http://www.csuci.edu/ira/index.htm

Application
Instructionally Related Activities Funds Request
2011-2012 Academic Year
DEADLINE: Fall and Academic Year 3/31/11
Spring 2012 deadline is 10/31/11

Applications must first be sent to the appropriate program chair. Chairs will then recommend and route them to the Dean's Office for review and authorization. The Dean's Office will then forward them to the IRA Committee for consideration.

Activity Title: Guest Lectures and Field Training from Dr. Josips Kusak
Project Sponsor/Staff (Name/Phone): Sean Anderson (staff = Mary Devins @ x 3253)
Activity/Event Date(s): March or April 2012
Date Funding Needed By: late January 2011 (for lesson planning and reservations)
***Please Note that for Fall Requests the earliest that you will be notified of funding availability will be early June 2011 and for Spring Requests early January 2012.*

Please check if any of the following apply to your IRA:

Equipment Purchase
Event
IT Requirements
X International Travel
Space/OPC Requirements
Infrastructure/Remodel
Other ___________

Field Trip
Participant data collection for public dissemination, i.e. interviews/surveys that result is a journal/poster session/newsletter
Risk Management Consultation
Late Submission

Previously Funded: YES X NO   Yes, Request # ___________

Does your proposal require IRB (Institutional Review Board) approval: Yes XNo

Assessment submitted for previously Funded Activity: YES NO

Academic Program or Center Name and Budget Code: ESRM 765-00035

Date of Submission: 10/31/11

Amount Requested: $2,650
(Should match item 2. E. on page 4)

Estimated Number of Students Participating: Conservation Biology: ~25, Field Methods: ~25, Campus-wide Seminar: ~40-60. **Maximum probably 120**, but as many of these students will participate in multiple events, probably a solid **50** or so students (primarily ESRM & Biology majors)

Application
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2011-2012 Academic Year

Conditions and Considerations

Equipment Purchase-If requesting large equipment, Project Sponsor must show proof of correspondence with OPC Administration. In addition, all other purchases must follow Procurement Guidelines.

Events-For a large event, consultation with the events coordinator is recommended.

Participant Data Collection for Public Dissemination-If Project Sponsor proposes to conduct research with human participants then it may be subject to IRB (Institutional Review Board for the Protection of Human Subjects) review. It is the Project Sponsor's responsibility to inquire with the IRB **prior** to IRA application submission to determine if the project is exempt from IRB review so that funding is not delayed. Please indicate on the cover page if your project is exempt from IRB review.

Field Trip-If approved, Identified Risks of Participation and Release Agreement must be submitted for each student to the Program Office (Public Folders-HR Forms).

IT Requirements-Requires proof of correspondence and approval from IT Administration

International Travel-Requires International Travel application be submitted to Center for International Affairs.

Risk Management Consultation-Requires proof of correspondence with Risk Management.

Space/OPC Requirements, Infrastructure/Remodel-Requires proof of correspondence with OPC Administration .

Late Submission - Requires explanation for emergency funding.

Fiscal Management: Project Sponsor's program will be responsible for all costs incurred over and above what is funded through the IRA award and will be responsible for seeing that any revenue that is intended to offset the amount of the IRA award is transferred accordingly.

Application
Instructionally Related Activities Funds Request
2011-2012 Academic Year

Requirements and Signatures

Please provide the following in your application:

1. **Brief Activity Description.** Describe the activity and its relationship to the educational objectives of the students' program or major.

2. **Relation to IRA to Course Offerings.** All IRAs must be integrally related to the formal instructional offerings of the University and must be associated with scheduled credit courses. Please list all classes that relate to the program proposed.

3. **Activity Assessment.** Describe the assessment process and measures that the program will use to determine if it has attained its educational goals. **Please note a report will be due at the end of the semester.**

4. **Activity Budget.** Please enclose a complete detailed budget of the entire Activity **bold** specific items of requested IRA funding. (Page 4)

5. **Sources of Activity Support.** Please list the other sources of funding, and additional support for the activity.

7. **Acknowledgment.** Project Sponsor and Program Chair acknowledge that they have reviewed and accepted the Conditions and Considerations detailed on page 2.

Signatures and Dates

Sean Anderson — 10/31/11 Date

Don Rodriguez — 10/31/11 Date

Karen Carey — 10/31/11 Date

Application
Instructionally Related Activities Funds Request
2011-2012 Academic Year

ACTIVITY BUDGET FOR **2011-2012**

1. Operating Expense Budget
   - A. Supplies ______
   - B. Vendor Printing seminar flyers = $150
   - C. In-State Travel ______
   - D. Out-of-State Travel Roundtrip (Zagreb-LAX) = $2,100
   - E. Equipment Rental ______
   - F. Equipment Purchase ______
   - G. Contracts/Independent Contractors ______
   - H. Honorarium $400
   - I. OPC Chargeback ______
   - J. Copier Chargeback ______
   - K. Other (Please Specify)

