

# Vertebrate Pest Management in Pistachio Orchards

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**8<sup>th</sup>** *Advances in*  
**PISTACHIO PRODUCTION**  
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# Vertebrate Pests in Pistachio Orchards

- Ground Squirrels
- Tree Squirrels
- Pocket Gophers
- Meadow Voles
- Birds
- Rabbits/Hares
- Wild Pigs
- Coyotes
- Deer



# Vertebrate Pest Management

- Identify the pest
- Assess management options
- Develop and implement a plan
- Monitor results
- Perform continued management as needed



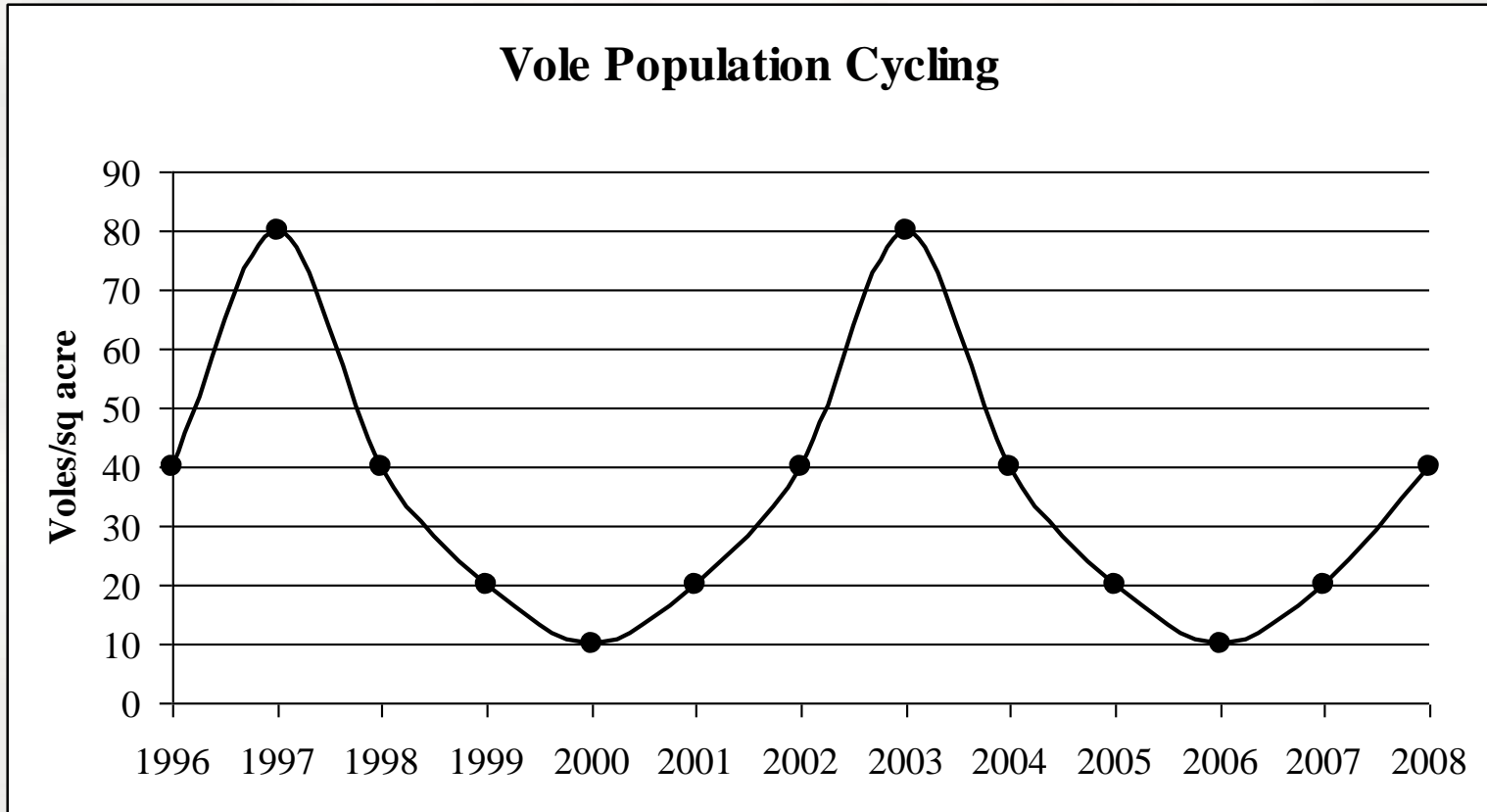
# Species Identification



# Ground Squirrels - Control

	WINTER	SPRING	SUMMER	AUTUMN
<b>MAJOR ACTIVITY PERIODS</b>				
adults		████████████████████		████████████████
reproduction		████████████		
juveniles	████████	████████████████████		
<b>MAJOR FOOD SOURCE</b>				
green foliage		████████████████████		
seeds			████████████████████	
<b>BEST TIME FOR CONTROL</b>				
fumigation		████████████		
baiting			████████	████████████
trapping		████████████████████		████████████

# Meadow Voles – Biology



# Control Options

	Habitat modification	Baiting	Burrow fumigation	Trapping	Exclusion	Repellent	Frightening	Shooting
