

SETAC
November 12, 2012

SETAC

November 12, 2012
Long Beach, CA

*You Intentionally
Put Pesticides in
Water? The
Role, Fate &
Risk of Aquatic
Herbicide Use*

Michael Blankinship

Blankinship & Associates Inc.
Agricultural & Environmental Consultants
Davis, CA



**Today's Talk:
Aquatic Herbicides**

- Role
- Fate
- Risk
- Questions



2

The Role

–Integrated Pest Mgt. (IPM)
“Tool Box”

- Mechanical
- Biological
- Structural
- Chemical



3

The Role

–Make the Waterbody...

- Functional
 - Frost Protection
 - Irrigation
- Presentable
- Swimmable/Boatable



4



Blankinship & Associates, Inc.
Agricultural & Environmental Consultants
(530) 757-0941 www.h2osci.com

The Role

–Make the Waterbody...**Functional**

- No clogged pumps
- No plugged emitters
- Maintain Capacity
- Flood Protection
- Water Quality

5

The Role

–Make the Waterbody...**Presentable**

- Clarity
- Odor
- Maintain Capacity
- Water Quality



6

The Role

–Make the Waterbody...**Swimmable & Boatable**

- Clarity
- Odor
- “Yuck” Factor
- Water Quality



7

Aquatic Animal Invasive Species



(Source: P. Mues, USEPA Dec 9, 2010)

8

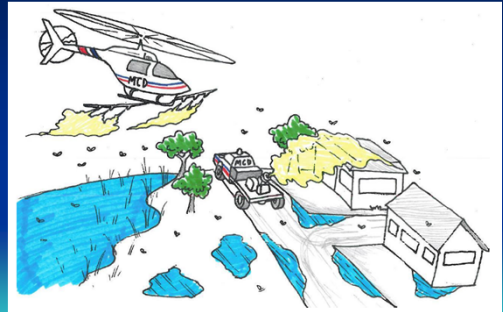
Spray Applications (CDFA and USFS Only)



(Source: P. Mues, USEPA Dec 9, 2010)

9

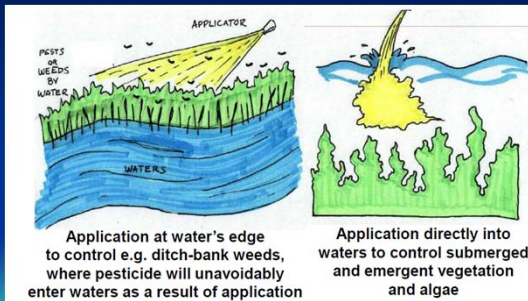
Vectors



(Source: P. Mues, USEPA Dec 9, 2010)

10

Aquatic Weeds



(Source: P. Mues, USEPA Dec 9, 2010)

11

Aquatic Herbicides

- Currently only 12 Aquatic Herbicides registered in CA



Triclopyr TEA
Diquat Dibromide
Penoxsulam
Glyphosate
Fluridone
Na ₂ CO ₃ Peroxyhydrate
Non-Ionic Surfactants
2,4-D
Imazapyr
Endothall
Acrolein *
Copper *

12

Environmental Fate

- Wide Range
 - Minutes (acrolein)
 - Days (glyphosate)
 - Months (fluridone)
 - Years (copper)



Aquatic Toxicity

- Wide Range
- Depends on:
 - Endpoint
 - Receptor
 - BMPs



Example: Endothal

LD 50 Values (mg/kg, 96 hour exposure)

	Cascade	Teton
Rainbow Trout	363	0.56
Bluegill	1071	0.94
Waterflea (daphnia)	223	0.36

Human Toxicity

- Wide Range
- Caution (imazapyr)
- Warning (triclopyr)
- Danger (acrolein)



Example: Triclopyr Risk

- Found in Renovate® Herbicide
- Terrestrial Use is Garlon®
- Contains :
 - Triclopyr TEA Salt 44.4 %
 - Inert Ingredients 55.6 %



Triclopyr Aquatic Toxicity

Organism	LC ₅₀ (mg/L)	USEPA Classification
Frog	0.6	Highly Toxic
Water Flea	1.2	Moderately Toxic
Juvenile Coho Salmon	3.2	Moderately Toxic
Juvenile Pink Salmon	3.6	Moderately Toxic
Rainbow Trout	5.7	Moderately Toxic

Risk: Resulting Water Concentrations

Protective Assumptions Include:

- Highest Label Rate
- 2 feet of water
- 50 % Plant uptake

Herbicide	Resulting water concentration (mg/L)
Renovate®	0.55

Risk Estimate

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

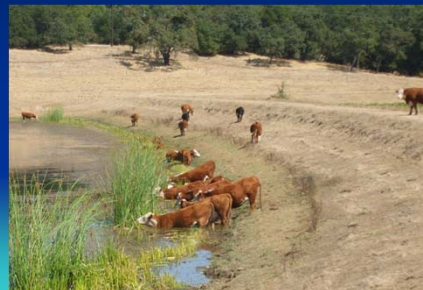
Risk Estimate

Protective Assumptions Include:

- Highest Label Rate
- 2 feet of water
- 50 % Plant uptake
- Most sensitive species considered (frog)

Herbicide	HQ
Renovate®	$0.55/0.6 = 0.92$

Breaking News: New Alternative to Aquatic Herbicides Introducing: Aqua-Cow™



24

SETAC
November 12, 2012

More Information

Blankinship & Associates, Inc.

(530) 757-0941

Mike Blankinship mike@h2osci.com



25



Blankinship & Associates, Inc.
Agricultural & Environmental Consultants
(530) 757-0941 www.h2osci.com