

ROADS AND AMPHIBIAN DECLINES

By: Dylan Compton



INTRODUCTION OF THE PROBLEM

- Road mortality is a widely recognized but rarely quantified threat to the viability of amphibian populations.
- The global extent of the problem is substantial and factors affecting the number of animals killed on highways include life-history traits and landscape features.
- Secondary effects include genetic isolation due to roads acting as barriers to migration.

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INDIRECT PROBLEMS

- Indirectly, roads may increase animal mortality by affecting animal behavior, reproduction capabilities, fragmenting their habitat, exposing animals to harsh climates and substrates, exposing animals to chemicals, and roads may serve as a physical barrier and isolate populations.



<http://campus.murraystate.edu/academic/faculty/hwhiteman/pdf/consbiojournalvol11-bkoby/arz.pdf>

INDIRECT CONTINUED

- Indirect effects also include alteration (e.g., changes in temperature, moisture, light, noise, pollutants). Such changes may influence the behavior, survival, growth, and reproductive success of individual animals.
- For example, increases in the noise and light levels may disorient an animal, preventing them from crossing a road by posing a risk or obscuring cues necessary to follow certain paths, thus interfering with access to cover, food, and mates.

<http://fishandgame.idaho.gov/public/wildlife/collisionAmphibRep.pdf>

ROAD FACTS

- Approximately 4.07 million miles of roads in the United States.
- From 2000 to 2010, the US added 35,801 miles of roads
- • 55% were local roads for residential neighborhoods
- • 19% were for adding to existing major roadways
- Worldwide, there are 11,194,445 miles of roads and highways (Central Intelligence Agency)

<https://www.cia.gov/Library/publications/the-world-factbook/fields/2085.html>

ROAD MAP OF TENNESSEE



ROAD MORTALITY

- In a study the activity patterns of Fowler's Toads on an 800-m long road in Massachusetts, were monitored over the course of an 11-wk period during the upland activity season of this species. The results indicated that a large number of individuals were active during nonrainy nights.



• SOC STUDY AMPHIBIANS REPTILES, C/O ROBERT D ALDRIDGE, ST LOUIS UNIV, DEPT BIOLOGY, 3507 LACLEDE, ST LOUIS, MO 63103 USA

STUDY OF MORTALITY RATES

- Seibert and Conover (1991) performed a 14-month road-kill count of vertebrates and invertebrates on a dual highway in Athens County, Ohio, and they found that approximately 40% of the victims were amphibians.



<http://campus.murraystate.edu/academic/faculty/hwhiteman/pdf/consbiojournalvol1-bkobyjarz.pdf>

MORTALITY CONTINUED

- Wyman (1991) reported average mortality rates of 50.3% to 100% for salamanders attempting to cross a paved rural road in New York.
- He suggested that individual salamanders generally fare worse than frogs because they are slower moving and often "freeze" in response to approaching vehicles.
- A different study recorded road mortality for >32,000 individuals over a 3.6 km two-lane road for a period of 716 days. Amphibians accounted for 92.1% of the total road mortality.

PURDUE UNIVERSITY STUDY

- "On hot summer nights when it rains, there are literally thousands of frogs out there," said Andrew DeWoody, a Purdue researcher.
- During the 17-month study, researchers found 10,500 dead animals along 11 miles of roads. Of those, 7,600 were frogs of unidentifiable species and another 1,700 were bullfrogs.



<http://www.purdue.edu/uns/x/2008a/080416/>

Purdue continued



- The dead included 142 road-killed eastern tiger salamanders, a finding DeWoody said was troubling.
- The number might not look large, but most individuals were mature, up to 10 years old, many of them were gravid, or females bearing eggs on an annual trip to breeding grounds where they often lay 500 to 1,000 eggs.

GLOBAL LEVEL

- The global extent of the problem is substantial and factors affecting the number of animals killed on highways include life-history traits and landscape features. Long-term effects of roads on population dynamics are often severe.



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FUNDING PROBLEM

- Despite the development of methods that reduce road kill in specific locations, especially under-road tunnels and culverts, there is scant evidence that such measures will protect populations over the long term.
- There also seems little likelihood that funding will be forthcoming to prevent further population declines.



POSSIBLE SOLUTIONS

- There are a few suggested ways by which amphibian road mortality could be reduced. Barriers, in conjunction with underpasses or toad tunnels could separate vehicles from amphibians, while allowing amphibians to travel between different habitats.

<http://campus.murraystate.edu/academic/faculty/hwhiteman/pdf/consbiojournalvol1-bkobyjarz.pdf>



SOLUTION CONCERNS

- One concern with this approach is that predation may be increased by funneling both predators and prey through the underpass or tunnel, which may shift the amphibian mortality from being traffic-related to predation.



<http://campus.murraystate.edu/academic/faculty/hwhiteman/pdf/consbiojournalvol1-bkobyjarz.pdf>

SOLUTIONS CONTINUED

- Another possibility would be to educate and alert drivers of areas of concern, where amphibians have been recorded crossing.
- Frog and salamander crossing signs could alert drivers of these special areas of concern.



REFERENCES

- WILEY-BLACKWELL, 111 RIVER ST, HOBOKEN 07030-5774, NJ USA :Research Areas:Biodiversity & Conservation; Environmental Sciences & Ecology.Web of Science Categories:Biodiversity Conservation; Ecology; Environmental Sciences
- SOC STUDY AMPHIBIANS REPTILES, C/O ROBERT D ALDRIDGE, ST LOUIS UNIV, DEPT BIOLOGY, 3507 LACLEDE, ST LOUIS, MO 63103 USA
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- <http://www.purdue.edu/unsl/v/2008a/080416DeWoodyRoadkill.html>
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