


# GCSAA Meeting Stockton Golf & Country Club August 22, 2011

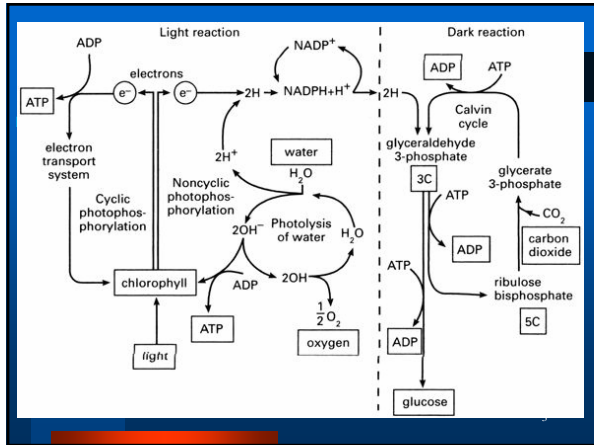
## Where Did My Pesticide/Fertilizer Go? (and why should you care)

Sierra Nevada/Nor Cal/Central Cal  
GCSAA Meeting  
Stockton Golf & County Club  
August 22, 2011

Michael Blankinship  
**Blankinship & Associates Inc.**  
Agricultural & Environmental  
Scientists & Engineers



The periodic table shows elements grouped into blocks: s-block (IA, IIA), d-block (Transition Metals), p-block (Non-Metals, Halogens, Noble Gases), and f-block (Lanthanide and Actinide series). Atomic numbers, symbols, and names are provided for each element.



## Today's Talk



- Turf's Perception
- The Risk Myth
- Case Study
- Golf & Water Quality
- Tools, Tools and More Tools

## Perception Is Reality

Beyond Pesticides Daily News Blog

**Aquatic Organisms Harmed by Golf Course Pesticides**


Self courses affect the environment by allowing the leeches through the release of nutrients and pesticides. The toxication (leeches) of central Ontario, Canada, a major recreational area, is especially concerning in the regions of golf courses as a result of the pesticide and herbicide application. The toxication is exacerbated by many lakes, rivers, and streams. Self courses in this area typically place tall on top of a world view which allows chemicals used on the courses to seep into surrounding bodies of water.

Beyond Pesticides Daily News Blog

**Cosmetic Use of Lawn Chemicals Banned in Ontario**

Ontario's new Cosmetic Use of Lawn Chemicals Ban is a landmark decision for the province. It is the first time in Canada that a province has banned the use of cosmetic lawn chemicals. The ban is a significant step towards reducing the environmental impact of lawn care products. The ban applies to all residential and commercial properties in Ontario. The ban is effective from January 1, 2011.

## Perception Is Reality



### GOLF DIGEST May 2008

"The most important article we've ever published"



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### Perception Is Reality

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### Perception Is Reality

- **Golf Digest:** Would you say that golf-course pesticide use in the United States today is not safe?
- **Jay Feldman\*:** I would say that, yes.

\* Co-founder: Beyond Pesticides

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### The Risk Myth

**Risk = Toxicity  
 x Exposure**

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### The Risk Myth: Toxicity Data

Product Name	Active Ingredient	LC50	
		mg/L	Species
Various	Glyphosate IPA Salt	79 -120	Fathead Minnow
Nautique	Copper Carbonate	2 to 21	Fathead Minnow
Sonar	Fluridone	12	Rainbow Trout
Reward	Diquat Dibromide	12	Rainbow Trout
Copper Sulfate	Copper Sulfate Pentahydrate	1	Fathead Minnow

### The Risk Myth: Exposure

- Dermal (Absorption)
- Oral (Ingestion)
- Inhalation (Inhalation)
- But, what happens to the chemical on the way to the receptor.....?

