NEED FOR SPEED - Wolves, Highways & Railways, in Greece. Will they cope with it? Results from 2 case studies.

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INTRODUCTION. **Wolf distribution (50.000 km² - population size of approx. 700 ind.) was maintained un-fragmented until late 90's. A network of 4000 km multi-lane highways and high speed railways is under construction or planned during the next 5-10years. After completion, wolf distribution will be multi-bisected into 16 fragments, which may affect dispersal rates from the large Dinaric wolf population. Although wolves are capable of crossing highways, when several infrastructures are combined together or with other physical or artificial barriers (lakes, large rivers) have synergetic effects and may account for delayed re-colonization and dispersal (Blanco, Cortes & Virgos, 2005), increasing the influence of stochastic events on the population and threaten its long term viability.**

Greek wolf distribution and linear infrastructure network

CASE STUDY 1*: "Double trouble" in Central Greece: *E65 Highway of Central Greece* and *High speed railway* (Lamia-Domokos), parallel alignments, intersect protected wolf distribution for 40 kms in semi-mountainous and flat areas in Central Greece.

Project type: *Pre-construction evaluation* of wolf corridors and mitigation proposals. Duration: 2005-2006.

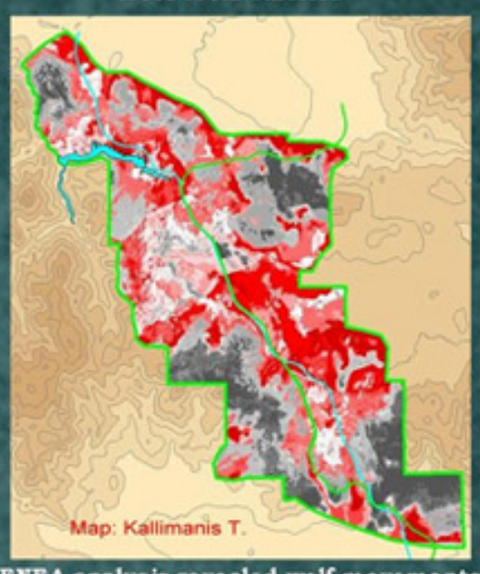
Field methods and analysis: Extensive snow tracking of three wolf packs and infrared camera surveys. Analysis of data included ENFA (*Environmental Niche Factor Analysis*), Hirtzel *et al.* 2002,2004).

Main results : 105 km of wolf routes were followed and mapped. Wolves selected areas closer to human settlements, with smoother slope, and fed mainly on carrion and livestock. Movement corridors established through habitat modelling. Wolf travel route selection close to alignments was strongly influenced from prey availability and location of local barriers, like deep draining ditches. Wolves used manmade small bridges to cross such barriers and this affected spatial referencing of proposed mitigation measures.

Actions and proposals. 18 technically feasible mitigation measures were proposed, including 4 wildlife passages and 3 Green Bridges common for both infrastructures. Construction authorities accepted proposals but implementation is delayed due to the lack of co-ordination, different construction timelines of the two infrastructures and lack of political and social support .

Photos: ILIOPOULOS Y. "Callisto NGO"

Wolves use manmade overpasses to cross local barriers



ENFA analysis revealed wolf movements corridors over the alignments

Mitigation solutions should be intergraded for both highway and railway parallel alignments

CASE STUDY 2†: Evaluating the effects of EGNATIA highway on wolf movements and habitat use in Northern Greece.

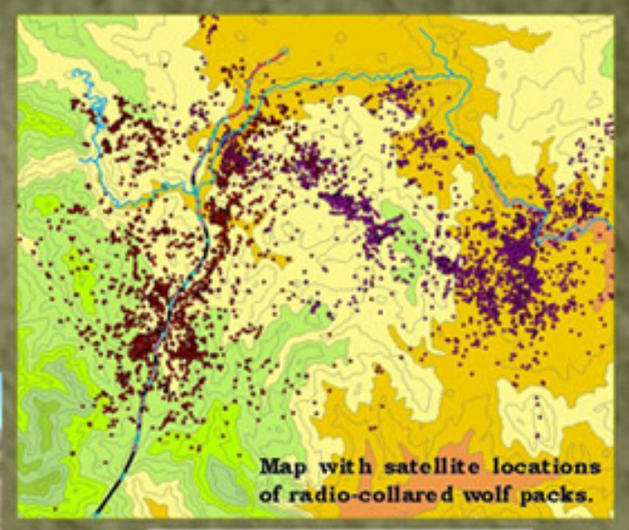
Project & history: Evaluating construction phase effects. Egnatia Odos 4.1 section (37km) intersects large carnivore and ungulate species distributions in northern Greece. Legal actions undertaken prior construction since 1994, increased total highway mitigation to 42%, including 9 km. of tunnels and 18 valley bridges. Duration: 2006-2009

Field methods and analysis: Satellite telemetry on the two resident wolf packs, snow-tracking, infrared cameras. Analysis included multivariate regression and ENFA.

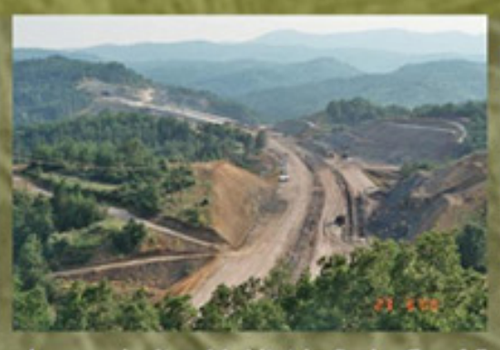
Main results: Wolves crossed under-construction highway 198 times. Wolves tolerated well construction works by travelling and hunting mainly during the night. Most crossings were on the construction zone and revealed the maintenance of several travel routes as prior to construction phase. Increased wolf travel energetic cost is expected after work completion and fencing. Wolves crossed construction zone with significantly greater speed. Travel route selection was strongly influenced by livestock spatial distribution and large rivers, which affected crossing locations and territory shape.

Wolves soon learned to utilize areas under large bridges to cross fenced highway parts already used by traffic, while seemed to avoid narrow underpasses. Inappropriate fencing resulted in the killing of some individuals in the least mitigated northern part of the highway.

Actions and proposals: Land use and fence characteristics were proposed. Available data were used to exclude adjacent to highway areas from further development (gas stations, drivers rest).



Management implications: *Undertake legal action prior highway construction to ensure mitigation improvements * Evaluate the role of large rivers and other barriers and look for crossing locations from wildlife * Restrict construction works only during daylight * Restore habitat under bridges soon after work completion * Design appropriate carnivore-proof fencing especially in less mitigated parts * Restore prey availability in adjacent areas * Prefer overpasses to underpasses * Monitor post-construction use of mitigation infrastructures * Increase social interest for wildlife locally.



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