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### Outline

- Cattle facts
- Effects on pre-metamorphic amphibians
- Effects on post-metamorphic amphibians

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### How many cattle are there?

- According to the USDA there were approximately 90.8 million head of cattle in the U.S. as of January 1<sup>st</sup> 2012.
- To put that into perspective
  - ▣ 507 times greater than Knoxville's population of 178,874 people.
  - ▣ 14 times greater than Tennessee's population of 6,456,243 people.

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## Effects on larval amphibians.

- It is speculated that egg masses can sustain losses due to trampling.
- Larval amphibians are affected most by damage done to water quality.




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## More effects on larval amphibians.

- Important effected water quality parameters.
  - Turbidity 3.5x greater in cattle-access wetlands.
    - Stirring up sediment
    - Defecation.
      - Can lead to eutrophication.
      - Lowered dissolved oxygen.
    - Increased levels of nitrogen and ammonia.
    - Ammonia produced higher percentages of deformities and reduced egg survival. (Jofre and Karasov 1998)
  - Schmutzer et al. showed a decrease in ranid populations in more turbid cattle-access wetlands.
    - Smothering of egg masses.
    - Reduce larval stage amphibians abilities to find food.
- Excluding cattle from wetland areas protects species richness of larval amphibian communities. (Schmutzer, 2008)

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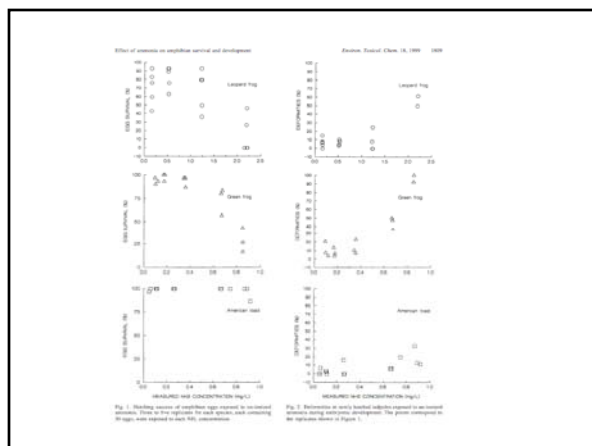
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## Effects on post metamorphic amphibians

- Jansen and Healey,
  - Studied 25 wetlands of varying size.
  - Conducted frog surveys.
    - Looked at egg masses.
    - Conducted call surveys.
  - Also assessed wetland condition.
- Increase in grazing intensity
  - Decrease in species richness and wetland condition.
- Impacts felt most with concerns to vegetation.
  - Removal of habitat structural complexity may lead to an increase in predation by fish on adults as well as larvae.
  - May also decrease reproductive opportunities.

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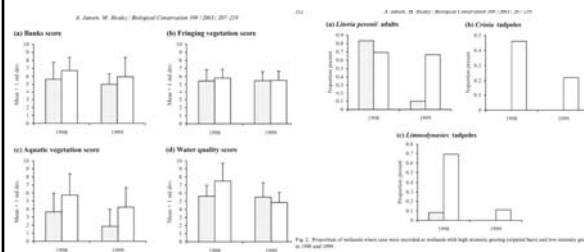
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## Effects on post metamorphic amphibians.




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## Are cattle the biggest concern?

- Causes a loss in species richness in both pre and post metamorphic individuals.
- Degrades water quality.
- Attributes to the alteration of habitat.

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## References

- Jansen, Amy, and Michael Healey. "Frog communities and wetland condition: relationships with grazing by domestic livestock along an Australian floodplain river." *Biological Conservation*. 109. (2003): 207-219. Print.
- Jofre M.B. & Karasov W.H. (1999) Direct effect of ammonia on three species of North American anuran amphibians. *Environmental Toxicology and Chemistry*, 18, 1806-1812
- Schmutzer, Chandler, Matthew Gray, Elizabeth Burton, and Debra Miller. "Impacts of cattle on amphibian larvae and the aquatic environment." *Freshwater Biology*. 53. (2008): 2613-2625. Print.
- "USDA ERS-Cattle & Beef." *Statistics & Information*. USDA, 26 may 2012. Web. 16 Apr 2013. <<http://www.ers.usda.gov/topics/animal-products/cattle-beef/statistics-information.aspx>