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### Outline

- I. Introduction
- II. Discuss harmful effects livestock have on amphibians
- III. Research
- IV. Why most important?

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### Introduction

- USDA - 2014
  - Range & Pasture
    - 528 million acres (contiguous 48 states)
  - Other
    - 106 million acres
  - Approximately 1.1 million cattle farms in US (USDA 2007)
  - "...artificial ponds created for agriculture or stockbreeding purposes represent valuable, strategic breeding habitat for wildlife, such as amphibians" (Canals, et al. 2011)

Year	Inventory (Million)
1874	~30
1894	~40
1914	~50
1934	~60
1954	~70
1974	~110
1994	~90
2014	87,730,000

[http://www.nass.usda.gov/Charts\\_and\\_Maps/Cattle/inv.asp](http://www.nass.usda.gov/Charts_and_Maps/Cattle/inv.asp)

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## Effects on aquatic systems

- Vegetation loss
  - Exposes soil
  - Increases water temperature
  - No cover or escape
  - Loss of breeding and foraging sites
  - Increases runoff
- "Sediment runoff is higher for heavily grazed watersheds compared to lightly grazed watersheds" (Hoorman 1999)
- Pesticides and fertilizers
  - Toxic
- Nitrogenous waste
  - Drinking, grazing, cooling
- Trample egg masses



[https://c1.staticflickr.com/3/2381/2160673208\\_baa471ca6c.jpg](https://c1.staticflickr.com/3/2381/2160673208_baa471ca6c.jpg)

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[https://www.blounttn.org/col/images/85/85\\_StreamCrossing.jpg](https://www.blounttn.org/col/images/85/85_StreamCrossing.jpg)

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## Example



[http://www.ualberta.ca/~ahamani/teaching/renu\\_601/projects2008/janet/introduction\\_file0314336.jpg](http://www.ualberta.ca/~ahamani/teaching/renu_601/projects2008/janet/introduction_file0314336.jpg)

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## Study on Larval Amphibians

- Cumberland Plateau
  - 7 ponds (wetlands)
    - 3 cattle access
    - 4 non-access
- March – August
  - 2005 - 2006
- Sampled larvae
  - 2x/week
- Water quality
  - 2x/month
- Algal & detritus biomass
  - 1x/month
- Species present
  - Bufo spp.
    - American toad & Fowler's Toad
  - Spring peeper
  - American bullfrog
  - Green frog
  - Pickerel frog
  - Southern leopard frog

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## Sampling Techniques

- Four Quadrants
  - 1 quadrant randomly selected using sein & dip nets
    - Opposing quadrant then sampled
  - Dip net sampling performed in remaining two quadrants
  - All captured larvae were counted and identified to species. (*Bufo spp.* identified to genus only)
    - First 5 larvae processed were measured, weighed and the Gosner stage was recorded.

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## Results

### ACCESS

- Turbidity was an average 3.6xs greater
  - From trampling vegetation & disturbing sedimentation
- Increased nitrogenous waste
- Lower amounts of detritus
- Species richness greater in low grazing compared to high.

### NON-ACCESS

- Overall species richness was greater.
- Increased biomass of amphibians
- Increased dissolved oxygen
  - Increased D.O. = increased species richness

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## Number One Killer

Large cattle industry

- Many cattle exposed water sources that are vital for amphibian breeding.

"Excluding cattle from wetlands helps protect species richness of larval amphibian communities" (Burton et al 2009).

Cattle exclusion fenced could reduce die-offs



[http://www.courcwaterpa.org/wp-content/uploads/2012/10/PA-cows-crossing-matt-kofoth\\_599192.jpg](http://www.courcwaterpa.org/wp-content/uploads/2012/10/PA-cows-crossing-matt-kofoth_599192.jpg)

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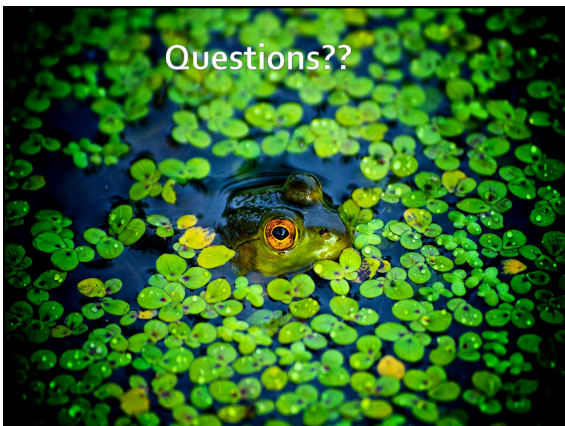
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## Questions??



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