

Give Turtles a Brake!

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Most turtle species possesses life history traits that make populations especially vulnerable and sensitive to increased human-caused loss and mortality: slow growth, late maturity, long lives, low reproductive potential (small clutches), and high natural mortality of eggs and hatchlings (such as from predators).



Hatchling Wood Turtle emerging from a roadside nest in Virginia

It's that time of year, maybe you've already noticed. Animals are back and moving about and trying to reproduce. But in this age of hundreds of millions of motor vehicles going everywhere at high speeds, anybody who's slow is vulnerable. And one of the most vulnerable to death on our highways are turtles. No matter how many times I see them crushed and lifeless on a road, it breaks my heart. It must happen hundreds or thousands of times a day in the USA.

Nesting Females: Roads, Roadsides, Vehicles, and Predators

What makes it even worse is that a disproportionate amount of the turtles being killed are adult females. They are especially at risk because of the longer distance forays they make searching for nest sites in spring and summer [1]. Some turtles are terrestrial, such as Box Turtles and tortoises, some are amphibious, such as Wood Turtles, but most are aquatic — and they all lay eggs and nest on land. Even aquatic species such as Sliders and Cooters, and Map, Musk, Softshell, and Snapping Turtles may nest 200-550 yards from the water [2,3]. When they leave their wetlands in search of upland nest sites, they usually will have to cross at least one road.

In addition, roadsides generally fabricate the environmental conditions sought by female turtles for their nests – open canopy, short or sparse ground vegetation, and friable soil [4]. They are attracted to roadsides for foraging and basking also. But though the physical conditions may be favorable, such sites also incur increased mortality.

Breeding females are the ones most important to sustaining populations and the ones that populations can least afford to lose. Vehicular mortality can cause population declines and roadkill of females during the nesting season can be the most significant threat to population persistence [5,6]. The mortality to the adults can occur from not just vehicles, but also from the predators such as Raccoons who are attracted to roadsides [7]. These predators also dig up the nests and eat the eggs and the hatchlings. At one place, the proportion of turtle nests lost to Raccoon predation ranged from 63% to 100%, and this was in a “protected” area [7].

Population Viability

Most turtle species possesses life history traits that make populations especially vulnerable and sensitive to increased human-caused loss and mortality: slow growth, late maturity, long lives, low reproductive potential (small clutches), and high natural mortality of eggs and hatchlings (such as from predators) [8,9]. Some species, such as the northeast’s Wood Turtle, can take 15-20 years to reach maturity. And then, after reaching maturity, turtles must survive and reproduce for decades more just to replace themselves [10,11,12].

For turtles there is no apparent “density dependent” response operant [11]; *i.e.*, at low population densities there is no compensatory increase in birth rate or hatchling survival. In fact, just the opposite can reasonably be expected to occur in low populations — decreases in birth rates, due to such factors as difficulty in finding mates [13], resulting in further reductions in population size.

Field studies and statistical analyses clearly show that even modest rates of death or removal (intentional or incidental) of adult or juvenile turtles can lead to strong declines in populations [14]. The loss of a very small number of turtles above natural attrition can be devastating. Turtles may not reproduce enough or survive long enough to make up for the population losses from collection, predation, habitat degradation/destruction, and being killed on roads or by logging or agricultural operations. There are limits to how much cumulative mortality and stress a population absorb and still be healthy and viable for the long term.

Roads and Roadkill

Each and every day in America there are development and commercial activities on the ground, including more roads being built and more drivers using them. Most areas of the East, where most turtle species reside, are already within *ca.* 400 yards of a road [15]. Not surprising, considering that on the landscape currently occupied by the USA, in 400 years we’ve gone from ZERO to *ca.* 5 MILLION MILES OF ROADS. The ecological effects of roads and/or mechanized use include erosion, air and water pollution, spread of invasive weeds, avoidance of road or machine-affected areas by wildlife, increased access for poachers and common meso-predators (*e.g.*, Raccoons), habitat loss and fragmentation, and massive amounts of roadkill — some estimate 1 MILLION ANIMALS/DAY – and that of course doesn’t include the incomprehensible numbers of invertebrates.

Much of the problem, of course, is not the roads *per se*, but the vehicles using the roads. Roadkill is exacerbated due to increases in traffic volume. A probability model estimated that the likelihood of a turtle successfully crossing U.S. Highway 27 in Florida decreased from 32% in 1977 to only 2% in 2001 due to a 162% increase in traffic volume [16].

Wildlife Friendly Passageways and Fencing

The staggering magnitude of the day-in day-out road kill on America’s highways is a national disgrace and tragedy. Retrofitting the nation’s road system to make it much more “wildlife friendly” needs to be a priority for improving our infrastructure; such as installing fencing and wildlife crossings — overpasses and tunnels. A new Civilian Conservation Corp could put enormous numbers of people to work accomplishing this necessity.

Making the nation’s road system much more “wildlife friendly” is also a critical aspect for achieving real habitat connectivity and effective corridors. Hotspots of natural travelways used by fauna, as well as dispersal bottlenecks

wrought by human development, have been and can be identified [17, 18]. Improving these sites by putting up fencing and providing underpasses and overpasses for animal movements can bring enormous benefits to both individuals' survival and population viability. Barrier or drift fences with under-highway culverts to provide passageways and prevent animals' use of roads during dispersal can dramatically reduce roadkill. Along a 0.7-km section of one north Florida highway near Lake Jackson, turtle mortality before installation of the fence was 11.9 turtles/km/day, while post-fence mortality was 0.09/ km/day, a reduction of more than 99% [16].

Doing this systematically and comprehensively across the nation will be one of the most important public works projects in America's history. The corridor/connectivity issue is finally getting some of the public/political attention and funding it deserves [19]. For instance, in my home state of Virginia, I'm happy to report that the state Senate recently held a hearing on SB 455 which would create the Wildlife Corridor Grant Fund [see 20 for more on connectivity advocacy/issues in VA].

Direct Action

Until we systematically mitigate/ prevent/rectify these systemic sources of population decline, extirpation, and extinction – and even when we do – direct action and assistance for turtles are essential. Renowned writer Sy Montgomery establishes this beautifully in her latest book, *Of Time and Turtles* [21].

Stopping your vehicle and getting turtles off of roads can make a big difference

(I move snakes off the road as well). You can usually do this without compromising your safety. Be gentle and move the turtle in the same direction it was going, as far off the road as you can place it. It doesn't take up much of your time.

And the turtles need all the help they can get. Please help and give them a brake. And encourage your family, friends and neighbors to do likewise. The turtles and I thank you.

Literature citations

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