

The Road-RIPorter

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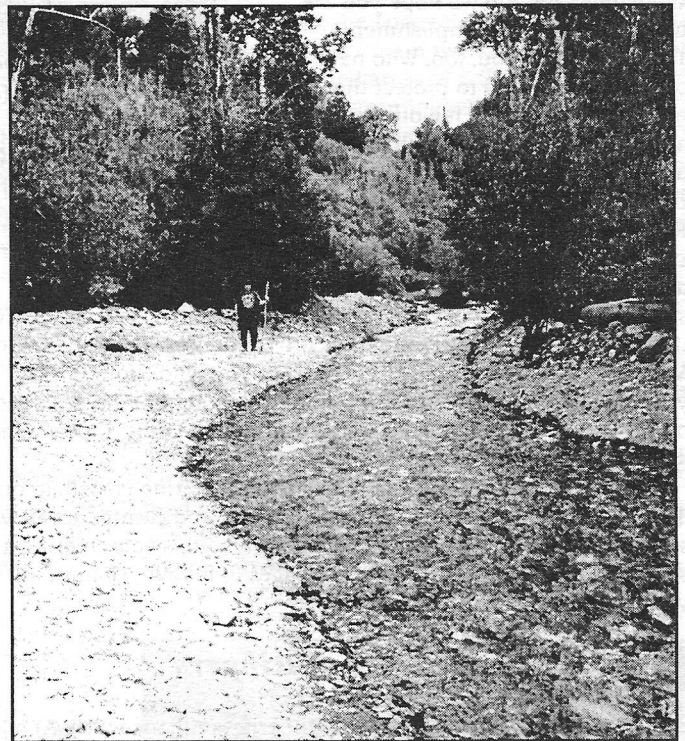
Bulltrout Rebellion?!?

ELKO ROAD RAGE ERODES DEMOCRACY

By Bethanie Walder

The threat was veiled, but undeniable nonetheless. Absent significant local, state or federal law enforcement, between 500 and 1000 people were expected to turn out to rebuild, in direct violation of the law, the Jarbidge River Road on the Humboldt-Toiyabe National Forest.

Before this trouble along northeastern Nevada's Jarbidge River reached the boiling point last month, however, a complicated mix of ingredients had been thrown into the pot. RS 2477 claims, Endangered Species Act (ESA) protection for bull trout, "sage brush rebels," and a disconnect between Forest Service law enforcement and the US Attorney's office all teamed up to create a confusing and potentially dangerous situation.



When Elko County, Nevada took the law into their own hands and rebuilt the South Canyon road, bull trout, the Jarbidge river, and the democratic process all suffered. Photo by Don Smith.

— See Bulltrout Rebellion, page 4 —

Bibliography Notes

Bibliography Notes summarizes and highlights some of the scientific literature in our 6,000 citation bibliography on the ecological effects of roads. We offer bibliographic searches to help activists access important biological research relevant to roads. We keep copies of most articles cited in Bibliography Notes in our office library.

Europe's Best Known Traffic Victim: the Hedgehog

By Marcel P. Huijser

Editor's Note: Hedgehogs are common throughout western Europe and thrive in countries with high human population densities such as The Netherlands. In the Netherlands, hedgehogs (*Erinaceus europaeus*) occur in a wide variety of habitats. They also are one of the most frequently found mammal species in road-kill surveys throughout western Europe (e.g., Blümel and Blümel 1980, Garnica and Robles 1986, Korhonen and Nurminen 1987, Andersen et al. 1996, Rodts et al. 1998). While it may seem odd to include an article in *The Road-RIPorter* about a generalistic species from Europe, it provides an interesting perspective on what types of challenges North Americans may face in the future with road management. This article also makes clear that while urbanization may benefit some species, the same characteristics that improve their habitat may also harm them in the end.

Death Toll

The Netherlands has extremely high road density and traffic volume. There are over three km of paved road per km² on average, and almost seven million motorized vehicles use the ± 110,000 km paved road system (Anonymous 1998). Minimum estimates on the number of dead hedgehogs per kilometer of road per year

vary between 0.3 and 2.9 (see review in Huijser et al. 1998). However, ± 65% of hedgehog corpses disappear from the road within a day (Huijser and Bergers 1998), therefore the number of victims can easily be underestimated. Huijser and Bergers (1998) estimated that between 113,000 and 340,000 hedgehogs are killed on Dutch roads each year. Sponholz (1965) estimated that the number of hedgehog traffic victims in former western Germany also was very high: 720,000-1,000,000 per year.

