The Impact of Imazapyr and Triclopyr on Bullfrog Tadpoles

Joel Trumbo Staff Environmental Scientist CA Dept of Fish and Game Pesticide Investigations Unit





Killing the Weeds without Killing the Frogs

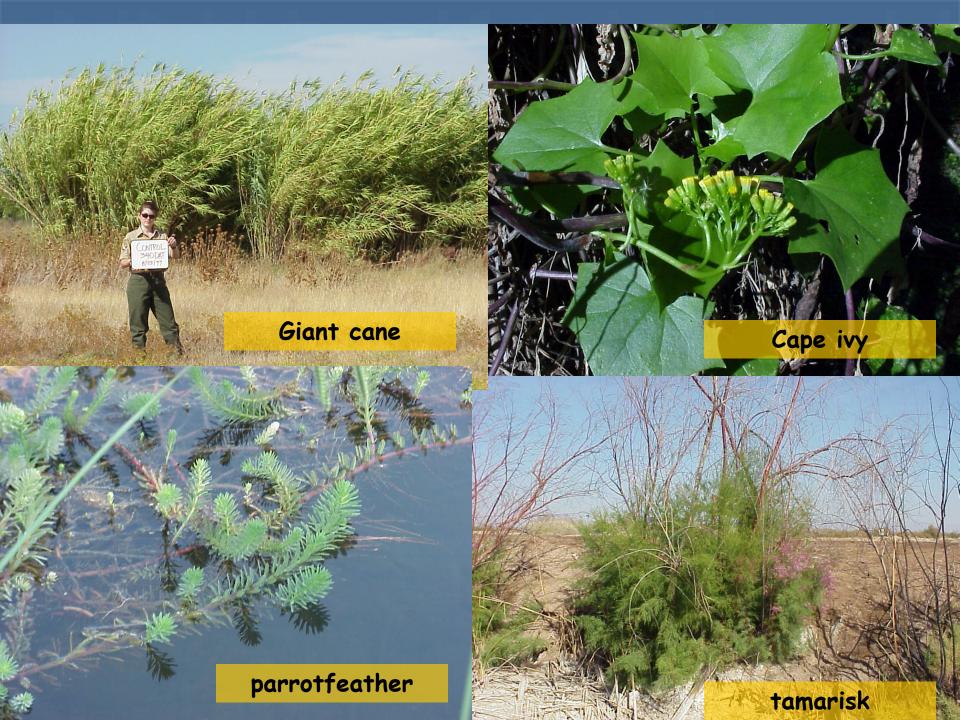




Purpose of Study

To assess the acute toxicological impact of two herbicide active ingredients and their formulated products commonly used in frog habitat.

Imazapyr (Stalker[®], Habitat[®])
 Triclopyr TEA (Garlon[®] 3A)



5 Compounds

Imazapyr acid (active ingredient)
 Stalker® (27.6% imazapyr IPA salt)
 Habitat® (28.7% imazapyr IPA salt)
 Triclopyr TEA (active ingredient)
 Garlon® 3A (44.4% triclopyr TEA salt)



Why Be Concerned?

 Worldwide amphibian decline

Recent CBD Lawsuit/Judgment

CA Red-legged Frog is a USFWS threatened species



Why Be Concerned?

These herbicides are commonly used to control invasive weeds in or near frog habitat.

There's no acute tox data on the active ingredient or formulated products for amphibians.



Its really pretty simple...

We ran tox tests in the lab with tadpoles

We took those tox values and compared them to known/estimated maximum conc in water to determine a Risk Quotient

Risk Quotient = exposure/toxicity
RQ values < 0.05 indicate no risk

What We Know Already

No acute tox data for the A.I.s for frogs Larval fish tox data indicates the A.I.s are "Practically non-toxic" No acute tox data for fish or frogs for Habitat or Stalker. Garlon 3A 96-h LC50: 300 - 450 ppm

Method 96-h Acute Tox Tests

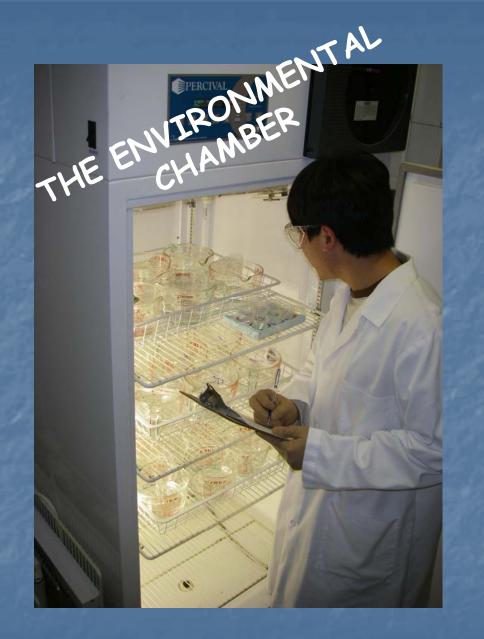


3 to 18 day old tadpoles

environmental chambers set at 22°C.

1000-ml Pyrex[®] measuring cups containing 400 ml of test solution

96-h test with 48-h renewal



This looks a little bit like what I do in front of the fridge at home,

except that I'm not usually holding a clipboard and I rarely wear a lab coat.

Method 96-h Acute Tox Tests

Five treatment groups (concentrations)
 Four replicates per treatment group
 Each replicate had ten tadpoles
 The LC⁵⁰ values were based on concentrations of active ingredients



Some Things to Keep in Mind

This is an ACUTE toxicity analysis The endpoint is MORTALITY We used bullfrogs not CRLF This study says nothing about habitat impacts.

Method Risk Quotient Analysis

The US EPA's Level of Concern is 1.0 for terrestrial species

LOC for Aquatic Species is 0.50
 LOC for Listed Aquatic Species is 0.05

LC⁵⁰ Definition

That concentration of the pesticide in water that kills 50% of the test population in a lab tox test

Small numbers = high toxicity

LC50 values > 100 mg/L are considered to be "practically non-toxic

Bullfrog tadpole 96-h LC⁵⁰ and 95% confidence interval values

	LC ⁵⁰	95% C.I.
Imazapyr acid	799.6	775.8 - 824.6
Stalker®	14.77	11.2 - 17.9
Habitat®	1,739	990.6 - 2,256.7
Triclopyr TEA	814.1	769.6 - 847.1
Garlon®3A	174.5	174.5 - 174.5

Environmental concentrations in water (EC) and risk quotients (RQ)

Statistics.	EC	RQ
Imazapyr acid	0.50	0.40/799.6 = 0.0005
Stalker®	0.50	0.40/14.7 = 0.027
Habitat®	0.50	0.40/1739 = 0.0002
Triclopyr TEA	3.50	3.50/814.1= 0.004
Garlon®3A	3.50	3.50/174.5= 0.020

What this all means

The preference to use glyphosate when these compounds are more effective and just as safe (perhaps safer)



This paper will be published in DFG's scientific journal...

California Fish and Game

http://www.dfg.ca.gov/publications/journal/