Pocket gopher	X	X	X	X	X			
Ground squirrel	X	X	X	X				X
Meadow vole	X	X		X	X			
Hares & rabbits	X	X		X	X	X		X
Tree squirrels	X			X				X
Deer					X	X		X
Birds	X			X	X	X	X	X
Coyotes				X	X		X	X
Pigs	X			X	X			X

# Fumigation

- Aluminum phosphide
- Gas Cartridges
- Carbon Monoxide
  - PERC
  - Cheetah



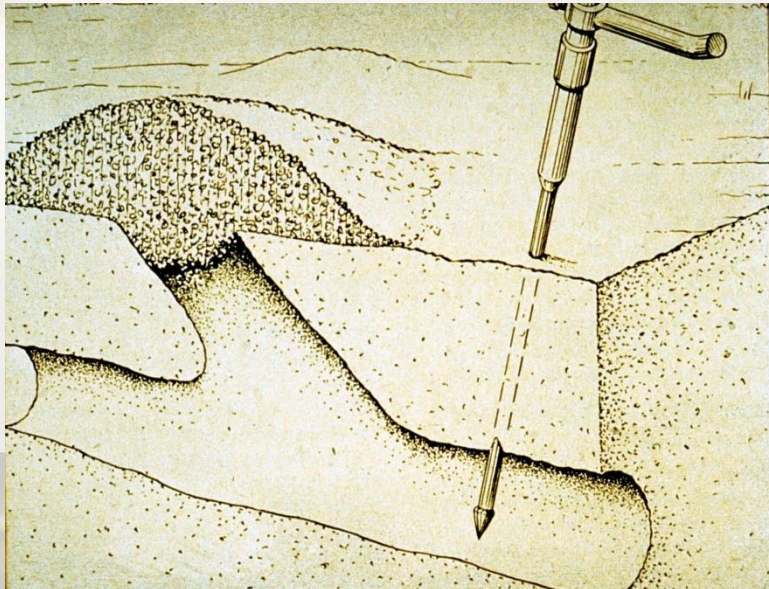


# Fumigants – What's New?

- Aluminum Phosphide
  - Fumigant management plan required
  - Application sites must be posted
  - Not labeled for use within 100 ft of occupied structure
- Gas Cartridge
  - Effective against ground squirrels, not gophers
  - Not very cost effective
- PERC – Pressurized Exhaust Rodent Controller
  - Up to 6 hoses per machine (treat multiple burrows at once)
  - 50-70% efficacy with gophers; multiple treatments can reach 100% efficacy
  - Up to 100% efficacy with Ground squirrels
  - PERC machines for commercial sale must be registered with DPR
  - Approved for use in schoolyards

# Baiting Options

- ▶ 1<sup>st</sup> generation anticoagulants
- ▶ 2<sup>nd</sup> generation anticoagulants
- ▶ Strychnine
- ▶ Zinc phosphide
- ▶ Bromethalin
- ▶ Cholecalciferol