When the impact of roads and traffic on hedgehogs is discussed, it is important to distinguish between the possible effects on individuals, populations, and the species as a whole. Many wonder whether the high number of hedgehog traffic victims affects the species' survival probability, but since hedgehogs are relatively common in western Europe and have benefitted from human induced changes in the landscape, it is unlikely that the species will be threatened with extinction in the near future. Effects on local or regional populations may well be present, but the way humans manage the landscape has a far greater effect than the presence of roads and traffic. Large scale agricultural areas that lack cover, and compact cities with little urban green and many barriers have little to offer hedgehogs. The animals have a strong preference for edge habitat and roam over relatively large areas.

So Why Did the Hedgehog Cross the Road?

Some have suggested that hedgehogs are particularly vulnerable to traffic because of certain behaviour patterns. It is often thought that hedgehogs roll-up in defense when threatened, e.g., by an approaching car, and may therefore be hit by the car or a following vehicle. Another theory suggests that hedgehogs are attracted to roads because of food that may be present: the road surface is often warmer than the surroundings and may therefore attract insects, or, after rainfall, earthworms (e.g., Poduschka 1971). But the evidence suggests that the dynamics of hedgehog traffic mortality are driven by a more fundamental instinct.

Hedgehogs, especially adult males, have relatively large home ranges (often 20-40 ha) and usually travel up to two or three kilometers per night (see Reeve 1994 for review). Males are especially active from June through August, when searching for females willing to mate. Since hedgehogs are non-monogamous and non-territorial, a male's reproductive success is largely determined by the ground he covers and the number of females he finds. Because of these large home ranges and travel distances, adult males



Despite their vulnerability to traffic, hedgehogs seem to get along quite well with human populations and have benefitted from human-induced landscape changes. Photo by Marcel Huijser.

encounter many roads and are particularly at risk. Therefore it is no surprise to find that \pm 60-70% of the traffic victims are male (Berthoud 1980, Palm and Stöwer 1990), despite a 1:1 sex ratio for all age groups (Kristiansson 1990, Huijser 1997).

High activity during the mating season also explains the peak in traffic victims between June and August (Huijser and Bergers 1998, Rodts et al. 1998). In the Netherlands hedgehogs usually hibernate from November/December until April/May. As a result relatively few victims are found in winter.

Research also has found that hedgehogs generally avoid roads (Bontadina 1991, Bontadina et al. 1993, and Zingg 1994), and when they do cross they do so with great speed (Bontadina 1991).

Effects on Populations

The sex ratio of hedgehog traffic victims combined with their mating system explains why the reproductive potential of hedgehog populations is not affected as much as one might expect. Males run a far greater risk than females, but even if only a couple of males remain in an area, the females are still likely to get pregnant and produce offspring.

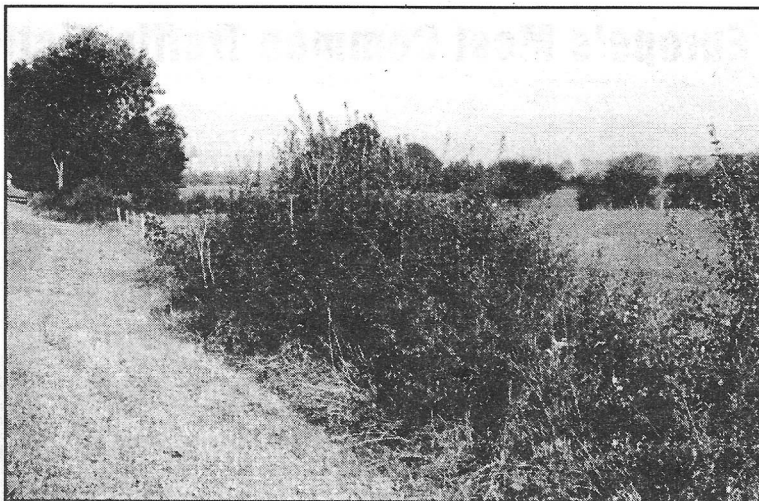
Some studies related the number of traffic victims to the population size: Göransson et al. (1976): 17-22%, Esser (1984): 5-20%, Kristiansson (1990): 2-24%. One study (Huijser et al. 1998) indicated that roads and traffic may reduce hedgehog population density by \pm 30% in 200 m wide zones adjacent to roads. Estimates like these may give us a general idea of the possible effect of traffic, but they do not show whether populations are actually affected in survival probability.

