

# THE EXPANDING BROWN BEAR POPULATION OF SLOVENIA: A CHANCE FOR BEAR RECOVERY IN THE SOUTHEASTERN ALPS

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**Abstract:** Slovenia is the northwestern edge of the Balcano–Dinaric brown bear (*Ursus arctos*) population area. A viable population of about 250 bears inhabits a core management area in southcentral Slovenia. A smaller population, established by bears emigrating from the core area toward the northwest, exists in adjacent border areas of Slovenia, Austria and Italy. Interstate cooperation is necessary to further increase brown bear numbers and range of this southeastern alpine population. Preserving main emigration corridors and improving the political habitat for the future welfare of bears in the Alps are among the most important tasks facing bear managers. The problems arising from increased sheep predation by bears in corridor areas, interstate highway construction, and other human influences affecting the spread of bears are discussed.

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**Key words:** Alps, brown bear, expanding population, Slovenia, *Ursus arctos*.

The Republic of Slovenia is a transition area between the Balcano-Dinaric brown bear range and the Alps. Slovenia represents the northwestern edge of the Balcano–Dinaric brown bear population, which encompasses parts of southcentral Slovenia and the mountainous areas of Croatia, Bosnia and Herzegovina, Montenegro, Kosovo, and Macedonia (Fig. 1). The population also extends south into bear range in Albania and Greece (Mertzanis 1989).

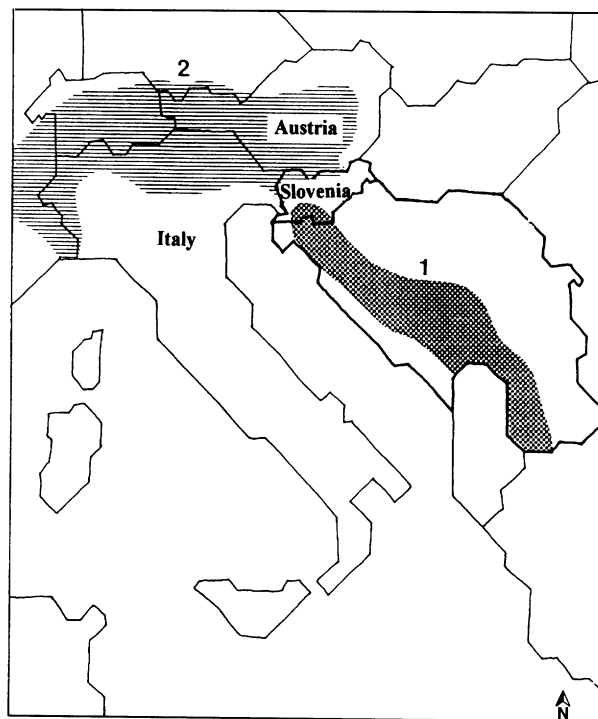
Between 1981 and 1990, the brown bear population in Slovenia was roughly estimated at 250–320 animals by the Slovenian Hunters Association. In the same period, this organization reported 421 bears legally harvested. This data suggests that the population in the western part of the Dinaric area is stable.

Since the brown bear was exterminated in the Alps before the beginning of the 20th century (Roth 1987), the Slovenian bear population is the closest source for bear population recovery in the southeastern Alps. During the 19th century the brown bear was less persecuted on the Slovenian side of the Alps and in the Karavanke and Julian Alps, as was the case in the rest of Europe (Simoncic 1994). Immigrant bears from the southeast frequently penetrated the Alps because of preserved habitats in the Balcano–Dinaric population area, the low density of bears in this area, and preserved migration corridors. Although most of these bears were killed by local people, the brown bear never completely disappeared from the Slovenian Alps (Adamic 1994).