   TOTAL Expenses $2,650

2. Revenue
   - A. Course Fees ______
   - B. Ticket Sales ______
   - C. Out of Pocket Student Fees (exclusive of course fees) ______

   Additional Sources of funding

   2008 year's Tablet PC GPS purchased jointly by IRA and Anderson's Start-up still in use(~$6,500) will be used to support class activities

   In-kind support and supplies provided by Santa Monica Moutnains National Recreation Area and Utah State

   Total Revenue ______

D. **Total Requested from IRA** $2,650

Application
Instructionally Related Activities Funds Request
2011 – 2012 Academic Year

Explanation/Consultation

Brief Program Description

In the fall of 2011 I began a collaboration with Dr. Josip Kusak, professor of Veterinary Medicine at Zagreb University in Croatia. My research group hired Dr. Kusak, one of the world's leading experts in bear and wolf trapping, radio collaring, and tracking. During our collaborations this past October in eastern Turkey, we discussed the similarities of the Conservation challenges we both face in and around our homes of Croatia and southern California. These challenges include the fragmentation of intact landscapes by roads, railroads, and developments. Croatians primarily utilize the European Gray Wolf as their focal species with which the effects of such ecological fragmentation can be measured and interpreted. Here is southern California we utilize the mountain lion. Just as I was finishing up my research stint in Turkey this past October and we were fitting our second trapped wolf with a radio tracking collar prior to release, I learned of the malicious killing of our last remaining radio-collared mountain lion here in the Santa Monica Mountains. Dr. Kusak and I both agreed that we each have much to offer our respective students, both at the level of practical field skills training and at the more general conceptual level comparing and contrasting the management approaches taken in southern Europe vs. southern California. Dr. Kusak was first trained to track and safely capture wolves in Minnesota and has subsequently run training programs around the world.

I propose to bring Dr. Kusak to California for a 3-day visit wherein he will give guest lectures and run a field training session for ESRM classes as well as give a campus-wide seminar on his work managing large carnivores in southern Europe and the Middle East. His trip will also afford us the opportunity to begin to deepen our collaborations with the National Park Service's large carnivore group. While here Dr. Kusak will also meet with regional experts and begin plans to hopefully spark an international exchange between CSUCI and Zagreb University students.

Relation to IRA Program to Course Offerings.

Dr. Kusak's trip will directly benefit various student groups at CSUCI. Chief among them ESRM and Biology majors enrolled in ESRM/Biology courses this Spring. At a minimum, Dr. Kusak will:

- provide a guest lecture on International Conservation to our *ESRM/BIOL 313: Conservation Biology* course
- run at least one half-day tracking and training session in our *ESRM 350: Field Methods* Course wherein students will gain unique hands-on training with trap deployment and carnivore tracking.
- give a general campus seminar on the lessons learned from large animal tracking and wildlife corridor planning across the former Yugoslavia and beyond.
-

This scholarship will build directly upon existing CSUCI strengths and of large-scale wildlife monitoring and tracking (Humpback Whale research in Hawaii, large animal monitoring with critter cams in coastal Louisiana, and road kill monitoring across Los Angeles and Ventura counties) and give students a unique training opportunity from one of the best practitioners on the planet. In addition, the public presentations should be of interest to Global Studies minors, International Affairs-oriented students/faculty and the broader public at large.

Program Assessment

Students will be tested on their practical field skills following their training with Dr. Kusak.

Justification

I will host Dr. Kusak in my home while here to minimize expenses and provide most if not all field equipment needed from my Restoration Ecology lab here on campus. The primary request is to cover the significant cost of a round trip airfare from Croatia to the U.S., a modest honorarium, and minor publication costs for his public lecture.

Attachments

I am attaching two example publications of Dr. Kusak to illustrate the scope and nature of his work in Croatia.

Biosphere Conservation 3 (1) : 35 - 39, 2000

The effects of traffic on large carnivore populations in Croatia

Josip Kusak[1], Djuro Huber[1], and Alojzije Frkovic[2]

[1] *Biology Department, Veterinary Faculty, Heinzelova 55, 10000 Zagreb, Republic of Croatia*

[2] *Croatian Forests, Delnice Forestry Office, Supilova 32, 51300 Delnice, Republic of Croatia*

Abstract Roads and railways are causing habitat fragmentation, disturbance and direct mortality to all three species of large carnivores in Croatia. As traffic is becoming faster, quieter and denser, and the number of traffic routes is increasing, so traffic kills are on the increase. Traffic related mortality in Croatia involved brown bear *Ursus arctos,* Eurasian lynx *Lynx lynx,* and grey wolf *Canis lupus.* During the period 1986-94, 19% (42 of 217) of the total brown bear mortality was caused by traffic (as compared with 11% until 1985); 6.6% (10 of 151) of total Eurasian lynx mortality during the period 1978-95 was due to traffic, and 3.6% (20 of 560) of total grey wolf mortality since 1945 resulted from traffic accidents. Large carnivores in the first year of their life were found to be significantly more vulnerable to such accidents than older individuals, relative to their share in the population (wolves $p<0.05$, $X^2 = 9.64$; bears $p<0.05$, $X^2 = 5.52$; and lynxes $p<0.1$, $X^2 = 2.91$). The main habitat corridor for all three large carnivore species in Croatia was found to be in the central part of Gorski kotar, which is bisected by major road and rail traffic routes. On the new highway, which is under construction through the area, there will be numerous under- and overpasses, and several green bridges were proposed in order to reduce the impact of traffic on wild animal populations.

