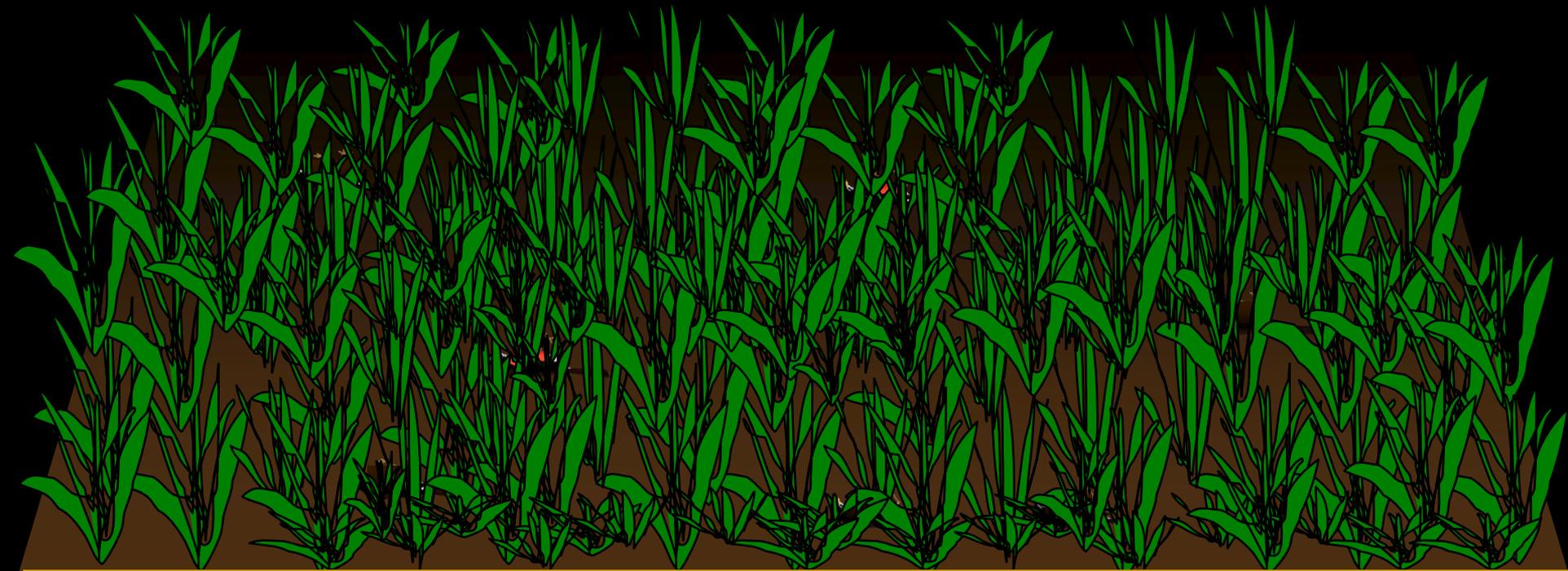


Ecological Incidents and Sampling Bias



**“The answer my friends
is blowing in the wind”**

- Bob Dylan

**“Oh mama, I'm in fear for my life
from the long arm of the law”**

- Styx

“Maximum can u risk it now

Maximum we risk all

**Maximum and make the dope boys go
crazy”**

- Brandy

**“Fish heads fish heads
Roly poly fish heads”
- Dr. Demento**

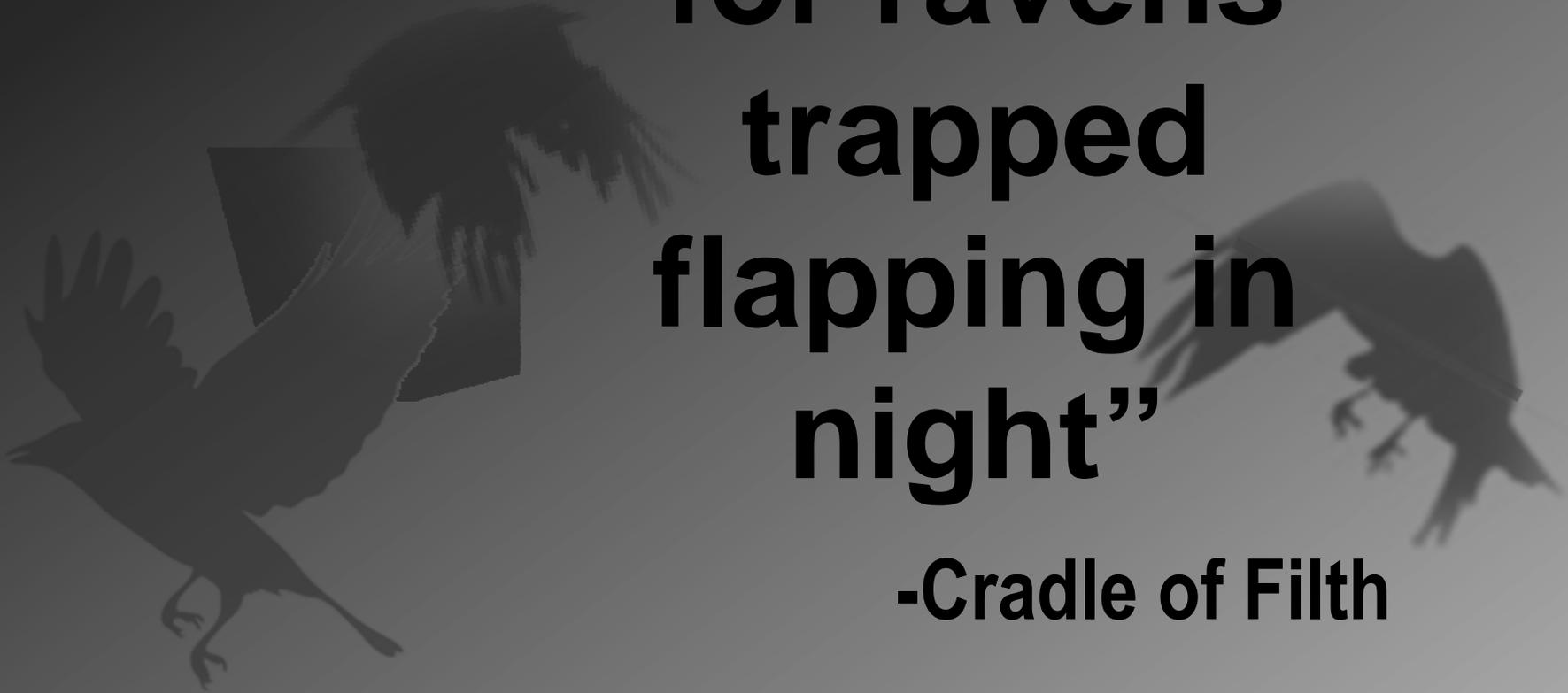
**“I be looking for labels,
I ain’t looking for love”
- Fergie**