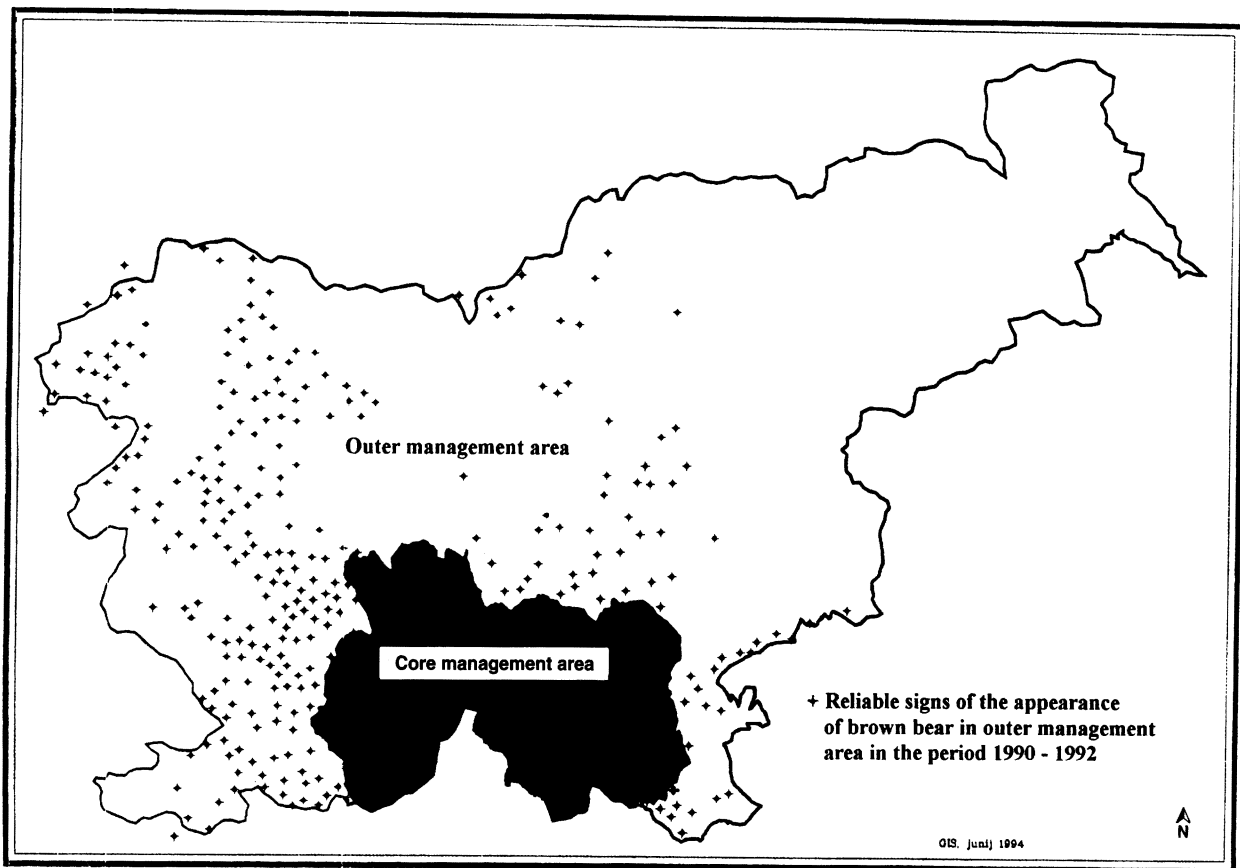
The brown bear now holds the attention and sympathies of people in Europe. Great efforts are being made to conserve isolated remnant populations of bears in the Spanish and French Pyrenees, the Trentino area in the Italian Alps, and in Norway. In Austria and France, reintroduction of wild bears into areas of their former range are in progress (Adamic 1994).

## MANAGEMENT AREAS

Because of pronounced differences in ecological characteristics, habitat suitabilities, and brown bear densities, 2 different systems of brown bear management were implemented in Slovenia in 1966. An area of about 3,000 km<sup>2</sup> in southcentral Slovenia was declared a core management area (Fig. 2). About 70% of this core area is covered by mixed Dinaric beech–fir (*Fagetum*



**Fig. 1.** Relationship between Slovenia as a transition area between the Balcano–Dinaric brown bear range (1) and the Alps (2).



**Fig. 2. Brown bear management areas in Slovenia.**

*dinaricum*–*Abies* spp.) and oak–beech (*Quercus*–*Fagus*) forests with good feeding and denning sites (Adamic 1990). Most of this core area is sparsely settled or uninhabited by humans (Ciglar 1979). Recent telemetry studies of brown bear movements in adjacent Gorski Kotar in the Republic of Croatia (Huber 1987) demonstrated that areas on both sides of the border represent continuous brown bear habitat covering approximately 5,000 km<sup>2</sup>. It is estimated that 400–450 bears live in this joint area (Adamic 1992). According to the 1976 Act on Hunting in Slovenia (Uradni list SRS 25/76), brown bear management in the core area must include the following: (1) central planning of the yearly harvest and its spatial distribution, (2) regulation of legal hunting methods, including the shooting season (October 1–April 30) and legal hunting weapons and calibers, (3) reimbursement to local farmers for damages caused by brown bears, (4) supplemental feeding at permanent feeding sites, (5) protection of key habitat, and (6) recording data collected on harvested bears into the Central Slovenian Bear Register.