Key words: Croatia, traffic kills, grey wolf, *Canis lupus,* European brown bear, *Ursus arctos,* Eurasian lynx, *Lynx lynx*

INTRODUCTION

Three species of large carnivores still occur in Croatia. They are the brown bear *Ursus arctos,* with a population of about 400 individuals, the Eurasian lynx *Lynx lynx* with 120 individuals, and the grey wolf *Canis lupus* with 50 individuals. Brown bears may still be hunted legally as game in Croatia, but wolves and lynxes are protected by law. Only the grey wolf population had declined in the decade up to 1995 (Frkovic and Huber 1995).

As road and rail traffic is becoming faster, quieter and denser, and as the number of traffic routes is increasing, so roads and railways are causing habitat fragmentation, disturbance and mortality to all three species of large carnivores in Croatia. Direct mortality results from collisions with motorized vehicles and indirect mortality is as a result of human factors such as shooting and den disturbance made easier by vehicular access.

Eleven species of mammals were found to be vulnerable to traffic accidents in Germany (Ueckermann 1964), although large carnivores were not involved. Subsequently, traffic-induced brown bear mortality has been documented in Europe (Frkovic et al. 1987 in Croatia, Kaczensky et al. 1996 in Slovenia), and traffic-induced mortality of American black bears *U. americanus* has been reported from Florida, USA (Wooding and Brady 1987) and North Carolina, USA (Warburton et al. 1993). Huber et al. (1998) have studied the mortality of brown bears in Croatia, and this paper describes a larger survey which included all three large carnivores living in Croatia, the brown bear, the grey wolf, and the Eurasian lynx.

During the 40 year period from 1946 to 1985, 281 brown bears were killed in Croatia, of which 31 (11%) were killed in traffic accidents, representing 0.78 bears per year (Frkovic et al. 1987). More recently (1986 to 1995), traffic-related mortality rose to 19% (42 of 217) of total mortality or 4.2 bears per year (Huber et al.