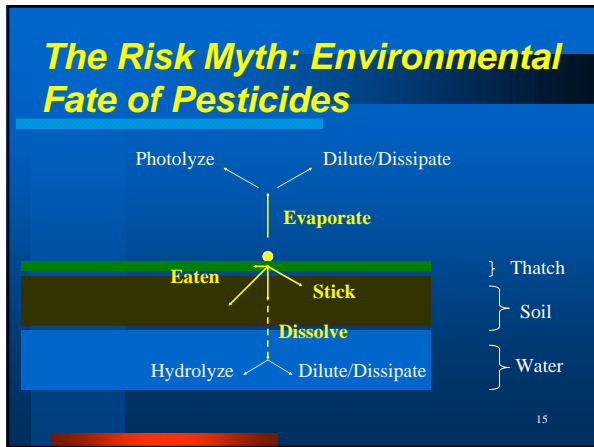
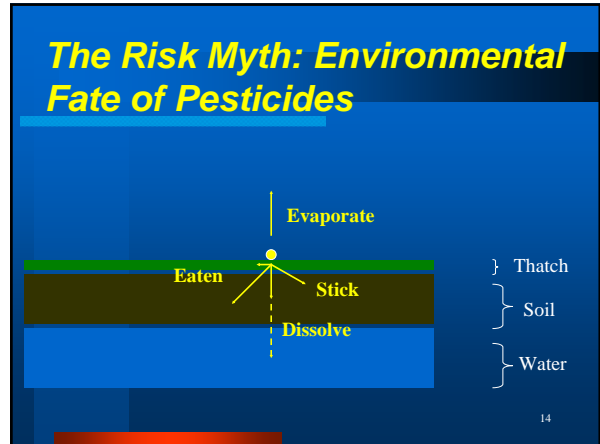
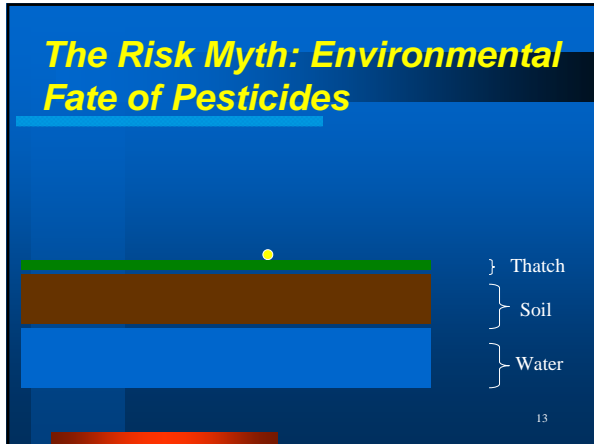
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### The Risk Myth: Exposure

- But, what happens to the chemical on the way to the receptor.....?
- aka... "Environmental Fate"

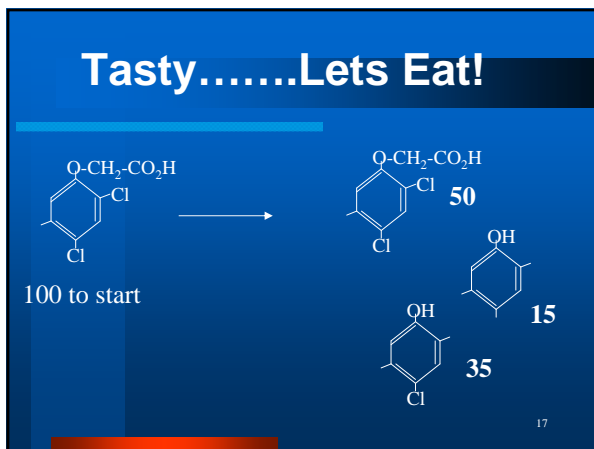
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Product/Active Ingredient	Solubility (mg/L)	Vapor Pressure (x 10 <sup>-8</sup> mm Hg)
Garlon 4 (Triclopyr BEE)	7	360
Garlon 3A (Triclopyr TEA)	400,000	1

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### Tasty.....Lets Eat !

100 molecules Today  
 50 molecules Tomorrow  
 Half Life (t<sub>1/2</sub>) = 1 Day

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### The Risk Myth: Managing Exposure

- You Can't Change Toxicity...
- ...So Manage Exposure
  - Understand Environmental Fate
  - Use BMPs
  - Read the Label
  - Make An Informed Pesticide Selection

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### The Risk Myth: Case Study


- Aquatic Use of Glyphosate for Control of Emergent Aquatic Vegetation



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### Case Study: Glyphosate Risk

- Check carefully for those Registered for Aquatic Use
- Found in AquaMaster®, AquaPro® and Other Brand Name Herbicides



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### Glyphosate Risk: Step #1 – Gather Toxicity Data

Organism	LC <sub>50</sub> (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

### Glyphosate Risk: Step #2 – Estimate Exposure

- Using Label rates and lake volume treated, estimate expected concentration (i.e., exposure)
- Conservatively assume no degradation

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### Glyphosate Risk: Step #3- Estimate Risk

- We now know the toxicity & exposure
- Estimate risk

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### Glyphosate Risk: Step #3- Estimate Risk

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

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### Glyphosate Risk: Step #4- Communicate

Assume: 3 inches of water and 50 % Plant uptake

Pesticide	HQ
AquaMaster®	4/14 = 0.29
Cygnat Plus®	1.3/31 = 0.04

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### Conclusions

- Treatment will be Efficacious
- Water Quality will be Protected
- BMPs Used:
  - Wind & Bird Nesting Prohibition

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### 2003-07 Golf Course Study

- Does the choice of fertilizer (organic v. traditional) influence surface water quality adjacent to golf courses?
- Are pesticides leaving golf courses ?



