

Learning: What is it good for?

**Eating and not getting eaten
(and a few other things, too)**





3 “uses” for learning

- **Food acquisition**
 - Search Image
 - Home range maps
 - Tool use
- **Predator avoidance**
 - Alarm cues
 - Avoidance behaviours
- **Kin/species recognition**
 - Imprinting
 - Cultures

Overlap?



Northern pike
(Essox lucius)

Fathead minnow
(Pimephales promelas)



Fathead Minnow (*Pimephales promelas*)

Ferrari, Capitania-Kwok and Chivers (2006), Zhao, Ferrari and Chivers (2006) and reviewed in Griffin (2004)

Schreckstoff - Ostariophysans

- **Alarm substance (pheromone) produced by modified epidermal club cells**
- **Requires injury to skin to release**
- **“Fright reaction” - changes behavior of fish dramatically:**
 - **Swim excitedly with heads against bottom, body at 60°.**
 - **Become motionless and show no movement for several minutes**
 - **Flee to the surface frequently jumping out of the water**
 - **Flee to the depths and form a school.**

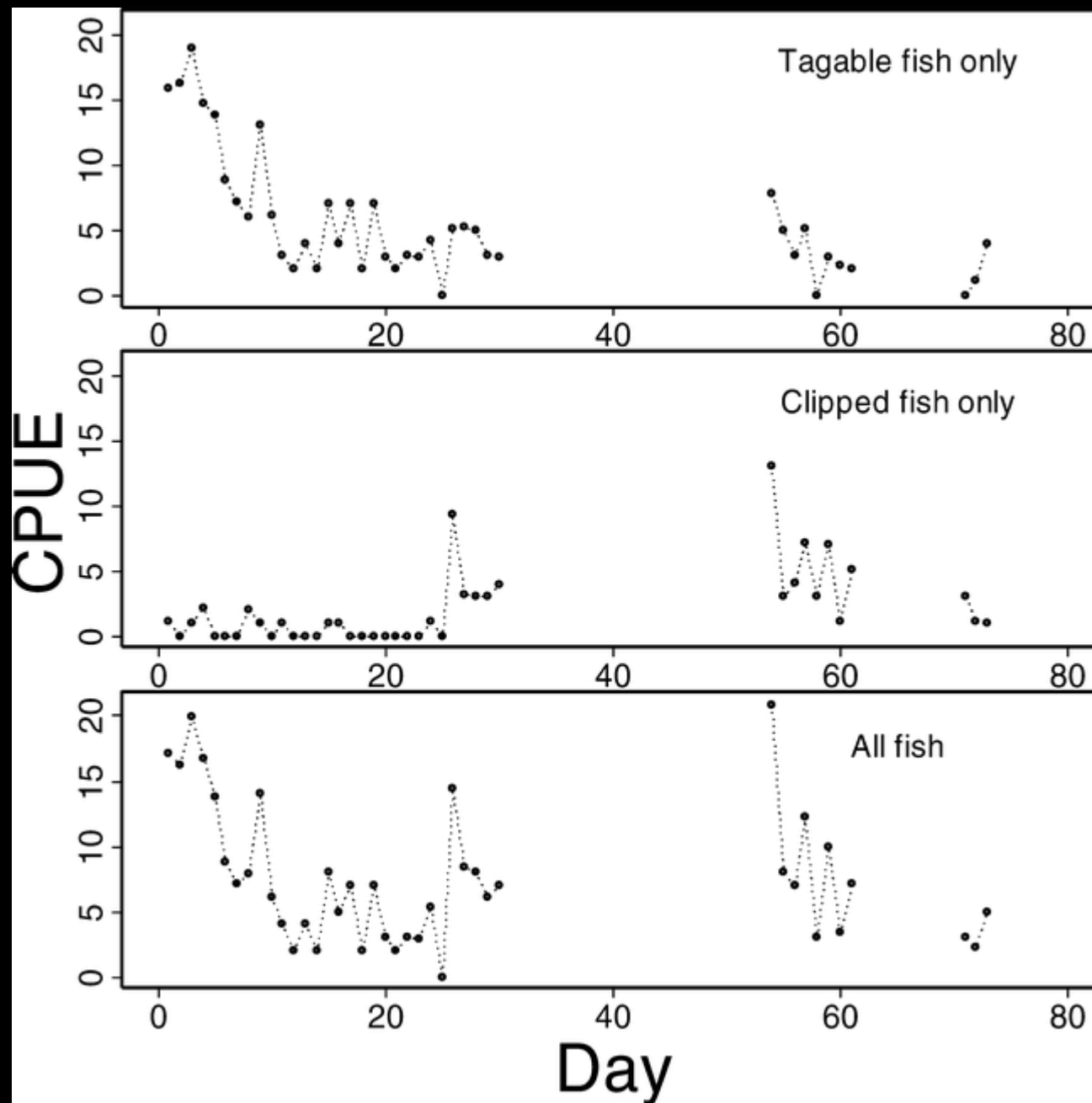
Alarm cues in fishes

- **Naïve fish can learn to recognize a predatory cue through conditioning of that cue with an alarm substance**
- **Naïve fish can also learn to recognize a predatory cue through social learning by witnessing conspecific alarm behaviour along with the predatory cue**
- **Fish modulate their alarm response behaviour to the intensity of the predatory cue, even if they have only been conditioned with one level of cue**