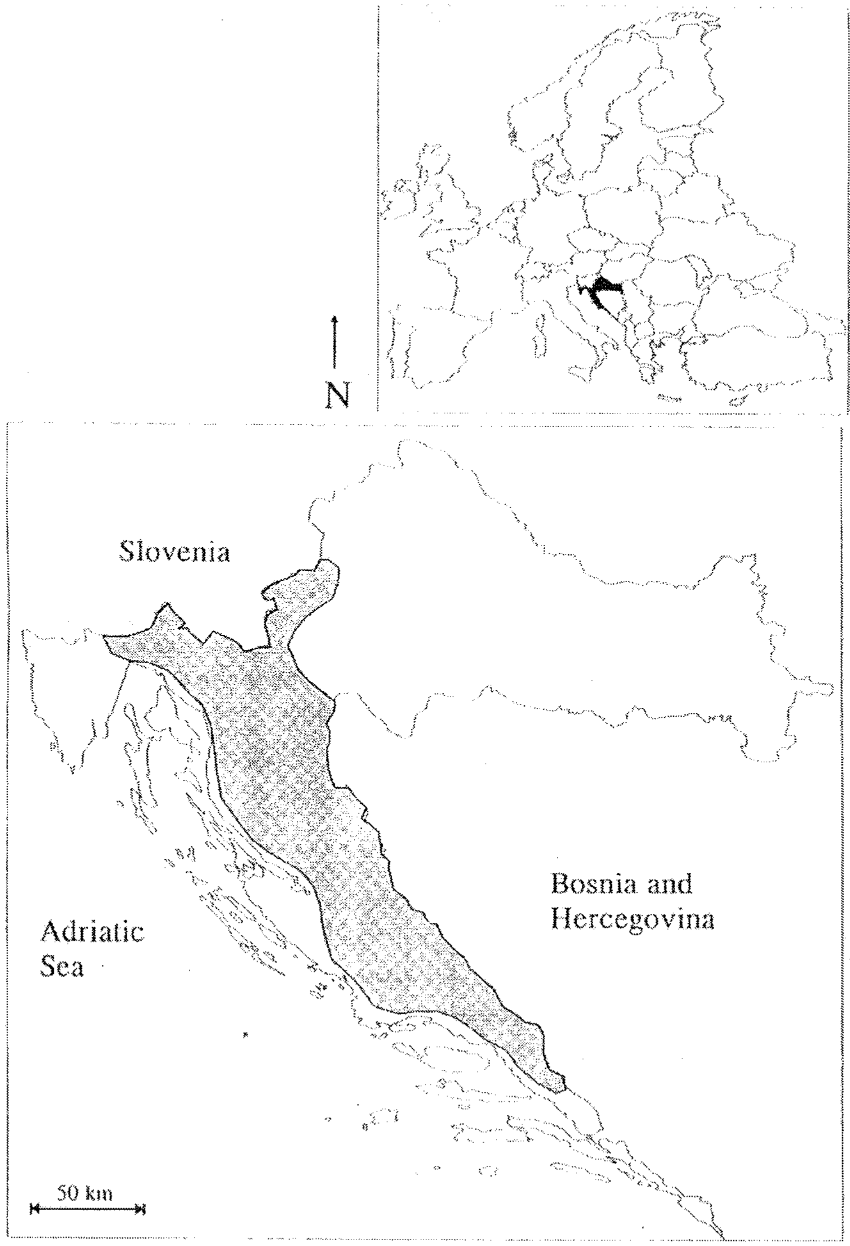

Fig. 1. Location of Croatia in Europe and the range of large carnivores (shaded) in Croatia.

1988). This dramatic increase prompted us to study traffic accidents involving all three large carnivores in Croatia in order to determine which main habitat corridors have been interrupted and to propose appropriate mitigation measures.

STUDY AREA

One or more of three species of large carnivores range across approximately 12,000 km^2 (21%) of Croatia (Fig. 1). Throughout most of that area, all three spe-

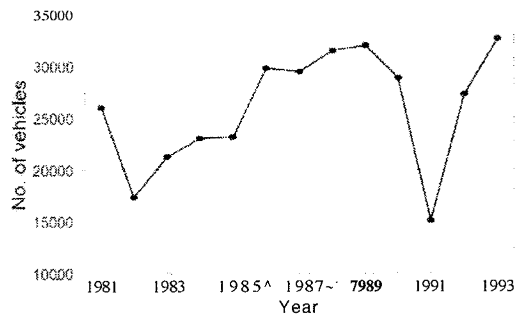

Fig. 2. Average daily vehicle traffic during summer on main roads within carnivore range in Croatia.

cies occur together. The region consists of part of the Dinara Mountains, with elevation ranging 0 to 1,700 m. Forest covers about 60% of the area, and two main roads and railways run through the area from the Croatian capital Zagreb to the Adriatic Sea. The main roads in the area carry 15,000 to 33,000 vehicles/day (Fig. 2).

The construction of a new highway, connecting Zagreb and Rijeka, is currently in progress.

METHODS

Records of traffic-related mortality have been collected by Alojzije Frkovic, for grey wolf since 1945, for brown bear since 1963 and for Eurasian lynx since 1978. These records include the exact site and date of collision, the sex and age of the animal, and the type of vehicle involved in each collision. Animals were classified as young or adult based on size and appearance, and in addition, since 1981, bears have also been aged by counting the cementum layers on the first premolar tooth root (Stonenberg and Jonkel 1966). Each known collision site has been inspected and details recorded as described in Huber et al. (1988).

RESULTS AND DISCUSSION

Between 1945 and 1996, at least 20 wolves were killed by traffic in Croatia (Fig. 3). Most of them died on roads and were less than one year old (Table 1). From 1978 to 1995, at least 10 Eurasian lynxes were killed by traffic (Fig. 4), most of which died on roads, were females, and less than one year old (Table 1). Traffic kills comprised 6.6% (10 of 151) of total lynx, and 3.6% (20 of 560) of total recorded wolf mortality. For bears it was 19% (42 of 217) in the period 1986 through 1994.

The main factor influencing the frequency of carnivore - motorized vehicle accidents in Croatia, was found to be the remoteness of the area. Where traffic routes bisect their ranges, large carnivores usually choose

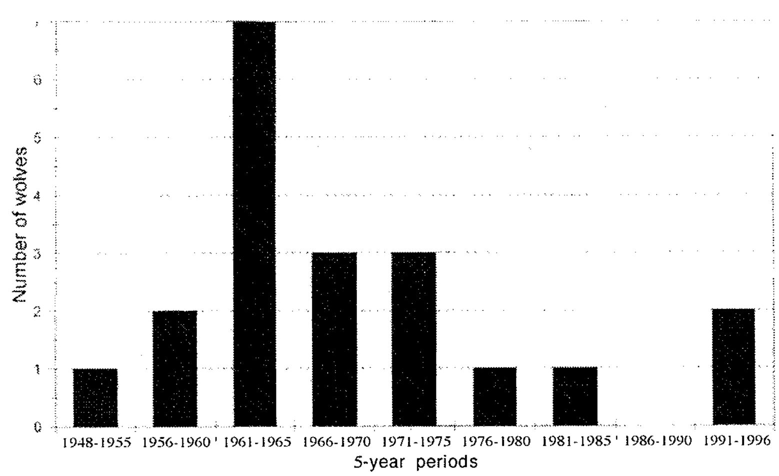

Fig. 3. Five-year sums of traffic-caused grey wolf mortality in Croatia.