Ecological Incidents and Sampling Bias

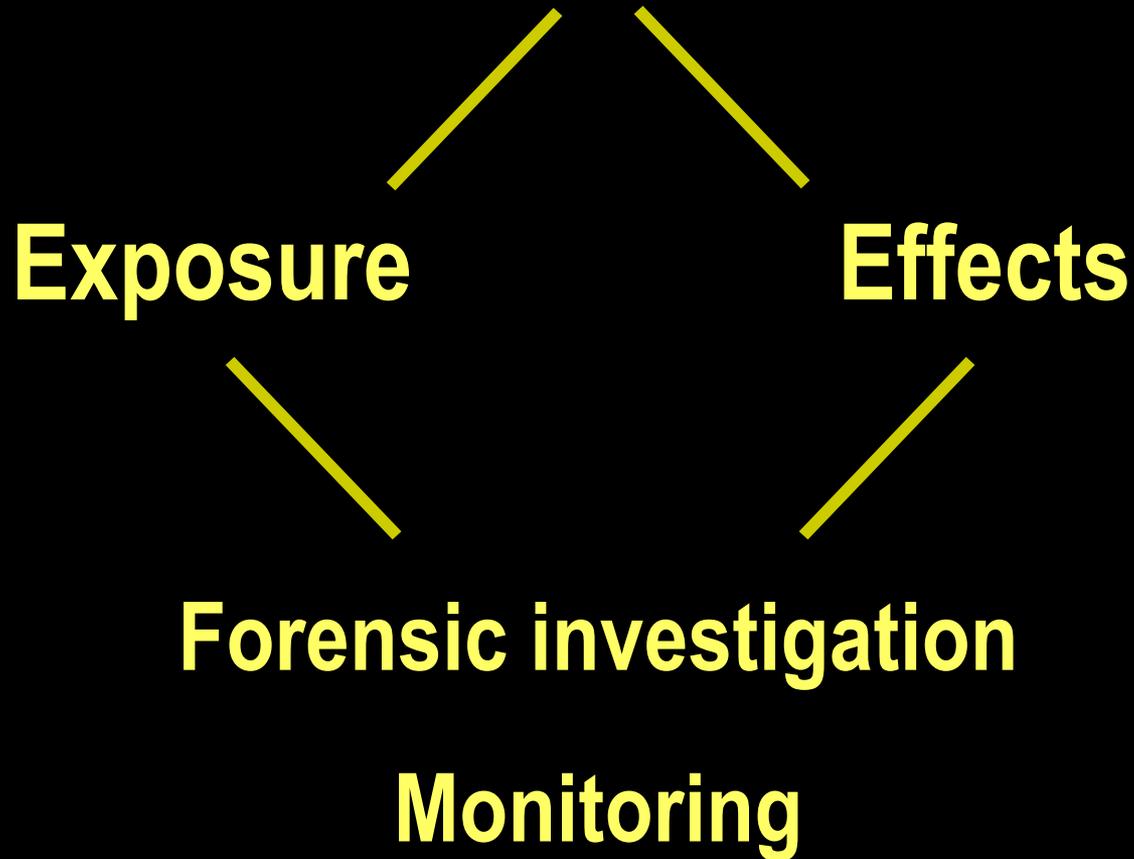


**“A swansong
for ravens
trapped
flapping in
night”**

-Cradle of Filth



Prove pesticide involvement



Interpreting the evidence

Cause of death

Mechanism of death

Manner of death

Challenges of documenting incidents



1. Detecting incidents

**Area
Search**



Nebraskaphotos.net



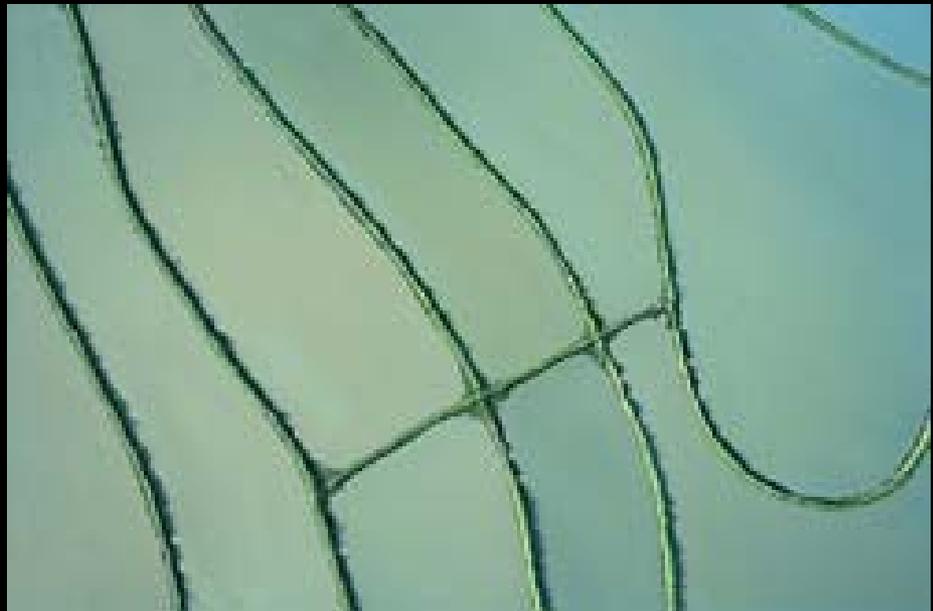
Calfed Bay Delta Program



Dan and Rachael Goddard



Calfed Bay Delta Program



Jupiterimages.com











Wildlife Mortality

Not observed

2. Reporting the incidents

Ignorant of the need to report

Ignorant of where to report

Apathy

Procrastination

Fear of prosecution

Camaraderie

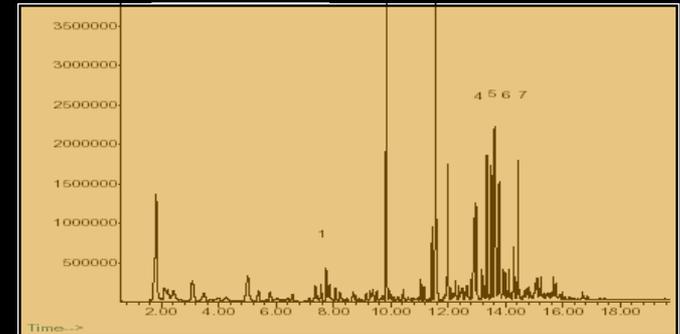
Feel sophomoric

Wildlife Mortality

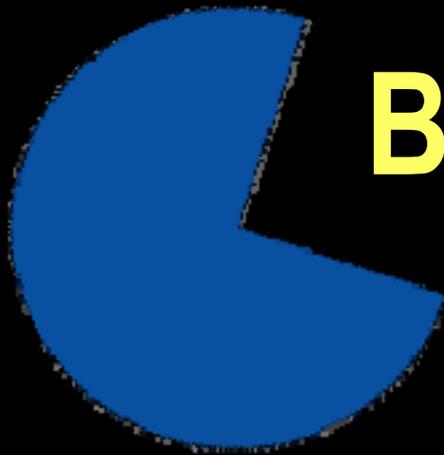


3. Confirming the incidents

