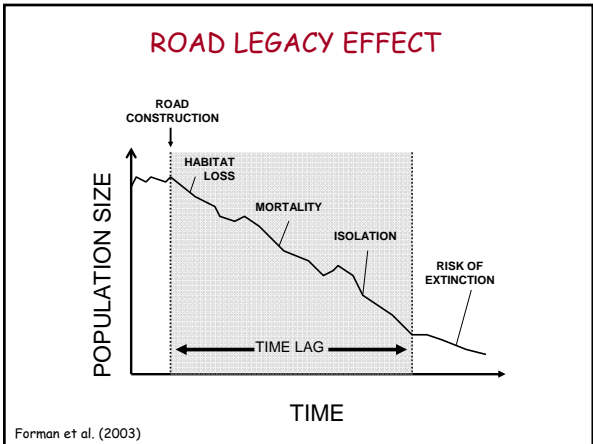
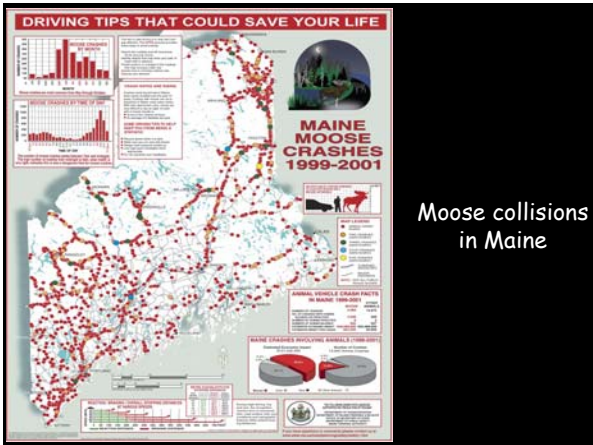




UNDERSTANDING THE EFFECTS OF ROADS ON WILDLIFE

- Roadkill hotspots - resulting in "legacy effects"
- Threshold of road density
- Collision models
- Solutions



Blanding's turtle



Life history strategy

- Low nest & juvenile survival
- Delayed maturity (15+ years)
- High adult survival (≥ 0.95 annually)
- Reproduce over decades (≥ 77 years)