Table 1. Details of traffic accidents involving wolves and lynxes in Croatia between 1945 and 1996.

		Wolf (n = 20)	Lynx(n =10)
Places	railway tracks	1	3
	road	19	7
Sex	male	11	2
	female	8	6
	unknown	1	2
Age	subadults	12	7
	adults	1	3

locations as far away as possible from human settlement, preferably where there is forest along both sides of the route, in order to cross. The broad area in the middle of Gorski kotar, in the western portion of the large carnivore range in Croatia, was found to be the main corridor connecting the eastern Dinarids in Croatia and Bosnia and Herzegovina with the Risnjak National Park and the western end of Dinarids in Slovenia (Fig. 4).

As a mitigation measure to reduce habitat fragmentation and conflicts with traffic along a highway currently under construction through the main carnivore corridor, we proposed at least six tunnels and/or viaducts in addition to those planned due to topographic reasons. One artificial tunnel or "green bridge" (100.5 m long) was incorporated into the highway project. A number of railroad tunnels should also be constructed at critical points. As brown bears feed on a wide range of food items (Cicnjak et al. 1987), we have also recommend removing potential bear food sources from along traffic routes.

Carnivores in their first year of life were found to be significantly more vulnerable to traffic accidents than older individuals, relative to their proportion in the population (wolves $p<0.05$, $X^2 = 9.64$, bears $p<0.05$, X^2

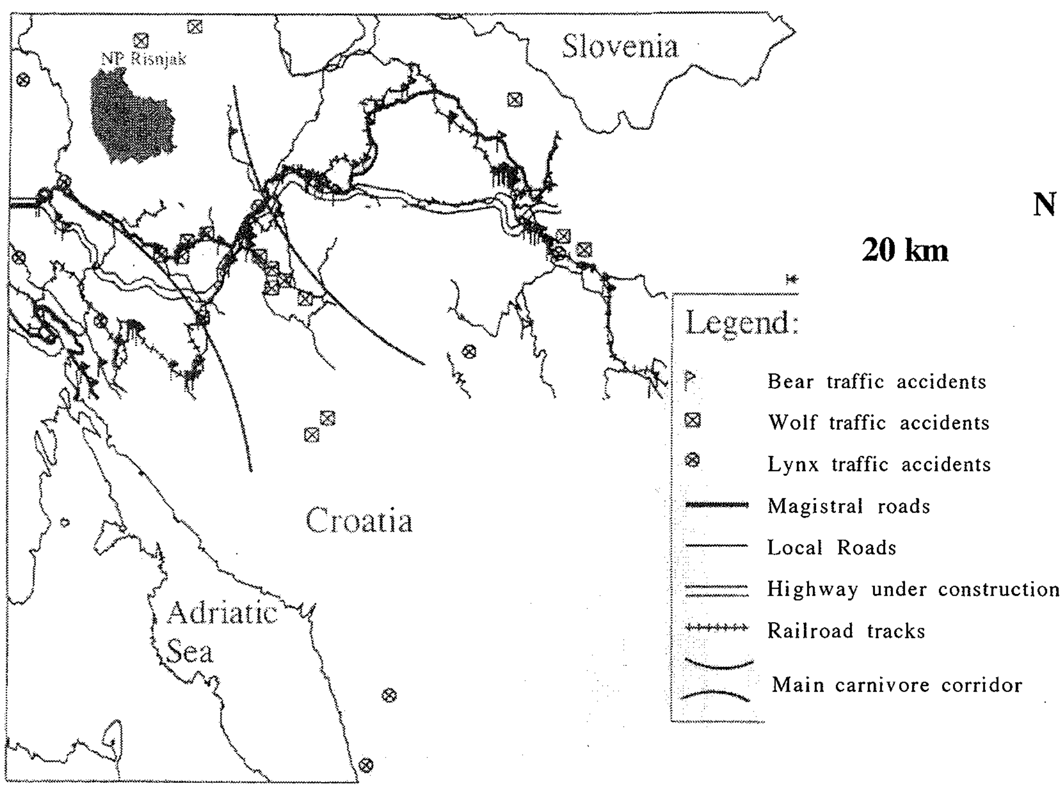

Fig. 4. The main large carnivore habitat corridor in the western portion of their range in Croatia. All lethal accident sites are marked.

$= 5.52$, and lynxes $p<0.1$, $X^2 = 2.91$. (See Frkovic et al. (1992) and Huber and Roth (1993) for population age structure data.)