Residues



Biomarkers





Linda Lyon

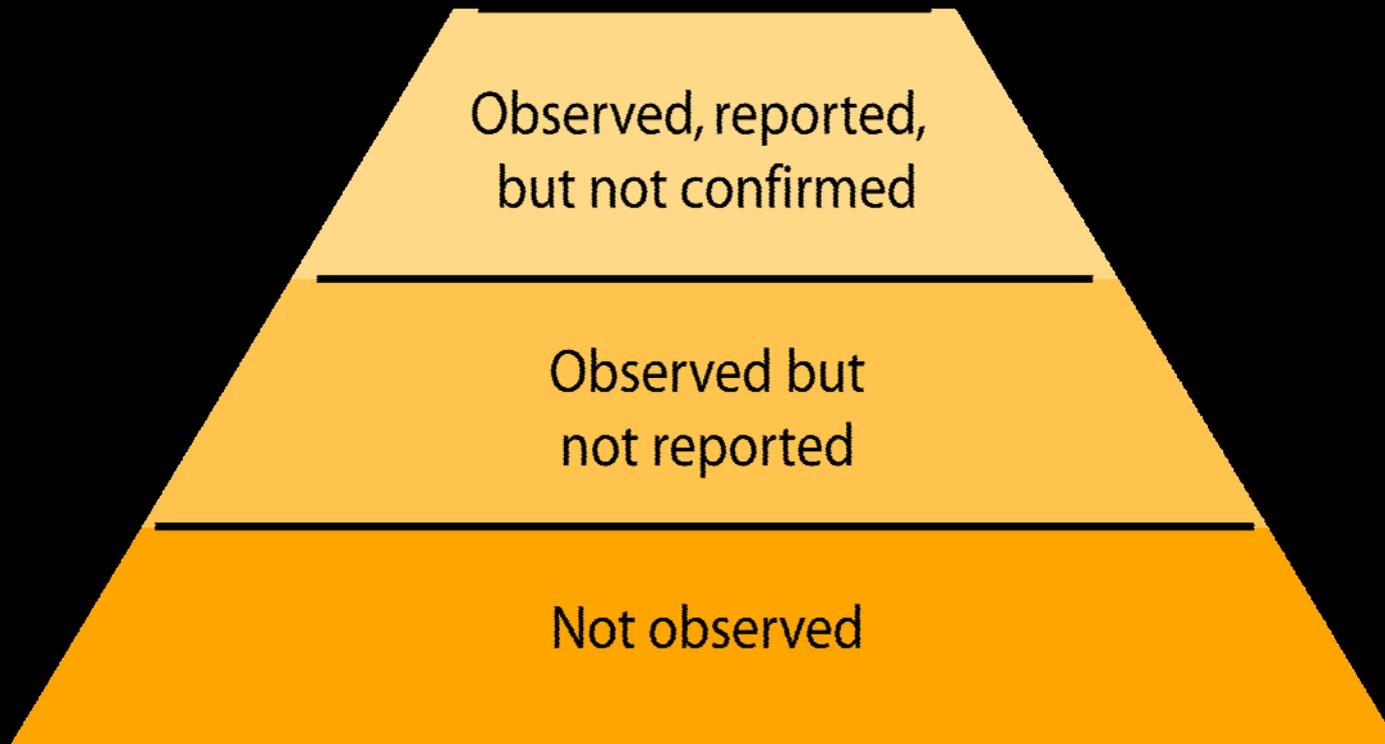


Don Patterson

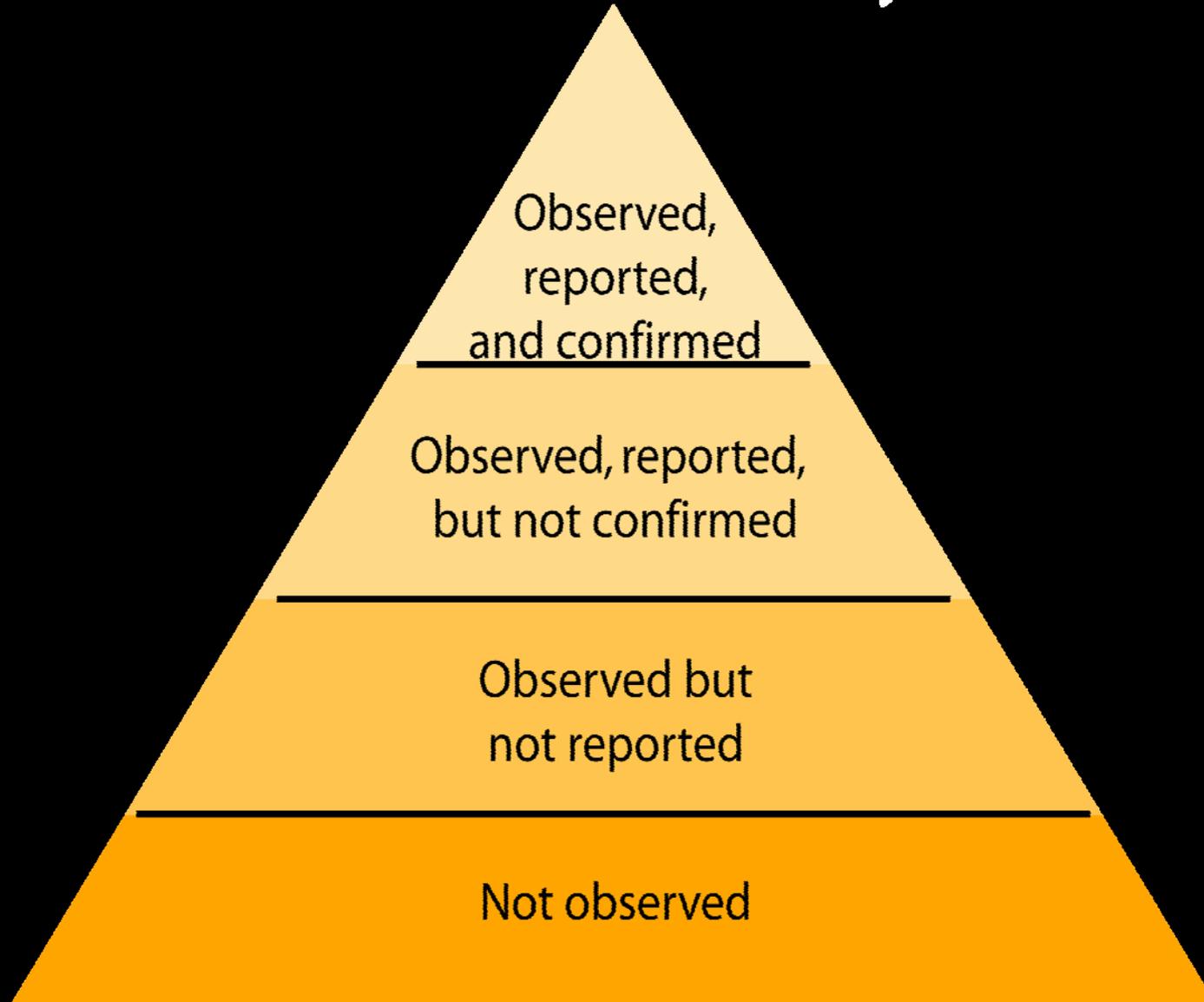


Linda Lyon

Wildlife Mortality



Wildlife Mortality



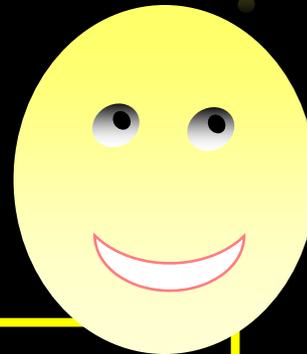
**Show me the
money**

Biases

Poor infrastructure

+

Insensitive techniques =



It's all
good

Underestimation of hazard

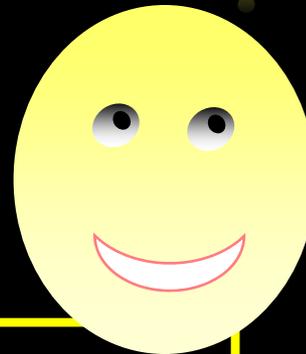
Lack of evidence \neq Safety

Biases

Poor infrastructure

+

Insensitive techniques =



It's all
good

Underestimation of hazard

Lack of evidence \neq Safety

EPA's Ecological Incident Information System (EIIS)

Contains reports submitted primarily from

- State agencies (voluntary)
- Toxicology laboratories (voluntary)
- Registrants (reporting requirements)

Changes in Registrant Reporting Requirements 1998