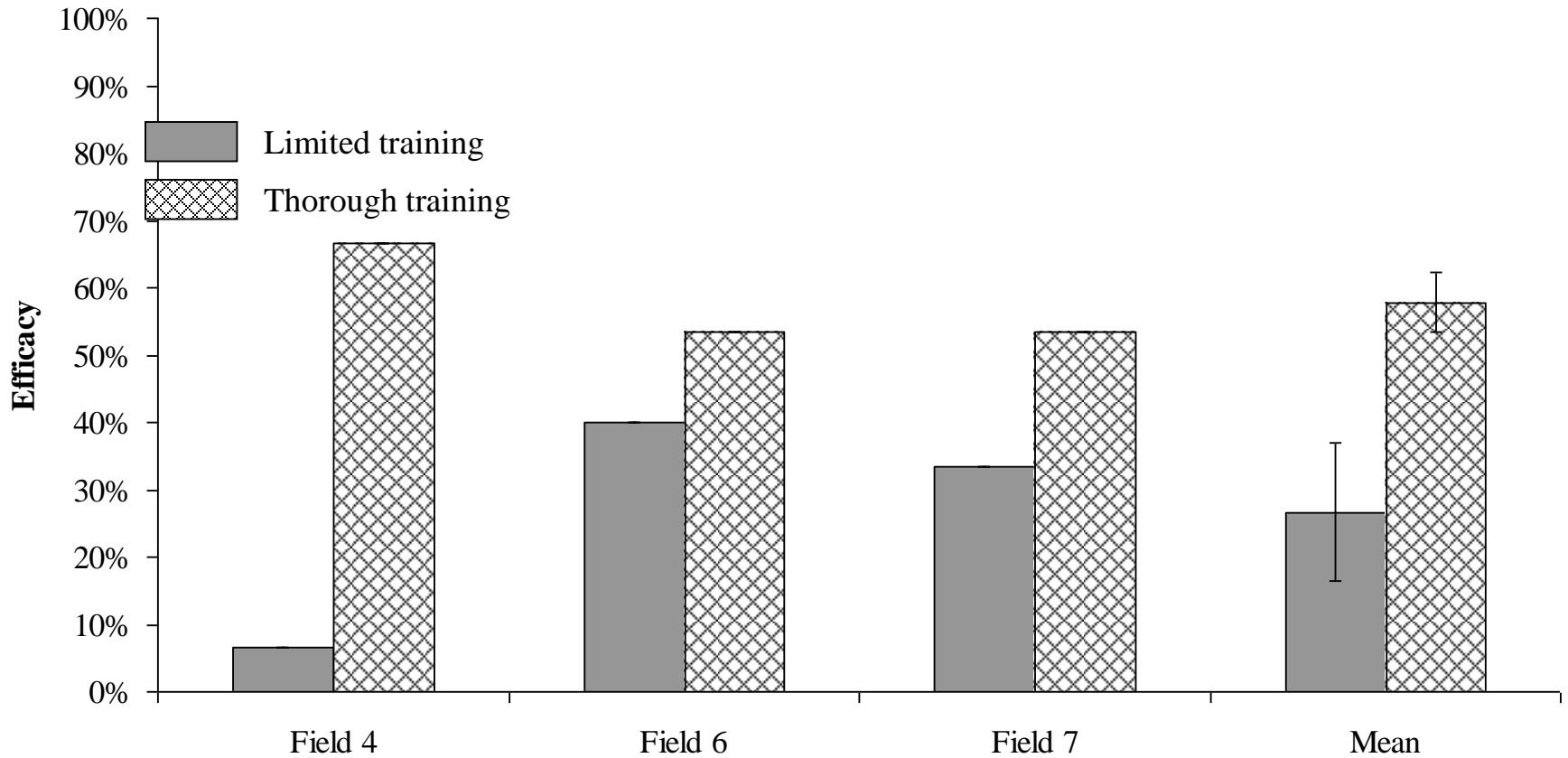
# Baiting Options

	1st Generation Anticoagulants	2nd Generation Anticoagulants	Zinc phosphide	Strychnine
Ground squirrels	X		X	
Pocket gophers	X		X	X
Moles	X		X	
Voles	X		X	
Rabbits	X			
Mice and Rats		X		

