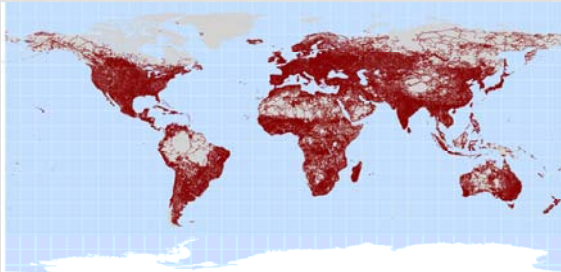


AMPHIBIAN DECLINES DUE TO ROAD MORTALITY

LEAH MORAN
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Map of Known Roads Worldwide

- Worldwide, there are 11,194,445 miles of roads and highways (Central Intelligence Agency)

ROADS OF THE UNITED STATES

- Approximately 4.07 million miles of roads in the United States, excluding Puerto Rico. (Federal Highway Administration)
- 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
- Roads make up less than 1% of the land in the U.S.
- According to the Council on Environmental Quality the Federal Highway Program has created over 52,000 acres of wetlands since 1996, or for every 1 acre of wetland negatively impacted, 3 new acres are restored or created.



U.S. Roads

THE EFFECTS OF ROADS...

- Traffic mortality has a significant negative effect on local density of anurans
- Increase in traffic volumes worldwide contributing to a decrease in world anuran populations
- Many need to use more than 2 habitats to meet needs, many separated by roads
- 26 cars/hr could reduce survival rate of toads crossing to zero
- 20-40 cars/hr killed 50% of migrating *Bufo bufo*
- Compared to all other families of animals, amphibians have the most kills on road mortality studies

- Number of dead and live frogs and toads/km decrease with an increase in traffic intensity.
- Proportion of dead frogs and toads increase with an increase in traffic intensity
- Frog/toad density increases with an increase in traffic intensity
(See Figure on next slide)

Route	Countdown	Time	Highway	Total KMs	Route Distance	No. of Services	Total km surveyed	Animals surveyed
Lansburg Rd	72	88	8,016	8,176	1.8	124	225.2	36.6
SR 26	80	33	1,648	1,761	2.9	124	599.6	4.9
US 231	76	76	237	346	3.4	124	421.6	0.8
S. River Rd.	132	132	40	232	3.9	124	485.6	0.5
TOTAL	360	205	9,930	10,515	12	496	1,488	7.1

TABLE 2. Vertebrate mortalities by taxonomic group for all four Tippecanoe County, Indiana, USA survey routes, 8 March 2005 - 31 July 2006

(Fahrig, Pedlar, et. Al. 1995)

THE EFFECTS OF ROADS...

Fig. 2. Box plots (Steel, 1991) of (a) log (counts of frogs and toads), (b) proportions of frogs and toads dead in non-zero counts and (c) the proportion of dead frogs and toads in non-zero counts across different traffic intensities. Thick black bar is median, shaded area is approximate 95% confidence interval for the median, box is interquartile distance (25% of the data), and brackets show range of observations except for thin bars which are outliers.

- Traffic exerts a negative effect on anuran populations.
- The fact that there was a higher proportion of dead frogs and toads on the high-intensity roads suggests that differential road mortality contributes to the observed differences in abundance.

(Fahrig, Pedlar, et. Al. 1995)

EFFECTS OF ROADS CONTINUED...

- One reason for such high mortality rates in amphibians is that they migrate *en masse* to or from breeding sites (Glista, Travis, et. al. 2008)
- Species associated with wetlands are much more vulnerable
- Short-lived species producing many young have a much higher mortality rate
- Leopard Frog, Bullfrog, Green Frog and American Toad encountered regularly alongside roads (Ashley, Robinson 1996)

FIGURE 2. Monthly road mortality of selected amphibians on the Long Point causeway as a percent of total road mortality per species, 1988, 1992, 1993 (1979 data excluded).

Video: [Roads and Migration Routes](#)

QUESTIONS?