Registrant is required to submit detailed information on 'major' incidents

- Birds: ≥ 200 of a flocking species, or ≥ 50 of a songbird species, or ≥ 5 of a predatory species.

USEPA, Carbofuran SAP, M. Panger

Changes in Registrant Reporting Requirements 1998

Registrant is required to submit detailed information on 'major' incidents

- Mammals, reptiles, amphibians: ≥ 50 of a relatively common or herding species or ≥ 5 of a rare or solitary species.

Changes in Registrant Reporting Requirements 1998

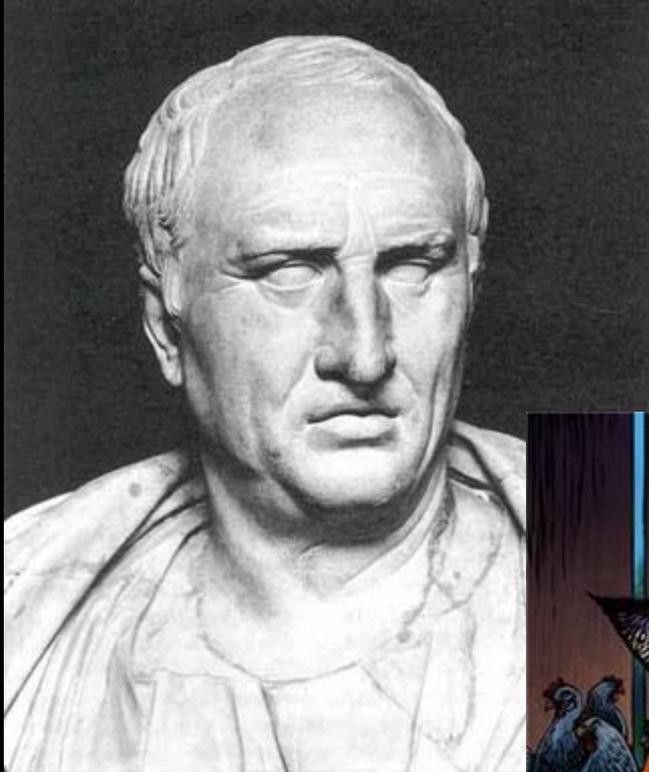
Registrant is required to submit detailed information on 'major' incidents

- Fish: $\geq 1,000$ of a schooling species or ≥ 50 of a non-schooling species.

Changes in Registrant Reporting Requirements 1998

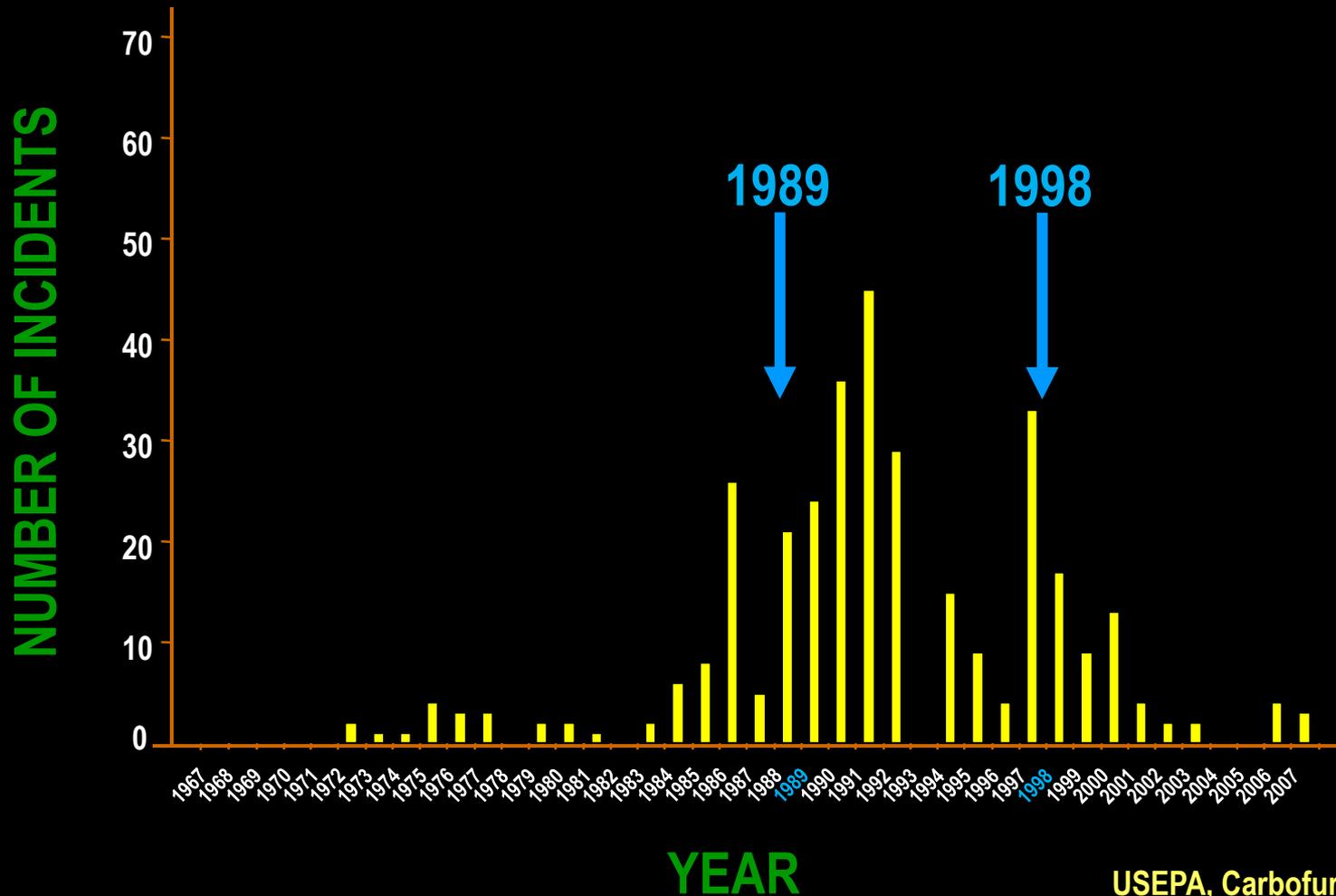
Registrant is required to submit detailed information on 'major' incidents