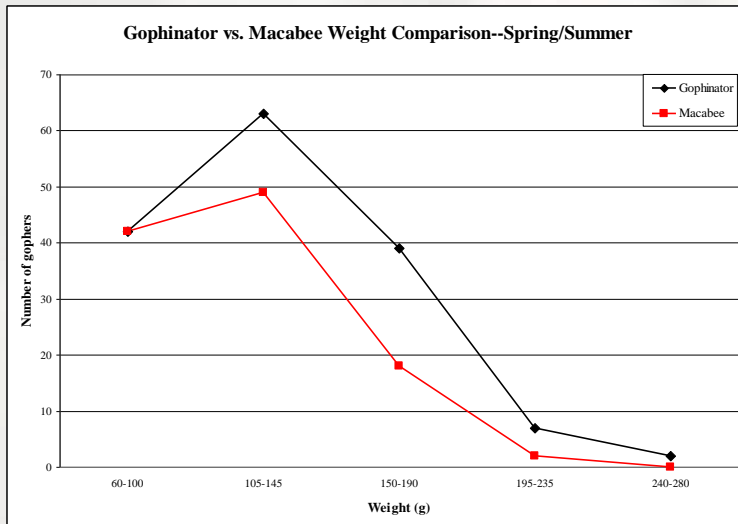
# Toxic Baits – What's New?

- 1<sup>st</sup> generation anti-coagulants
  - Now a restricted use material
  - 1-7% of raptors and kit foxes exhibited exposure
- 2<sup>nd</sup> generation anti-coagulants
  - Restricted use material under some circumstances
  - Can only purchase at Ag Supply stores, in bulk
  - Can be used up to 50 ft from a building (labels may vary)
  - Must use approved, tamper-proof bait station
  - Higher risk of secondary toxicity
    - More potent and last longer inside animal
    - 85-90% of raptors and kit foxes exhibited exposure
- Strychnine
  - Use in ag production/cultivated areas okay
  - Cannot use in park-like areas on valley floor