More frequent traffic accidents among younger animals are related to their generally higher mortality and are easier to compensate for at the population level than mortality among sexually mature animals. At the same time, such accidents act as a selective force favouring the more human-shy individuals, however only among wolves was there evidence of a decreasing trend in fatal traffic accidents (Fig. 3). The peak of mortality in the 1960s reflected the combination of a high grey wolf population at the time with rapid traffic growth on the main roads, whereas the recent low number of wolf traffic accidents merely reflects the low wolf population.

In contrast to the situation among brown bears, relatively large numbers of grey wolf and Eurasian lynx also died on local, minor roads. This problem is less easily solved by means of artificial tunnels and similar mitigation measures, instead, the closure of certain forest roads and restriction of speed and public acces on certain minor roads seem to be the only feasible solutions.

ACKNOWLEDGEMENTS

We thank the Croatian Ministry of Science and the John Sheldon Bevins Memorial Grant of the International Association for Bear Research and Management for financial support.

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IENE
Infra Eco Network Europe

Trends

Expanding awareness of issues and solutions increased awareness of the issues has raised the visibility with decision makers and the general public of the need to implement transportation work that is ecologically sound. This is evident in media coverage and is generally viewed as a positive attribute, when proposals are well explained and justified. At the same time, in a time where budgets are being reduced, there is increased concern that transportation investments are being made in a prudent and responsible way.

Governmental policy direction Policy documents ranging from site specific agreements, to multi-state strategies recent Western Governor's Association and even the Federal transportation budget support the idea that better integration of ecology and transportation is good public policy.

Expanded Academic focus on Road Ecology There has been a significant expansion of study of Road Ecology with several academic centers and specific programs of study established in the past decade. Partnership approaches have been used to combine funding and staff resources into effective research programs.

Improved coordination among practitioners There is a active and growing interaction through committees, organizations such as the Transportation Research Board (TRB), and the American Association of State Highway and Transportation Officials (AASHTO) , list serves, conferences and publications. This has provided synergy through shared ideas.

Challenges

The primary challenges for catalyzing factors are the limitations on funding and staff resource which has been made very critical by the recent economic downturn. This has forced difficult decisions, budget cuts and tradeoffs and many agencies have lost staff and funding for environmental work.

Opportunities

There is a great deal of interest and enthusiasm and support for promoting ecologically sound transportation. There are more opportunities to learn from others than ever before. Partnership approaches have been successful in many places for policy development, project planning, mitigation development, public outreach, citizen monitoring coordinated research strategies.

Conclusion

There has been significant progress in understanding and addressing the ecological effects of transportation. Considering the challenges involved the continuation of progress into the future may rely as much on partnerships and catalysts as on technical and process advances.

Trans European wildlife network

Green bridges and other structures for permeability of highways in Croatia: Case of large carnivores

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Biology Department of the Veterinary Faculty University of Zagreb, Heinzelova 55, 10000 Zagreb, Croatia

Introduction

Habitat fragmentation has been recognized as one of the most significant factors contributing to the decline of biodiversity in Europe (Damarad and Bekker 2003). Large mammals, and especially large carnivores, are sensitive to habitat fragmentation and destruction because of their low numbers, large ranges and direct persecution by humans (Linnell et al. 1996; Noss et al. 1996). Preserving or restoring habitat continuity is recognized as one of main tasks when the conservation of large mammals is the goal (Clevenger and Waltho 2000; Kaczensky et al. 2003).

Two new fenced highways were constructed through the main portion of the large carnivore's core area in Croatia. The Zagreb - Rijeka highway (Gorski kotar highway) was built during the period from 1996 to 2004. The Bosiljevo – Split – Dubrovnik highway (Lika and Dalmatia highway), branching of Zagreb - Rijeka highway was built till near Ploče town in the period from 2003 to 2008 *(Figure 1)*. Both highways cut though the most forested part of Croatia and though the range of all three large carnivores which live in Croatia (bear, wolf and lynx) possibly splitting the Dinaric mountain range into a northern and a larger southern part. Due to the mountains they transect, these highways have numerous viaducts and tunnels which help maintaining the habitat continuity. However, to further improve the permeability of highways, eleven additional green bridges (overpasses) *(Figure 2)*, one additional tunnel and five additional viaducts, were added to the objects constructed due to topography itself. The need for such objects was recognized in part due to previous studies of bear movements (Huber and Roth 1993), and bear mortality caused by traffic (Huber et al. 1998), as well as the impact of traffic on all three large carnivores in Croatia (Kusak et al., 2000) .

We studied if these new highways present a barrier for the movements of large mammals, or do they have enough crossing structures which ensure permeability and habitat continuity? In this paper we summarized already published monitoring data concerning northern highway through Gorski kotar (Kusak et. al. 2009) and compared them with first monitoring data for three green bridges on the Lika part of highway.