⇒ Premium on adult survival
⇒ Slow recovery from declines

All disjunct eastern populations are in trouble

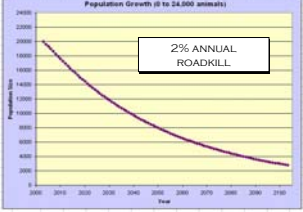
courtesy B. Compton

Road mortality



BLANDING'S TURTLE POPULATION GROWTH IN MASSACHUSETTS: A SIMULATION MODEL

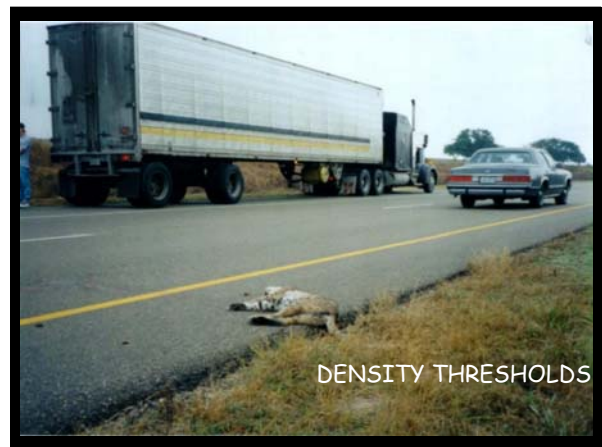
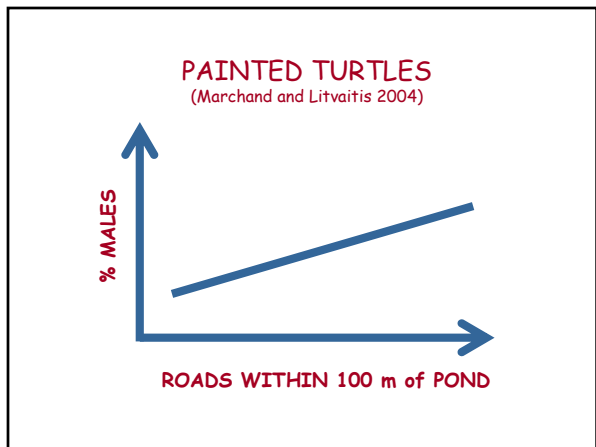
MODEL PARAMETERS	
Starting Pop. Massachusetts (A, B, C, D, E)	30
Cohort Size	
1 year olds	10
2 year olds	10
3 year olds	10
4 year olds	10
5 year olds	10
6 year olds	10
7 year olds	10
8 year olds	10
9 year olds	10
10 year olds	10
11 year olds	10
12 year olds	10
13 year olds	10
14 year olds	10
15 year olds	10
16 year olds	10
17 year olds	10
18 year olds	10
19 year olds	10
20 year olds	10
Adults	10
Annual Survival	
1 yr	0.276
2 yr	0.479
3 yr	0.706
4 yr	0.803
5 yr	0.863
6 yr	0.892
7 yr	0.903
8 yr	0.908
9 yr	0.910
10 yr	0.911
11 yr	0.911
12 yr	0.911
13 yr	0.911
14 yr	0.911
15 yr	0.911
16 yr	0.911
17 yr	0.911
18 yr	0.911
19 yr	0.911
20 yr	0.911
Adults	0.911
Roadkill Mortality	
1 yr	0.000
2 yr	0.000
3 yr	0.000
4 yr	0.000
5 yr	0.000
6 yr	0.000
7 yr	0.000
8 yr	0.000
9 yr	0.000
10 yr	0.000
11 yr	0.000
12 yr	0.000
13 yr	0.000
14 yr	0.000
15 yr	0.000
16 yr	0.000
17 yr	0.000
18 yr	0.000
19 yr	0.000
20 yr	0.000
Adults	0.000
MODEL ESTIMATES	
Current Size	10
Pop. in 100 yr	10

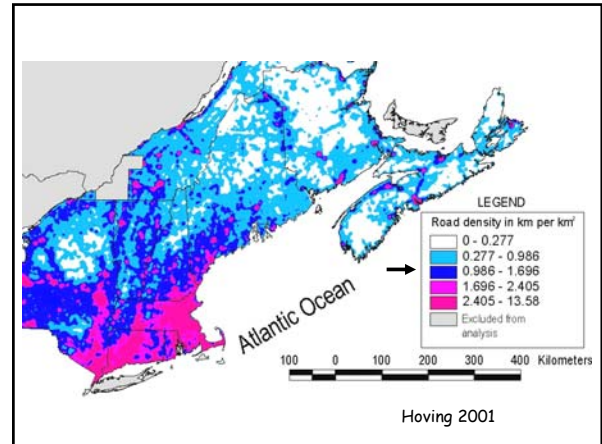
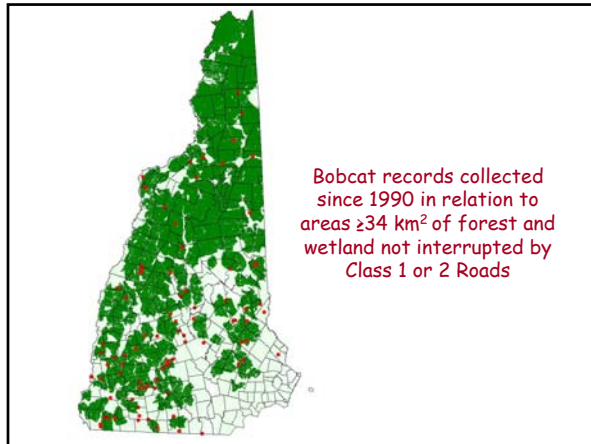


2% ANNUAL ROADKILL

Annual road mortality rates of 2-3% can extirpate populations.

courtesy B. Compton





ESTIMATING
WILDLIFE COLLISIONS
USING COLLISION MODELS

PROBABILITY OF BEING STRUCK
DURING ROAD CROSSING

$$P_{\text{killed}} = 1 - (e^{-Na/v})$$

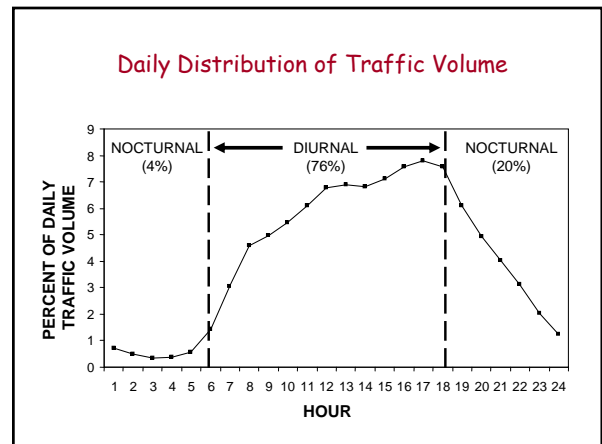
N = vehicles per minute
a = width of kill zone
v = velocity of animal moving through kill zone