A second area of about 17,000 km<sup>2</sup> (85% of Slovenia) was designated the outer management area (Fig. 2). The density of bears in this outer area is much lower than that found in the core area. Based on crude estimates, about 10% of the population of Slovenian bears is found in the outer management area, primarily in the northwestern and western region. The main source of bears in this outer population appears to be emigrants that leave the core area and disperse in several directions (Adamic 1990). According to the 1976 Act on Hunting in Slovenia (Uradni list SRS 25/76), brown bears in this outer area were declared unprotected. Members of local hunters clubs were allowed to shoot bears year-round, but the taking of females with cubs was illegal. Bears were unprotected in the outer management area because of frequent bear predation on sheep and cattle and damage to beehives, fruit trees, corn fields, and other crops. Although these damages were promptly reimbursed, local farmers were against protecting the brown bear. Despite its unprotected status, on average only 3 bears were shot annually in the outer area (Fig. 3).

## IMPLICATIONS OF BEAR EMIGRATION

Although cases of bear emigration from southcentral Slovenia were recorded during periods of low bear density in the first half of the 20th century (Erzen 1953, Pirc 1954, Amon 1961, Svigelj 1961), movement of bears into northwestern Slovenia and neighboring areas of Austria and Italy became more frequent in the mid 1960s (Anderluh 1972; Bozic 1972; Gaspersic 1973; Adamic 1987, 1990; Perco and Boscagli 1987; Strumbelj 1989). These increased emigrations occurred with the growth of the bear population in the core areas of southcentral Slovenia. According to Servheen (1987), Pulliainen (1983a,b) and Rogers (1987) frequent sightings of females with cubs in newly occupied areas is a reliable sign of an expanding population. Thus, frequent sightings of females with cubs in the outer management area suggests that the brown bear population in Slovenia is progressively expanding (Table 1). The first reliable signs of denning activity in the outer management area were reported in 1961 near Podbrdo in Baska Grapa (I. Arman, pers. commun.).

Following recommendations from the 1986 Trento, Italy, World Wildlife Fund Conference on brown bear in the Alps, the Hunters Association of Slovenia restricted the shooting of bears in the outer area in 1987. This was to support the natural recolonization of bears into

neighboring areas of Italy and Austria. Since 1990, only problem bears which repeatedly attacked cattle or sheep on open pastures were shot. Permission to shoot these animals, about 2–3 annually, is given on a case by case basis, by the Slovenian Ministry of Agriculture and Forestry.

In 1992 (29–30 June) the Alps–Adria Bear Specialist Group met in Ljubljana. Acute problems concerning the return of the brown bear to the Alps were discussed. A resolution on a common strategy to support the transfrontier extension of bears, addressed to the governments of participating countries, was adopted at this meeting.

## PROBLEMS OF FUTURE EMIGRATION

For the brown bear to continue to increase in Slovenia and to expand into the southeastern Alps of Italy and Austria, several problems must be addressed. Although damages incurred by bears have been promptly reimbursed, several cases of bear predation on sheep in 1991 and 1992 in northwestern Slovenia triggered rising opposition among sheep farmers against the protection of the brown bear and other large predators in the outer management area. During the drafting of future hunting legislation this opposition, which could seriously impact