Reichholf and Esser (1981) and Reichholf (1983) concluded that traffic mortality played a key role in the population dynamics of hedgehog populations in small villages in Bavaria. In some small villages no hedgehog traffic victims were found for several years in a row. This was interpreted as a population that had gone extinct, mainly because of traffic mortality in preceding seasons. These villages were mostly surrounded by agricultural lands that may have acted as a barrier preventing rapid recolonization. Although local populations may go extinct because of traffic, the net balance of human influences on hedgehog populations seems to be positive: hedgehog density is greatest in urban areas with abundant green spaces while forests have relatively few hedgehogs (see review in Mulder 1996b).

Mitigation

It is important to note that a negative effect on a population or the possible extinction of a species are not the only legitimate reasons to take action to reduce impacts from roads and traffic. Many traffic fatalities may simply be unacceptable because of the intrinsic value of animals, and changing values in today's society. However, if priorities have to be set, action should first be taken for species that are close to extinction. Nevertheless, it is far easier to preserve a species while it is still relatively abundant than when it has become very rare.

In the Netherlands traffic volume is unlikely to decrease in the near future. In fact, there is no indication that its present growth rate is levelling off. The same applies to road density: closing and removing roads is a rare phenomenon. Building roads underground is a more realistic mitigation option, but the financial costs are usually considered too high. Currently



Hedgehogs spend much of their time in or close to linear features such as hedgerows or a forest's edge. These linear features can be used to guide hedgehogs toward a wildlife passage. Photo by Marcel Huijser.

most of the efforts for wildlife are put in more traditional mitigation and compensation measures.

Over the past decades fences combined with wildlife passages have become fully integrated in managing existing roads as well as building new motorways in the Netherlands (Anonymous 1995). It is clear that the location of wildlife passages should be carefully chosen for a target species or a species group. Apart from the technical characteristics of a passage, e.g., its dimensions, the use of a wildlife passage can further be increased by altering the landscape in its immediate vicinity.

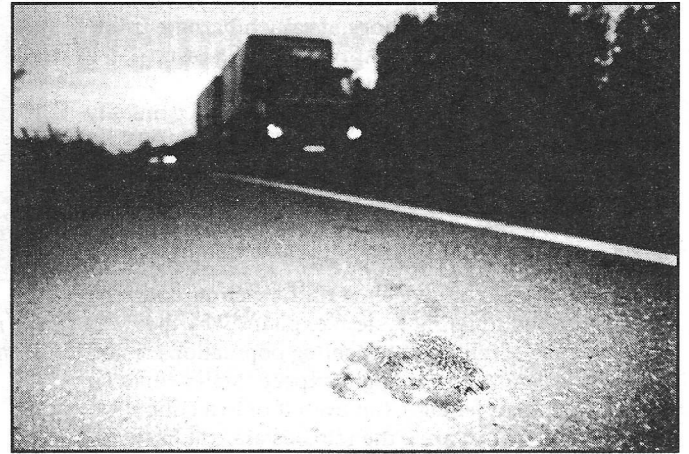
The preliminary results of one recent study indicate that hedgehogs spend most of their time in or close to hedgerows and forest edges while closed forests are used infrequently. Wherever a hedgerow or a forest's edge is oriented perpendicular to a road we may expect \pm 25% more traffic victims compared to a parallel orientation of these linear features. The results suggest that by altering the landscape adjacent to a road, wildlife passages can be made more effective for hedgehogs. However, it is clear that any changes in the landscape should first be carefully evaluated for their possible effect on other species. One of the tasks that lie ahead is to determine what measures are needed to ensure effective use of wildlife passages by a broad range of target species.

— Marcel P. Huijser conducted the hedgehog study for the Vereniging voor Zoogdierkunde en Zoogdierbescherming (VZZ) (Dutch-Belgian mammal society) and the Dutch Ministry of Transport, Public Works and Water Management. He now is a part time PhD student at Wageningen Agricultural University in the Netherlands and also an ecologist at the Research Institute for Animal Husbandry.

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Every year 113,000-340,000 hedgehogs are killed by traffic on Dutch roads. Photo by Marcel Huijser.