Materials and methods

We studied the impact of highways on large and medium sized mammal movements by the use of radio-telemetry, IR counters, by reading signs on sand-tracks and by photo traps (Kusak et al. 2009). We compared the data from the two highways and related them to habitat features in regions where those highways were situated.

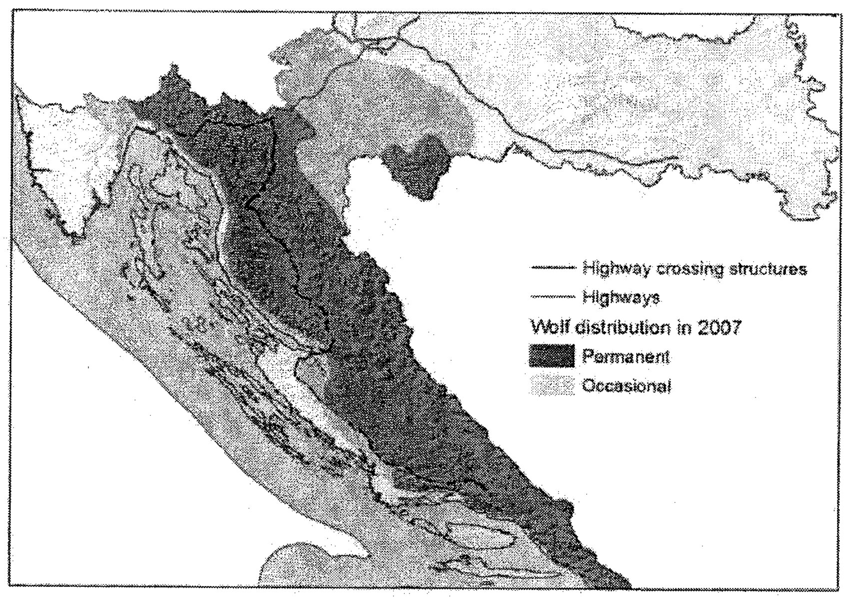

Figure 1: Wolf distribution (bear and lynx distributions are inside the area of wolf distribution) in Croatia in relation to highways and crossing structures built in Croatia in the period from 1997 to 2008.

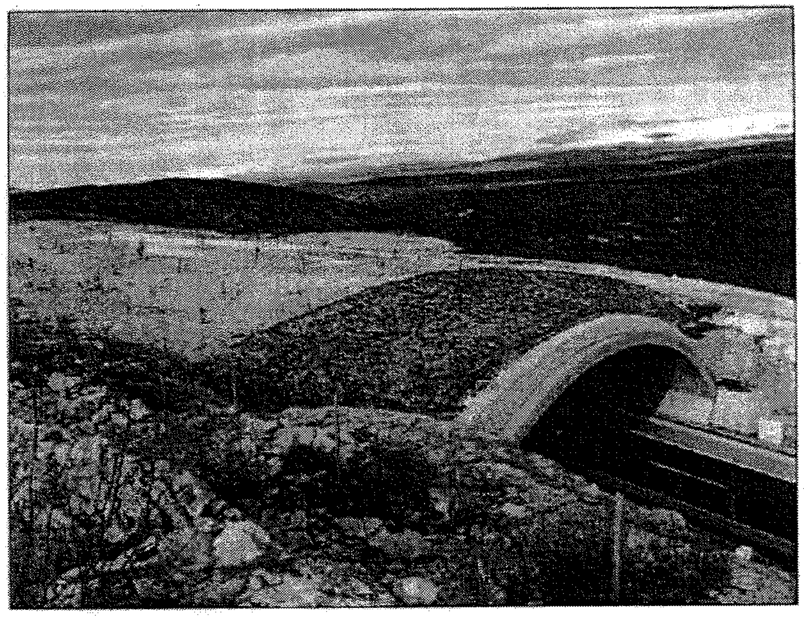

Figure 2: Green bridge Konšćica (150m) built in 2008 and is one of ten green bridges in Croatia on the highway to the south (Lika and Dalmatia).

Results and discussion

There are differences in the three studied sections mostly due to different topography of three regions (Table 1).

Table 1: Highways in Croatia with numbers and sizes of all objects that can serve as possible crossing structures for animals. The last green bridge was in the section which was still under the construction, and as such was not included in this study.