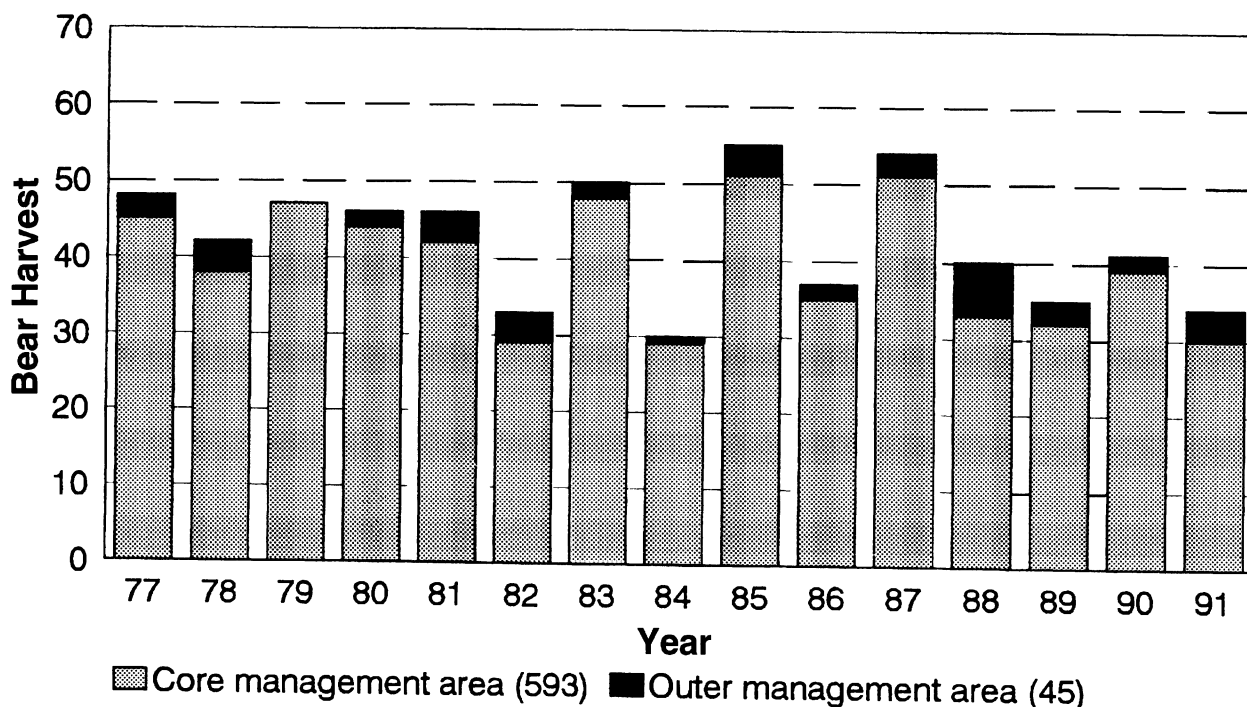


Fig. 3. Brown bear harvest in Slovenia from 1977–91. (Total harvest in parentheses).

**Table 1. Signs of brown bear presence, bear sightings, and sightings of females with cubs in the outer management area, Slovenia, 1946–92.**

Period	Years <i>n</i>	Bear sign observed <i>n</i>	Bear sightings <i>n</i>	Females with cubs among sighted bears <i>n</i> (%)	Cubs total <i>n</i>	Average litter size <i>n</i>
1946–1959	14	37	25	1 (4.0)	1	1.00
1960–1969	10	42	39	4 (10.3)	5	1.25
1970–1979	10	54	52	6 (11.5)	9	1.50
1980–1989	10	174	124	18 (14.5)	31	1.72
1990–1992	3	62	40	7 (17.5)	14	2.00

efforts for further transfrontier expansion of bears, became very clear (A. Simonic, pers. commun.).

Another important problem affecting the spread of bears through northwestern corridors is the recent construction of a highway network in Slovenia, which began in 1991 with the building of the Osimo highway sections Razdrto–Nova Gorica and Razdrto–Koper. These highways will split the main bear emigration corridor at 2 places. Although bears skillfully climb fences constructed along such highways, they seldom escape the vehicles on the highway and are often hit and killed. From our observations along the fenced Ljubljana–Razdrto highway, it appears to take bears a long time to find ways of avoiding new barriers on traditional routes. Four bear caused accidents took place on the Ljubljana–Razdrto highway in 1992: 2 bears were killed and another 2 were injured but escaped. A driver of 1 of the vehicles was also seriously injured. In 1992 on the Idrija–Gorica motorway, 1 bear was killed by a car, and another by a train in the vicinity of Divaca (Table 2). Bear–traffic collisions in 1992, especially those on the Ljubljana–Razdrto highway helped persuade planners at the Slovenian Ministry for Public Transport to consider installing wildlife crossings on planned sections of highways. Traffic-caused bear mortalities in neighbor Croatia were studied by Frkovic et al. (1987), who stressed that bear mortality increases when highways and railways are constructed in bear habitat.

## MANAGEMENT IMPLICATIONS

The future of the brown bear in Slovenia remains unclear. Despite moderate hunting pressure and negative environmental effects from human activities, the population of brown bears in Slovenia has not been seriously affected (Berce and Strumbelj 1994). The brown bear was declared a vulnerable species in the recent Red List of Mammals of Slovenia (Krystufek 1992). The planned highway and railway corridors to be built in Slovenia during the next 15 years represent a serious threat to the future status of the brown bear in its core area and for future expansion. Public attitudes are of crucial importance for the survival of a vital bear population in Slovenia, which has the only source population (Pulliam and Danielson 1991) for the return of the brown bear to the Alps. This makes its protection of international as well as local importance. The future conservation strategy for brown bear in Slovenia should include the following: (1) protection of key habitats in the core management area, (2) preservation and improvement of natural food sources, (3) intensive management of hunting mortality, (4) education of local people on ways to cohabit with bears, and (5) consideration of the brown bear in spatial planning operations on statewide levels. We hope that our ideas on the future conservation of the brown bear in Slovenia will be accepted and supported on an international level.

**Table 2. Reported bear–traffic collisions in outer management area, Slovenia, 1992.**

Date of collision	Location	Area of collision	Cause	Fate of bear	Sex and weight
2 May	highway	Postojna	car	wounded	unknown
21 May	motorway	Idrija	car	killed	male 55 kg
25 May	railway	Divaca	train	killed	male 30 kg
16 July	highway	Logatec	car	killed	male 49 kg
17 August	highway	Unec	car	wounded	unknown
16 December	highway	Planina	car	killed	male 166 kg

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