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Summary

	Floating			Emergent			Terrestrial	
	Chem	Mech	Chem/Mech	Chem	Goats	Manual	Chem	Goats
Abatement Method								
Environmental Impact	Low	Med.	Med.	Low	Med.	Low	Low	Med.
Efficacy	High	Med.	Very High	Med.	Med.	Low	Med.	High
Relative Cost	Low	High	High	Low	Low	High	Low	Low



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Summary

- Mechanical Techniques Alone Are Expensive & Are Required Annually
- Goats Work Well

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Summary (Continued)

- Water Quality Impacts Transitory
- Chemical then Mechanical is Best
- Risk of aquatic pesticides is minimal

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Acknowledgments

- San Francisco Estuary Institute
- SWRCB
- Contra Costa Co.
- Reclamation District 999

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More Info

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