- **'Minor' incidents are generally reported aggregately and are not included in the EIS.**

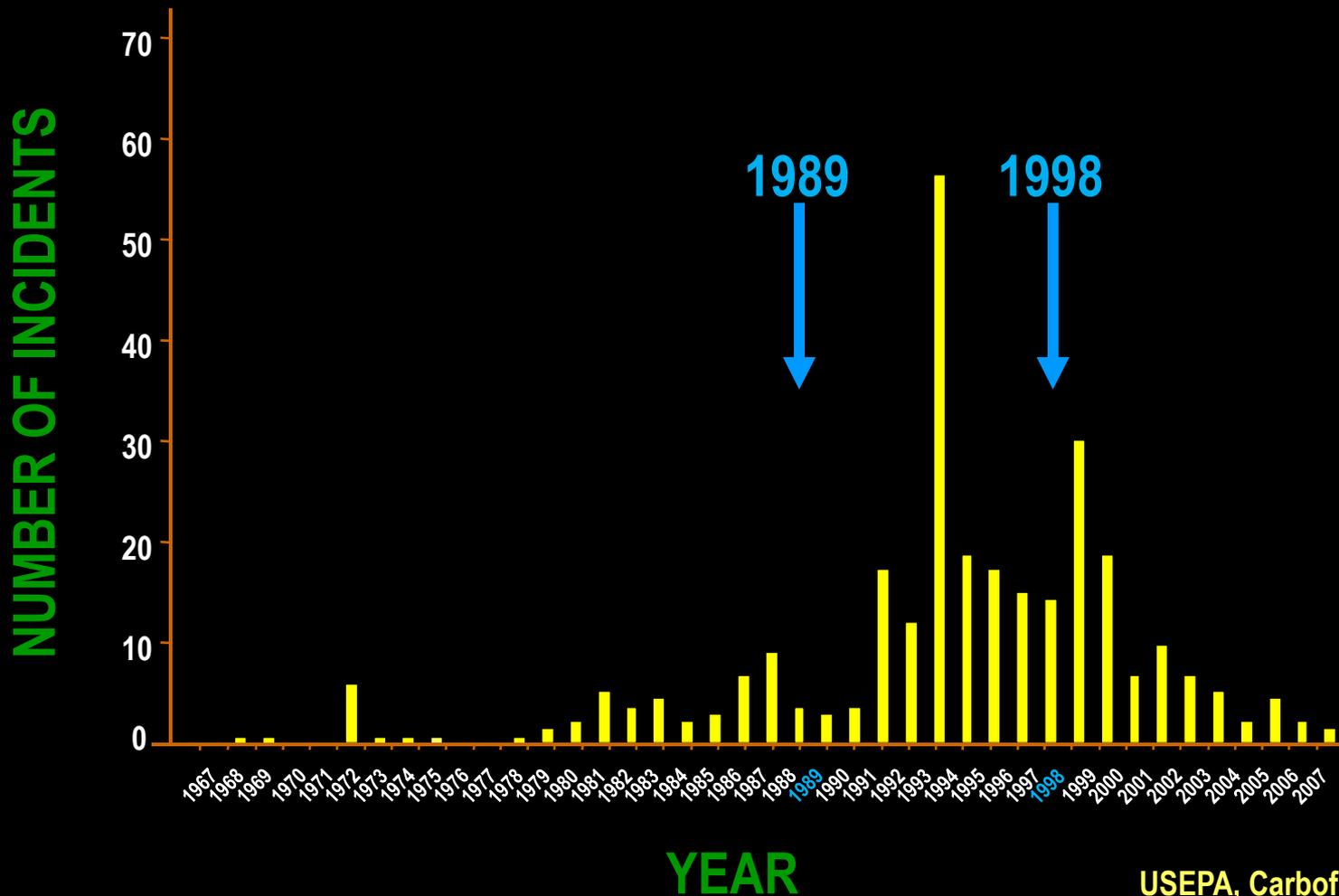


Chet Philips

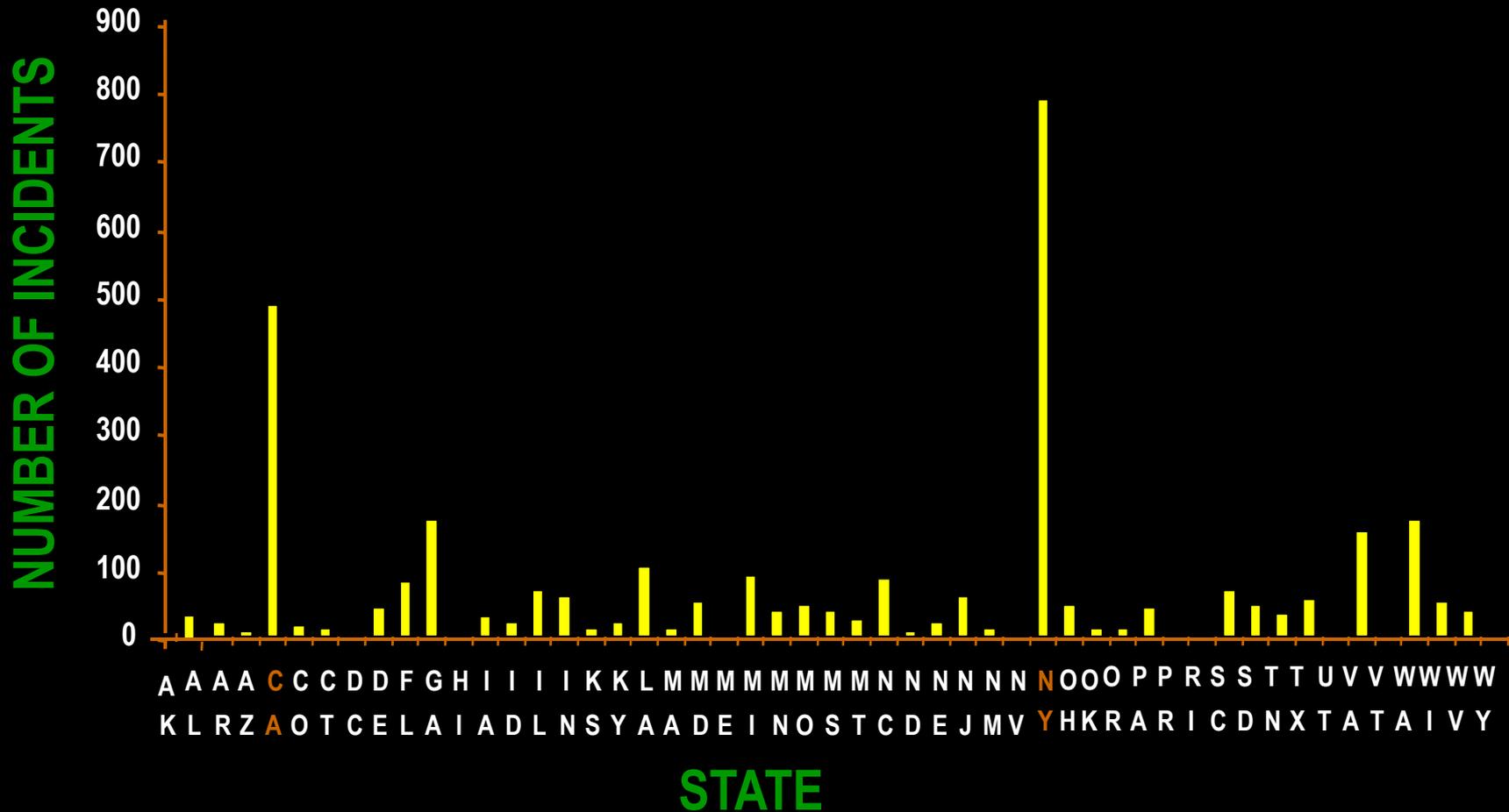
Carbofuran incidents submitted to EPA



Non-carbofuran incidents submitted to EPA



Terrestrial incidents submitted to EPA



~ 40% of all reported incidents from registered uses



USEPA, Carbofuran SAP, M. Panger

Case Study

Value of incident monitoring



In 1992 and 1993, California conducted a carbofuran-related incident monitoring program in grape orchards

- Pre-1992 = 1 incident (1986)
- 1992-1993 = 27 incidents
- Post-1993 = 0 incidents