Catch and Release Angling



Angling

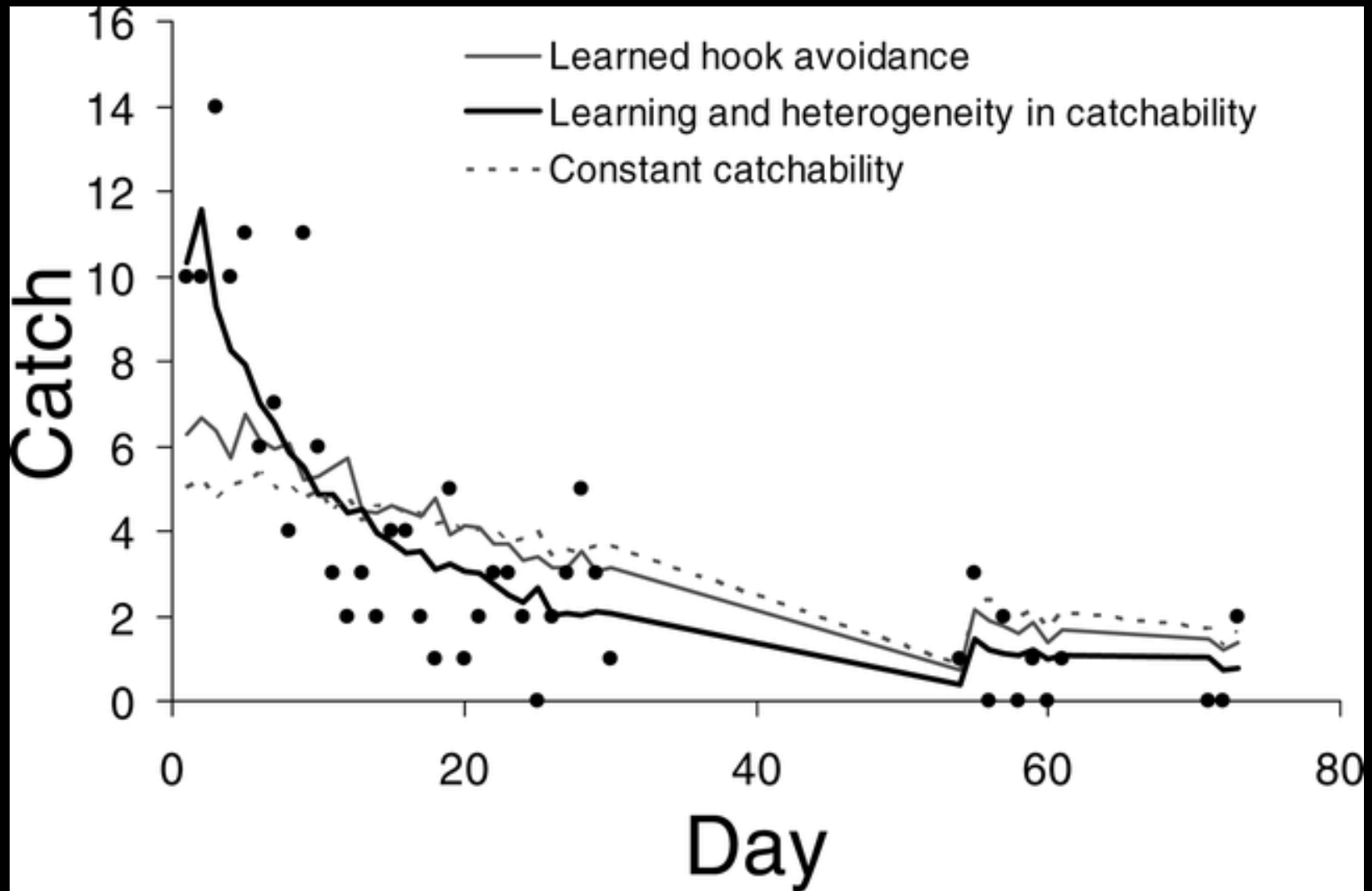


**Hook-avoidance
learned by highly
catchable fish**

**Small fish
recruited into
catchable
population**

All fish combined