# Control Options—Baiting

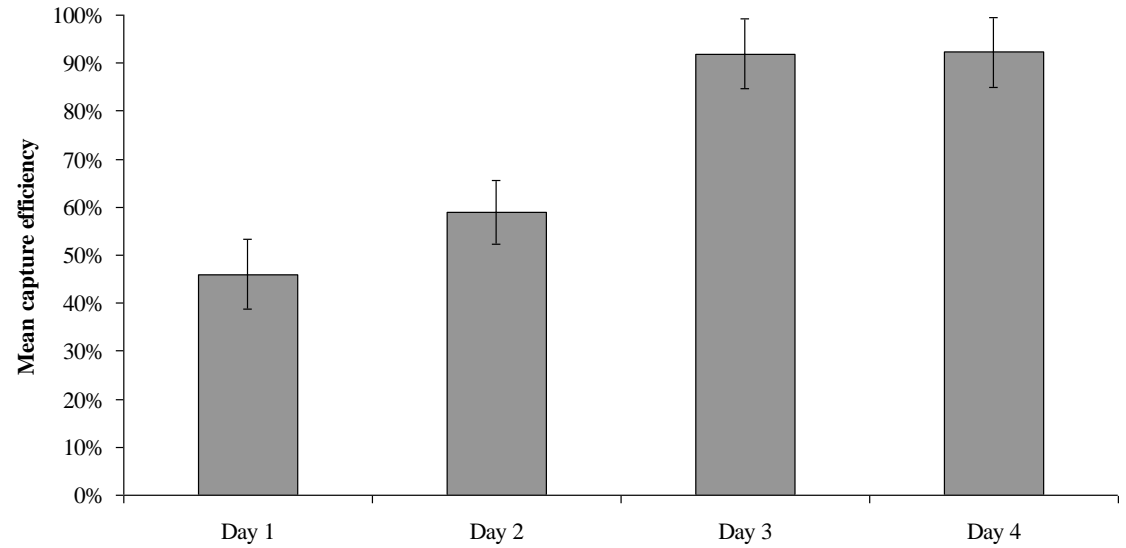


# Control Options—Trapping

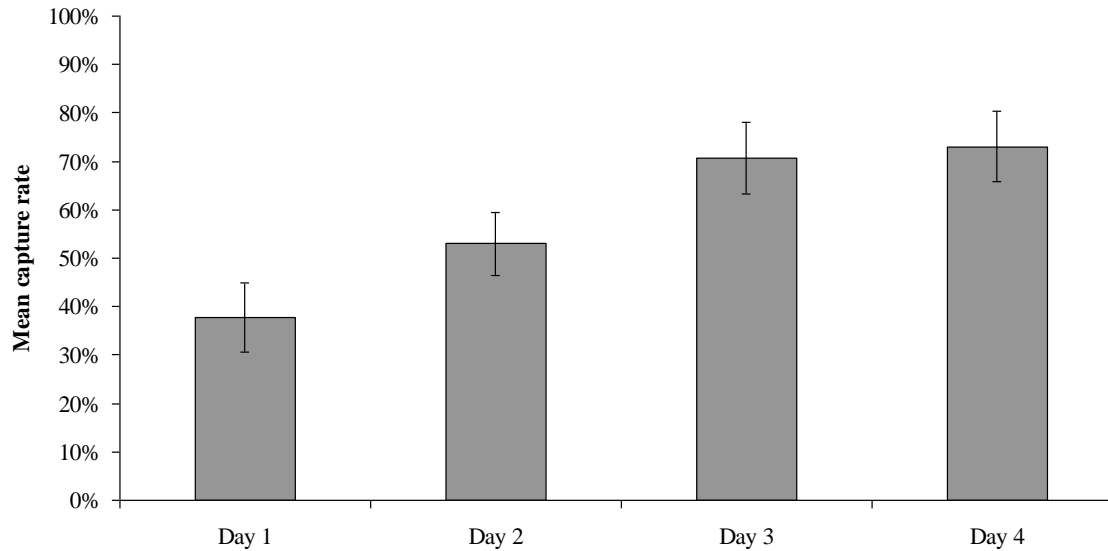


# Pocket Gophers - Trapping

Capture Efficiency



Capture Rate



# Tree Squirrels – Control

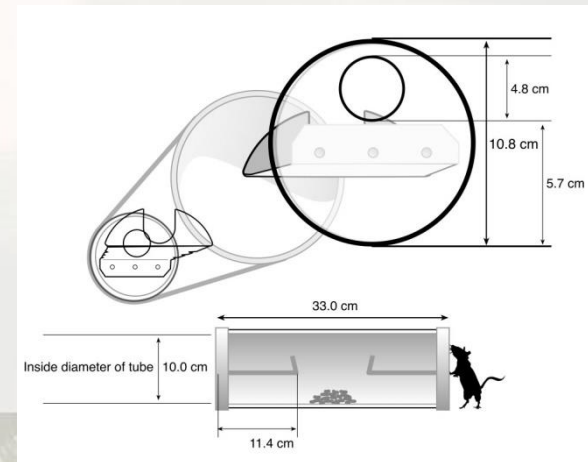
- Only Eastern Fox Squirrel can be taken without permit
  - Other three species need a permit to control
- Trapping
- Exclusion





# Roof Rats and Deer Mice

- Difacinone bait
- Non-bearing season
- ANR Publication 8513



[Wild Pig \(Revised\)](#)

[Wood Rat](#)

### **[Chapter 5 Birds Part 1](#)**

[American Coot](#)

[American Crow](#)

[Band tailed Pigeon](#)

[Blackbirds and Cowbirds \(Revised\)](#)

[Cedar Waxwing](#)

[Cliff Swallows](#)

[Common Raven](#)

[Crowned Sparrows](#)

### **[Chapter 5 Birds Part 2](#)**

[Goldfinches](#)

[Gulls](#)

[Horned Lark](#)

[House Finch](#)

[House Sparrow \(Revised\)](#)

[Jay](#)

[Magpies](#)

[Red breasted sapsuckers](#)

[Rock Doves \(domestic & feral pigeons\)](#)

[Starling \(Revised\)](#)

[Waterfowl \( ducks & geese\)](#)