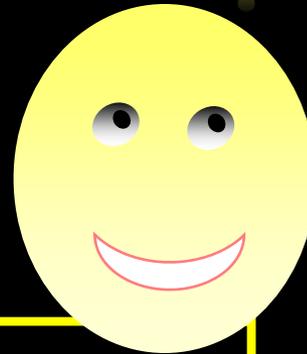
Biases

Poor infrastructure

+

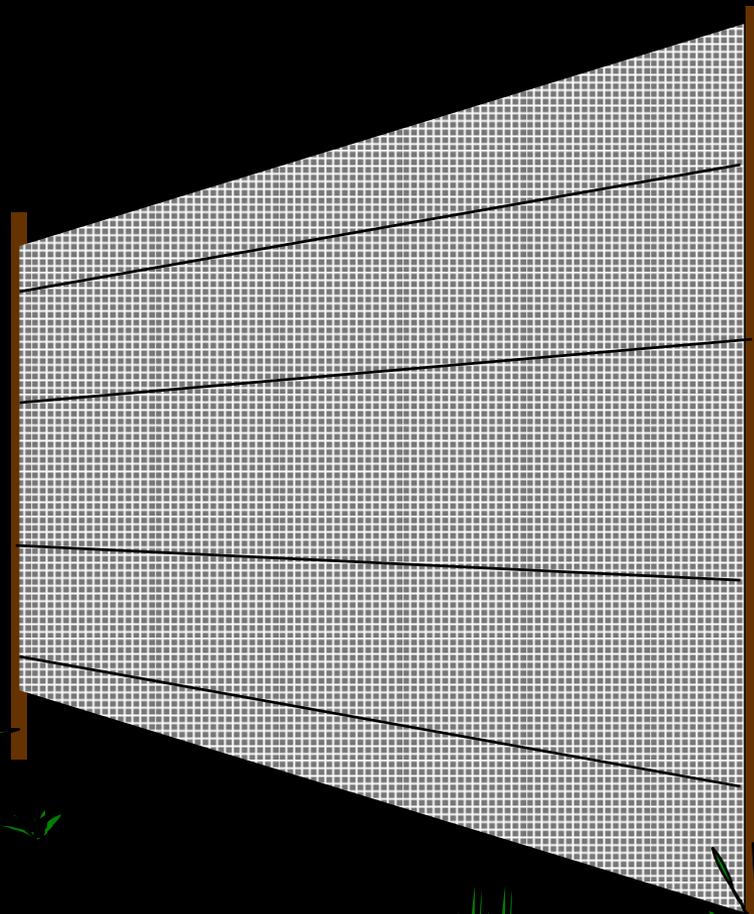
Insensitive techniques =

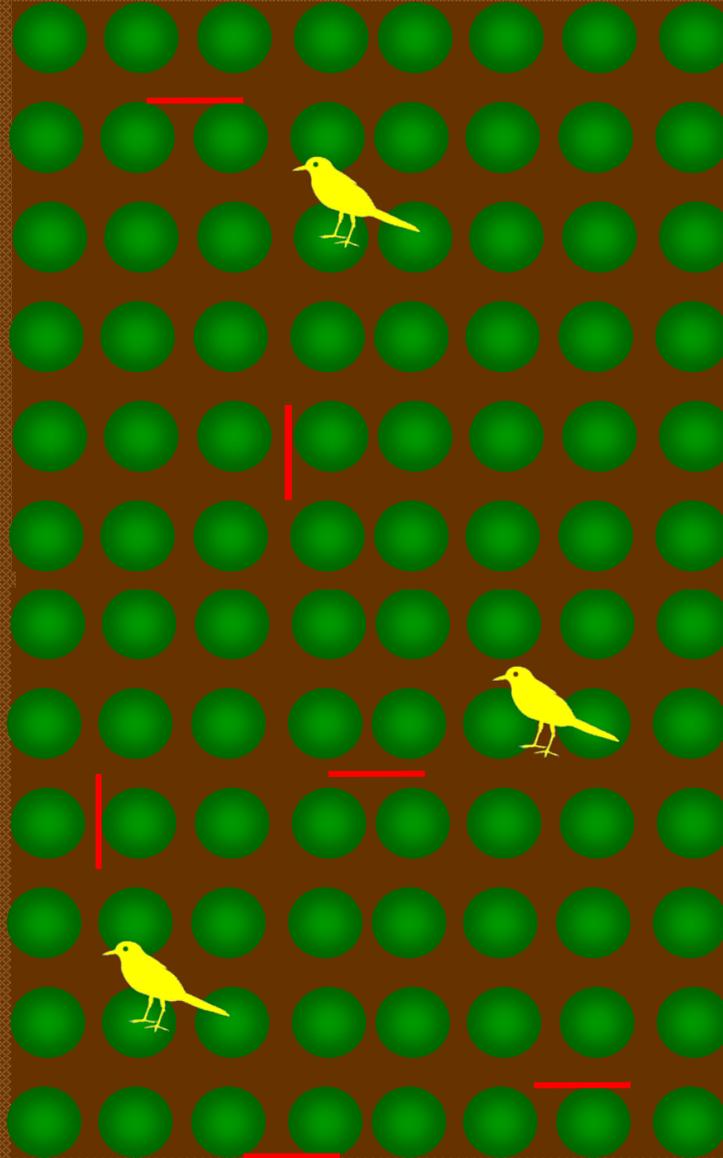
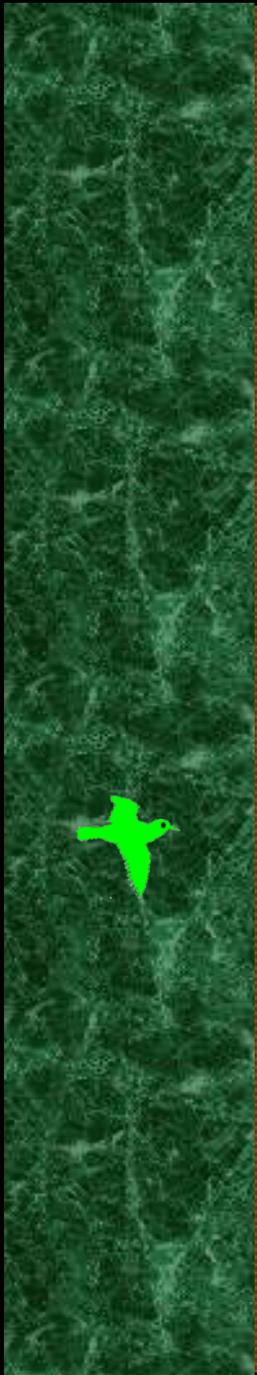
Underestimation of hazard



It's all good