Region	Highway length (m)	Bridge N (m)	Underpass N (m)	Tunnel N (m)	Viaduct N (m)	Green bridge (n)	Total N (%)
Gorski kotar	68500	3 (898)	24 (246)	12 (10045)	16 (5996)	1 (100)	56 (25.3)
Lika	160940	16 (2595)	26 (336)	7 (18842)	18 (6594)	4 (480)	71 (17.9)
Dalmatia *	137739	7 (2262)	71 (525)	6 (38338)	20 (4056)	5 (800)	109 (8.3)
Total	367179	26 (5755)	121 (1107)	25 (32725)	54 (16646)	10 (1380)	236 (15.7)

**includes part finished until the end of 2008 (to Šestanovac exit)*

The Dedin green bridge in Gorski kotar was crossed by large mammals 15.8 times per day (Kusak et al. 2009). This is comparable to the daily use (12.2 to 16.3 passes) by ungulates of one overpass (50 by 95 m) in The Netherlands (van Wieren and Worm 1997) and by sum of 13.7 that passed per day under all monitored (N=11) underpasses together in Banff NP (Clevenger and Waltho 2000). The total number of crosses per day over/under four monitored crossing structures in Gorski kotar is five times higher than under all underpasses on phases 1 and 2 of the highway in Banff NP (Kusak et al. 2009). As the length of monitored crossing structures represented only 16% of all objects on the length of the highway through Gorski kotar, the total highway permeability, with included unmonitored structures, may be three to four times higher.

In the period from 26.10.2005 to 28.02.2008, we monitored the use of three green bridges on the highway to the south, in Lika region. We recorded a total of 18423 crosses, giving a total of 27.99 crosses per day, for all three objects together (Table 2) what was in average 6.5 less pre day per green bridge compared to the use of Dedin green bridge. That could be due to lover animal density, difference in habitat surrounding crossing structures and increased human disturbance.

Table 2: The length of monitoring periods, total number of crosses and daily use of three green bridges monitored in Lika region in the period from 26.10.2005 to 28.02.2008.

Green bridge	Days of monitoring	N crosses	N crosses per day
Ivačeno brdo	592.42	5921	10.15
Medina gora	710.96	7451	10.43
Varošina	682.73	5051	7.41
TOTAL	662.04	18423	27.99

The analysis of the green bridges use by different species revealed some striking differences. The frequency of ungulate crossings was highest on Ivačeno brdo, while there was lowest frequency of large carnivores crossing (χ^2= 8.68, df = 2, p<0.01). It was opposite on Medina gora, high rate of large carnivores crossing with rather low rate of ungulates crossing (difference not significant), and without a single appearance of red deer. The presence of a man and dog was observed on all three crossing structures, with the highest frequency on Varošina green bridge *(Figure 3)*. This coincides with lover overall crossing frequency for this crossing structure, and low frequency of large carnivores. Strong positive correlation was found between crossing frequencies of ungulates and man with dog (Spearman Rank R= 0.78, p= 0.003), then for ungulates and dog (Spearman Rank R= 0.82, p= 0.001). It is evident that human disturbance can influence the use of crossing structure by animals. Ungulates in Banff NP are sensitive to structural attributes of the underpasses, whilst large carnivores are sensitive to distance to town and human activity level (Clevenger and Waltho 2000). Similar pattern was found by Kusak et al. (2009); crossing structures highly used by large carnivores are less used by large herbivores.

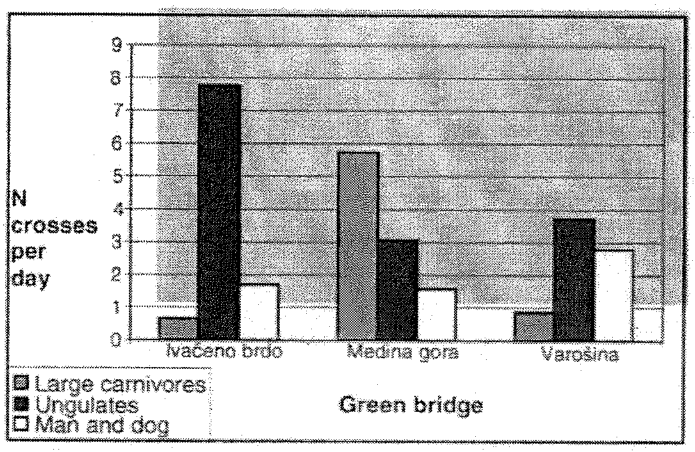

Figure 3: Number of crosses of three monitored green bridges in Lika.

We have confirmed that all large mammals use green bridges on regular basis, but the frequency and patterns of crossings vary during day, as well as between large mammal species and groups. No difference in frequency and patterns of usage was found between the three bridges. There is also a strong negative correlation between human passage and passage of large carnivores as well as between passage of large carnivores and ungulate passage, and positive correlation between human and ungulates passage. Therefore, in order to increase usage of green bridges by large carnivores, human influence at green bridges should be eliminated or at least minimized. To achieve this, the Minister of Culture, pursuant to the Nature Protection Act (Anon. 2008), with the approval of the Minister of the Sea, Tourism, Transport and Development, and the Minister of Environmental Protection, Physical Planning and Construction, issued the "Ordinance on wildlife crossings" (Anon. 2007) that restricts the human use of animal crossing structures. Crossing structures are marked by signs made in accordance with these regulations. Signs are placed on the side of the road *(Figure 4)* and on the crossing structures itself and at a distance of 300 m from the structure.

Figure 4: The sign on the highway telling that the object is crossing structure for wild animals.

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