[Woodpecker and Common Flicker](#)

### **[Chapter 6 Reptiles](#)**

# Hares and Rabbits - Control

- Game animals
  - No license required if a rabbit is causing damage
- Traps
  - Useful for jackrabbits and cottontails
  - Live traps not recommended
- Exclusion
  - Fencing
  - Trunk guards
- Baiting
  - Only registered for use in ag situations
  - All carcasses must be recovered



# Other Species of Concern



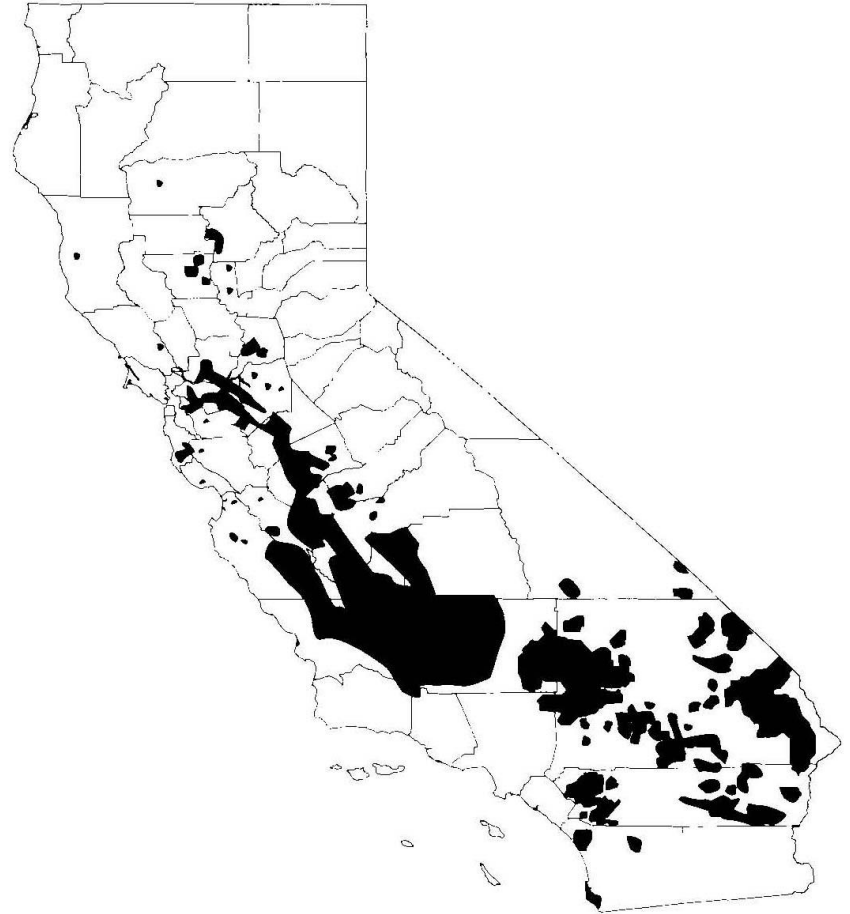
# Control Options—Other Strategies

- Shooting
  - Labor intensive
  - Compliment to frightening
- Gas explosive device
- Biocontrol
- Exclusion
  - Netting
  - Tree Guards



# Assessing Options

- Integrated approach
- Endangered species habitat
- Ag Commissioner
- Resources on CDPR website
  - <http://www.cdpr.ca.gov/>
  - PRESCRIBE



# Useful Information

UC IPM Pest notes:

- <http://www.ipm.ucdavis.edu/PMG/menu.vertebrate.html>

UCCE Vertebrate Pest Control Education Videos:

- <http://groups.ucanr.org/vpctraining/>

Vertebrate Pest Management Specialist Roger Baldwin

- <http://baldwin.ucdavis.edu/>

California DPR Endangered Species Query:

- <http://calpip.cdpr.ca.gov/county.cfm>

The Vertebrate Pest Control Handbook:

- <http://www.vpcrac.org/about/handbook.php>

The Internet Center For Wildlife Damage Management

- <http://icwdm.org/handbook/index.asp>

# Questions?



Oh Daddy, look at the kittens!