Lack of evidence \neq Safety





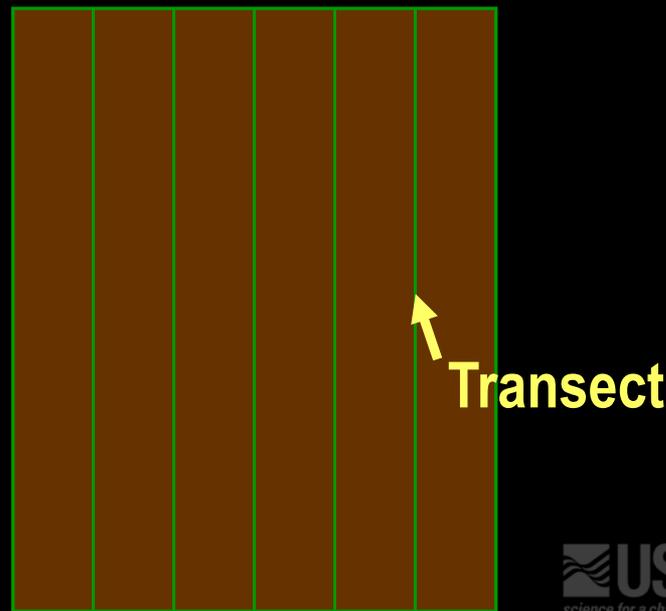
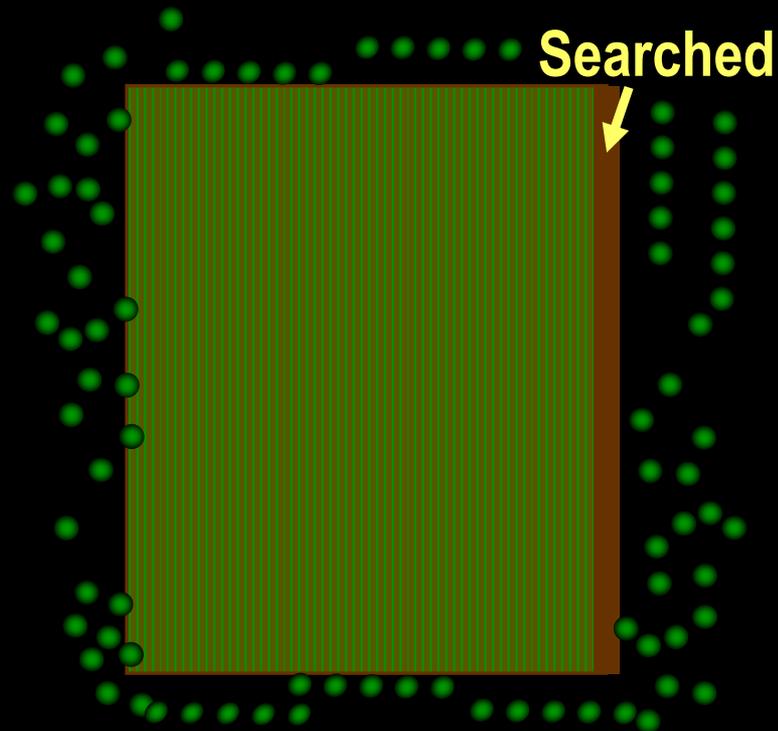




Area searched
Method of search
Time of year
Time of search



Arthur Morris



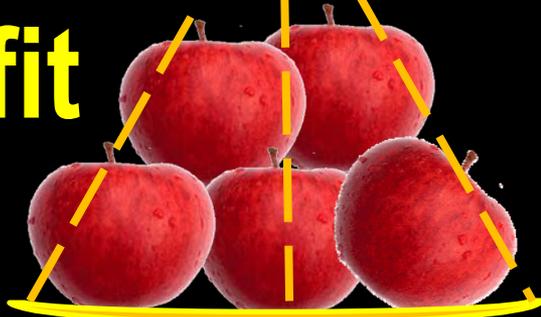
FIFRA section 3 (c)(5)