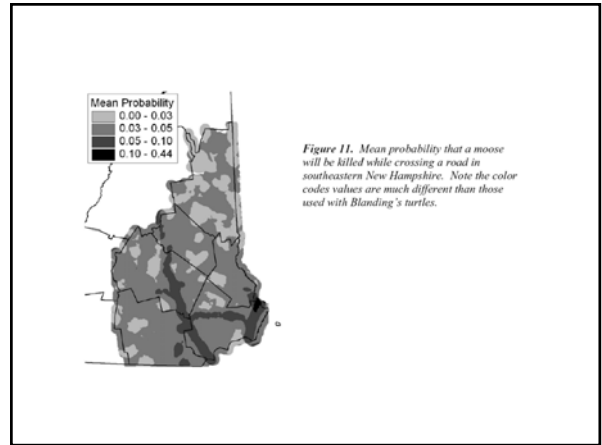
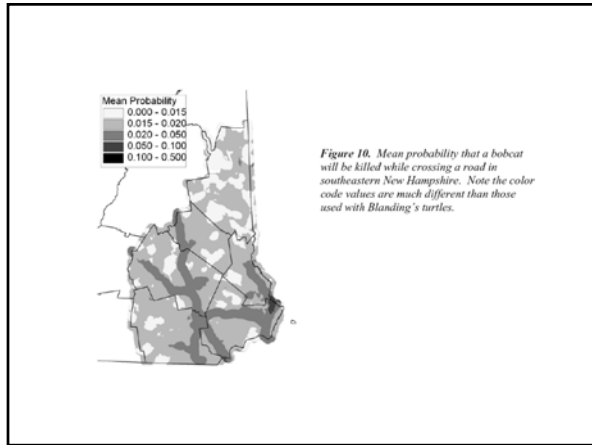
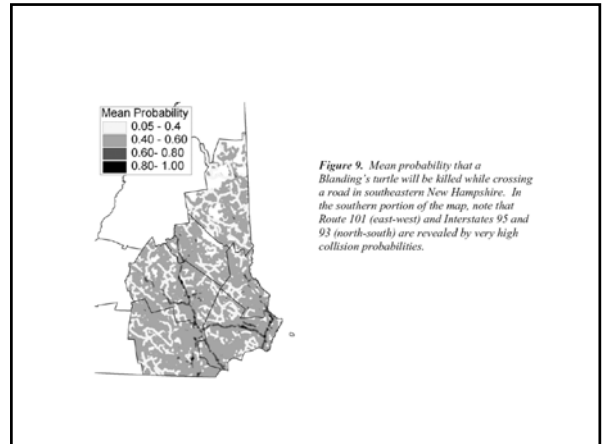
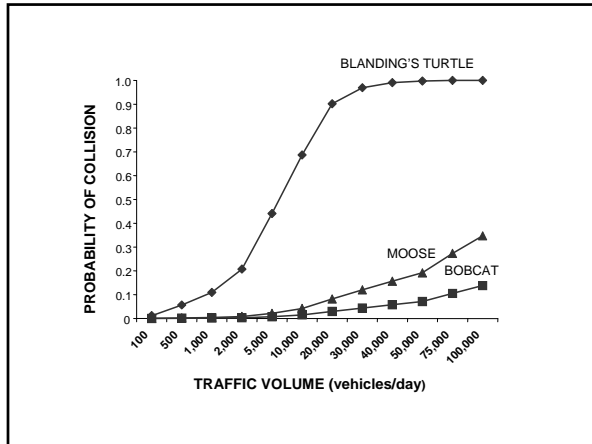
Hels and Buchwald (2001)

ROAD-ASSOCIATED MORTALITY

$$d_{\text{road}} = 1 - (1 - p_{\text{killed}})^{n_{\text{crossings}}}$$

$n_{\text{crossings}}$ = number of road crossings/year dependent on animal movements and road density





Forecasting impact with future changes resulting from population growth