**CPUE = Catch
Per Unit Effort**



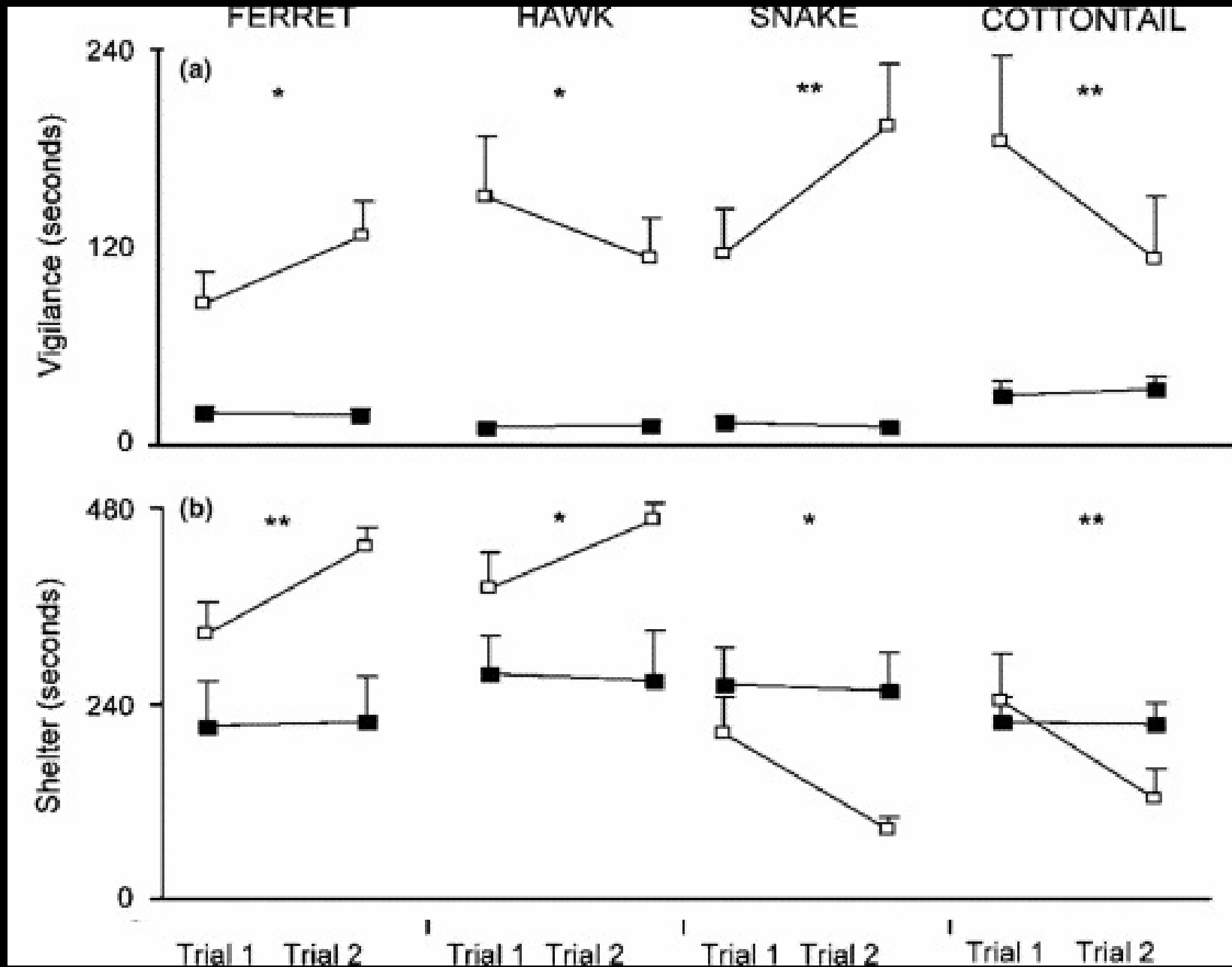
Prairie dogs

- Colonial
- Keystone spp.
- 98% population declines
- Alarm call
- Different calls/ behaviours for snakes vs. other predators