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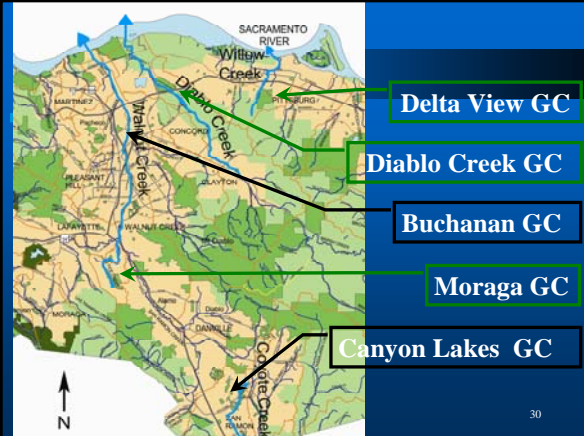
### Overview



#### Golf in Contra Costa Co.

- 30 Courses
- 31 Watersheds
- Wide Geographic, Climatologic and Area-Specific Variability

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### Methods



- **Grab Samples**
  - Up and Down Stream of the Course
  - Sampled Primarily During Wet Weather Flow
- **Analysis**
  - Nutrients (NPK) & General Chemistry
  - Aquatic Toxicity (Algae & Water Flea)

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### Results



- 3 storm seasons
- 17 rain storms
- 46 sample events
- > 1,000 water quality measurements made

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### Summary of Results



- No insecticides leaving courses studied
- Fungicides/herbicides are not leaving traditional courses
- Nutrients maybe leaving traditional courses
- Algae-limiting agents maybe leaving organic courses

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### Tools: Buffer BMPs



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### More Tools: More BMPs



- Make multiple fertilizer applications in small amounts
- Select and use slow release fertilizer carefully
- Apply fertilizer based on soil & plant tissue testing & according to the label
- Do not apply fertilizer before rainfall/irrigation

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*Now I Know  
where my  
pesticide went....*



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### ...Why Should You Care?

- Perception
- Regulations



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### ...Why Should You Care?

- Perception
  - Be a Good Stewart
  - Follow the Label
  - Invite & Engage Visitors
  - Brag about your IPM program
  - Remember: Risk=Toxicity x Exposure

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### Regulations Commonly Involved With Golf

- Local City/County Planning Department
- State Agencies
  - State Water Resources Control Board (SWRCB)
  - Department of Fish & Game (DFG)
  - Department of Pesticide Regulation (DPR)
- Federal Agencies
  - US Army Corps of Engineers
  - US Fish & Wildlife Service



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### Regulations Commonly Involved With Golf


- State Agencies
  - State Water Resources Control Board (SWRCB)
- NPDES Aquatic Pesticide Permit



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### What is NPDES?


- National Pollutant Discharge Elimination System
- Part of the Federal Clean Water Act
- Typical Uses: stormwater, construction, industrial discharges
- Benefits:
  - Protect water quality
  - Allows discharge
  - Provides legal protection



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### Recent History

- 2002: CA issues Emergency General Permit for Discharge of Aquatic Pesticides **Permit Required**
- 2002: Forsgren Case: **Permit Required**
- 2004: New 5 year Permit Issued by CA **Permit Required**
- 2005: Fairhurst Case: **Permit NOT Required**
- 2007: EPA: **Permit NOT Required**
- Jan 2009: 6<sup>th</sup> Circuit Court: **Permit Required**
- June 2009: 6<sup>th</sup> Circuit Court: 2 Year "Stay" Granted = **Permit NOT Required**
- Mar 2010: Supreme Court Will Not Consider the Case **Permit Required**
- Aug 2010: House & Senate introduce bill to overturn NPDES permits for pesticides and rely on FIFRA **Permit Required**
- Apr 2011: **Permit Required**



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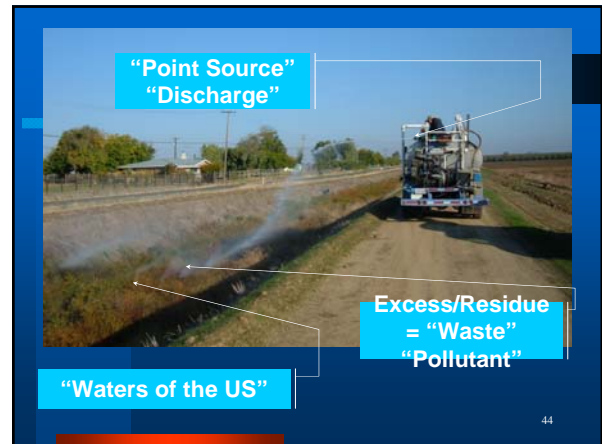
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## Do I Need an NPDES Permit?