“when used in accordance with widespread and commonly recognized practice, the product will not generally cause unreasonable adverse effects on the environment”

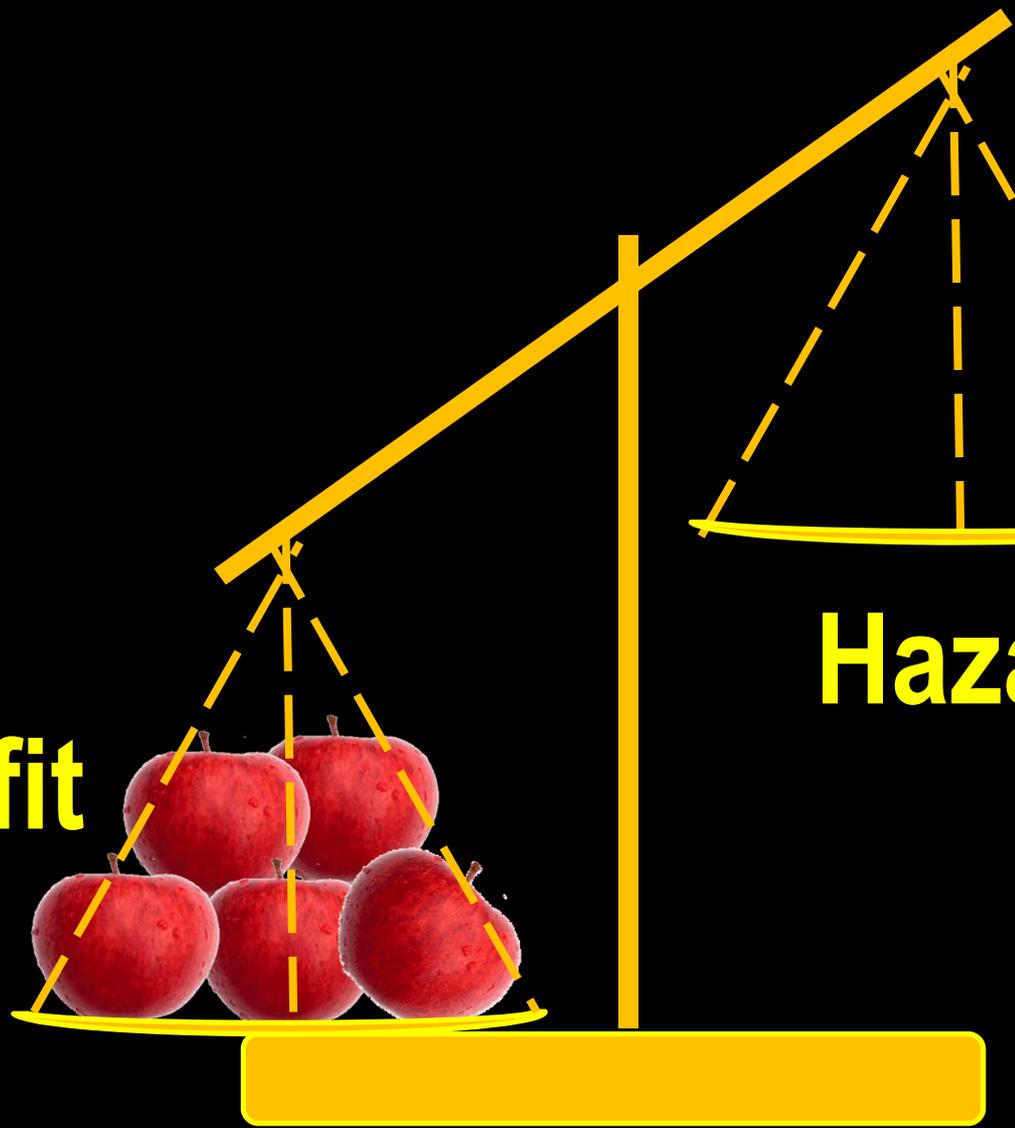
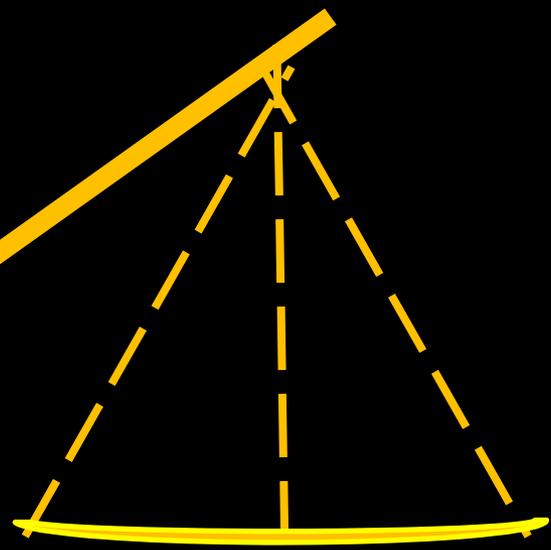
FIFRA section 2 (bb)

Unreasonable adverse effects are "any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide...."

Benefit



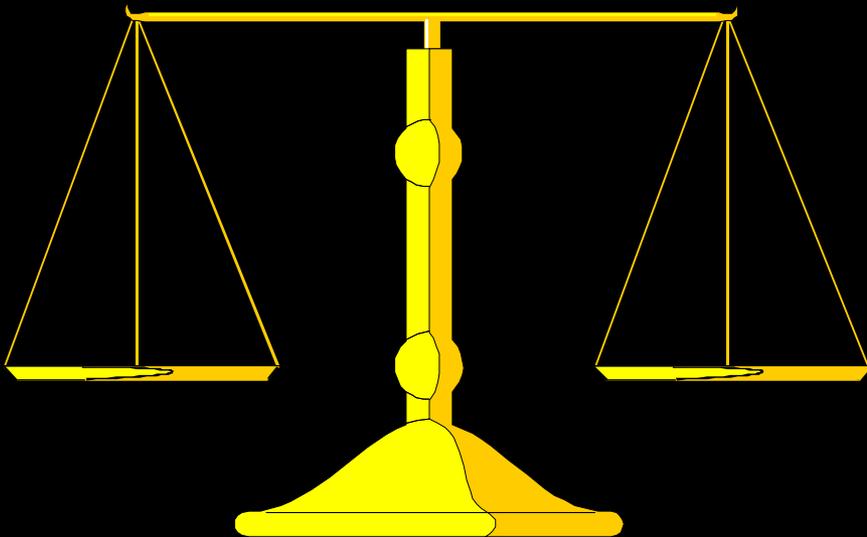
Hazard/Risk



Challenges in using the evidence

Persuading prosecutors and judges

Persuading regulators and managers



FIFRA section 3 (c)(5)

“when used in accordance with widespread and commonly recognized practice, the product will not generally cause unreasonable adverse effects on the environment”

What is more important?

Every bird per site or

Every site with a bird