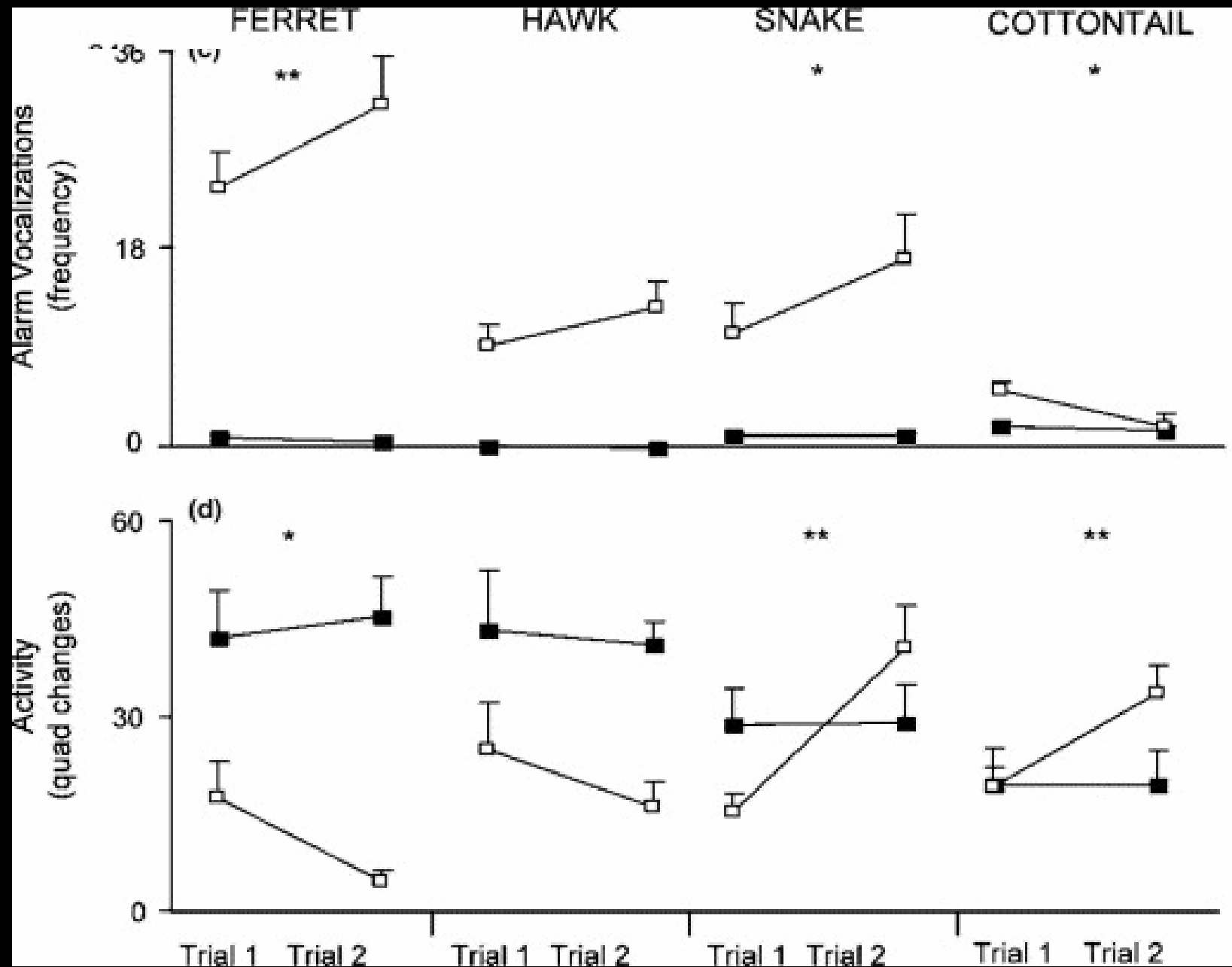


**Black-tailed prairie dogs
(*Cynomys ludovicianus*)**

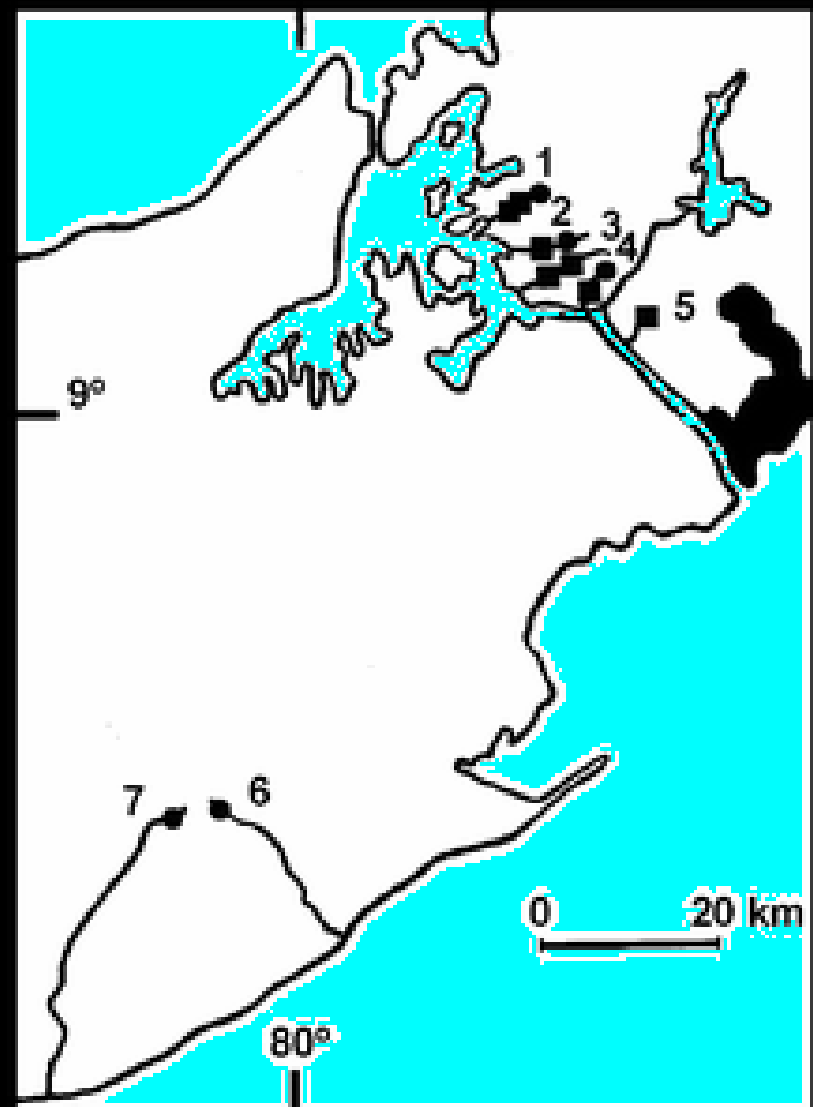
Learning in prairie dogs



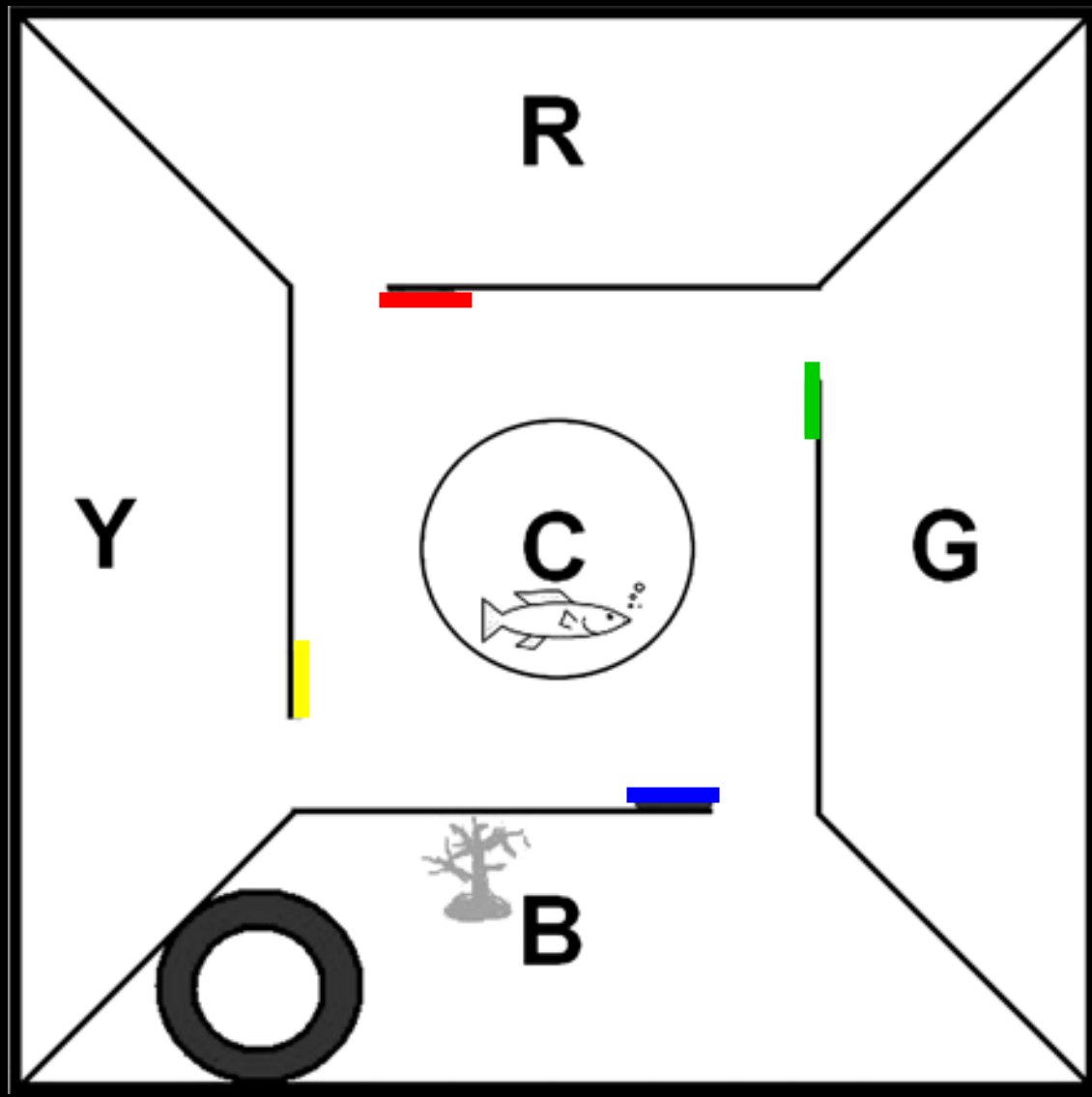
Learning in prairie dogs



Brachyraphis episcopi



The rivers are: (1) Río Macho, (2) Río Mendoza, (3) Río Frijolito, (4) Quebrada Juan Grande, (5) Quebrada Sardinilla, (6) Río Mato Ahogado and (7) Río Antón. The *dark area* is Panama City



Brachyraphis episcopi paper

- **Did the authors show learning differences based on evolutionary pressures? Why or why not?**
- **Who learned and what did they learn?**
- **What were the costs of learning?**
- **Did the authors use the right cues (coloured tiles)?**
- **Were the tests adequate to show a difference between predated and non-predated populations?**

Brachyraphis episcopi paper

- **What does it mean that some fish jumped a wall to reach the forage patch?**
- **Would it have made a difference in results if the fish had been tested with conspecifics in the test chamber?**
- **With predators (or a predator cue)?**
- **Does it matter that these fish are live bearers and not egg layers?**
- **Would you use cognition abilities as a basis for making management decisions for these populations?**

General questions

- **Is learning culturally or genetically transmitted?**
- **If learning has evolved (i.e., been selected for), than being able to learn must increase fitness. What trade-offs are made in order to increase learning potential?**
- **How much learning is too much? (Too costly?)**
- **Do behavioural syndromes affect learning potential? How and when?**

Conservation questions

- **What are the implications of cultural transmission of learning to endangered species/ captive breeding programs/ declining populations?**
- **What are the implications of genetic based learning for these same animals?**
- **Should learning/ learning potential be considered as a valuable trait to be conserved in vulnerable populations?**