- You “discharge” a “pollutant” to “Waters of U.S.”
- Your pesticide application leaves a “residue”
- Your applications are to, over or near water
- Perceived CWA Violations and Subsequent Citizen Lawsuits Concern You



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## Waters of the US (“WOUS”)

- All interstate waters and wetlands currently, formally or potentially used in interstate commerce;
- All other waters, including intrastate waters the use, degradation or destruction of which could affect interstate or foreign commerce
- Waters which are or could be used:
  - by interstate or foreign travelers for recreational or other purposes;
  - for industrial purposes by industries in interstate commerce
  - to take fish or shellfish and sold in interstate or foreign commerce; or

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## “Waters of the US”

- Adjacent Wetlands and Ponds
- Tributaries
- Seasonally intermittent streams ultimately emptying into a WOUS

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## “Waters of the US”

### Excludes:

- Pre-1985 converted cropland
- Waste treatment ponds
- Artificial lakes/ponds created by excavating/diking dry land to collect/retain water used exclusively for stock watering, irrigation, settling basins, or rice growing
- Above the “ordinary high water mark”

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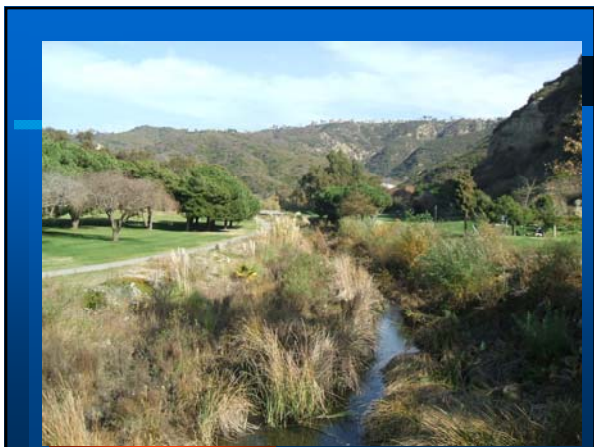
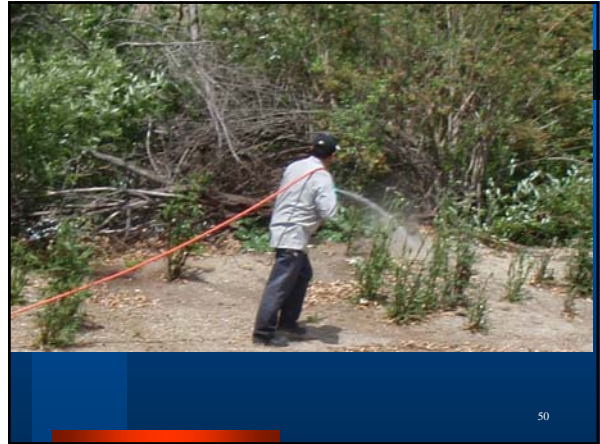
## “Waters of the U.S.”



Ask: Could I Be Connected?”


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**The Existing Ca Aquatic Pesticide Permit**

- Still In Effect and Usable
- Submit Notice of Intent (NOI)
- Prepare and Execute an Aquatic Pesticide Application Plan (APAP)
- Report Annually
- Public Hearing 10/18



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**“California Water Quality Objectives”**




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)

\* Requires SIP Exception

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**Injunction Dysfunction**



- Salmon/Steelhead
- Red-legged Frog
- Goby 11
- Bottomline:
  - Buffer Zones
  - Exceptions for Invasive & Noxious Species Control

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**The Future: Stay Informed**



- California Aquatic Pesticide Permit (“Weed Permit”)
  - [http://www.waterboards.ca.gov/water\\_issues/programs/npdes/aquatic.shtml](http://www.waterboards.ca.gov/water_issues/programs/npdes/aquatic.shtml)
- Goby 11 Injunction
  - <http://www.epa.gov/oppfead1/endanger/litstatus/factsheet.html>
  - <http://www.epa.gov/oppfead1/endanger/litstatus/use-limitation.html>
- Red-Legged Frog Injunction
  - [http://www.cdpr.ca.gov/docs/endspec/rl\\_frog/index.htm](http://www.cdpr.ca.gov/docs/endspec/rl_frog/index.htm)
  - <http://www.epa.gov/espp/litstatus/redleg-frog/rlf.htm>
- Salmonid Injunction
  - <http://www.epa.gov/espp/litstatus/wtc/maps.htm>

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**Today’s Talk**



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- Case Study
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**Questions?**



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