BROWN BEAR MORTALITY IN CENTRAL ITALY FROM 1970 TO 1984[a]

GIORGIO BOSCAGLI, Gruppo Orso Italia, Centro Studi Ecologici Appenninici, 67032 Pescasseroli, L'Aquila, Italy

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This paper evaluates causes of brown bear (*Ursus arctos*) mortality for a 15-year period in central Italy, including Abruzzo National Park. Mortality was evaluated relative to human activities, population density, and traditional hunting. This evaluation is particularly important for establishing priorities by the Abruzzo National Park Agency (P.N.A.) regarding future conservation measures for brown bears.

Vigna-Taglianti et al. (1984) support the hypothesis that the brown bears of central Italy should be given subspecific classification; this could be useful for the general conservation plan that the Abruzzo P.N.A. and the Italian Bear Group (I.B.G.) will send to the Italian authorities.

STUDY AREA

Bear mortality data were collected in the Central Apennines throughout the bears' range (Fabbri et al. 1983), which has been partitioned according to different levels of protection (Fig. 1). Within the Park (40,000 ha), it was possible to develop a complete monitoring program. Unfortunately, in the 60,000-ha External Protection Area (E.P.A.), or outside the Park, the protection level is operationally and legally insufficient. Within the Park, hunting is forbidden, whereas in the E.P.A. (like most of the Italian territories) hunting is allowed except for wild boar (*Sus scrofa*) and weasel (*Mustela nivalis*).

METHODS

We divided the bear range outside Abruzzo National Park into 6 parts (Fig. 1) based on the information of Fabbri et al. (1983) and other general habitat characteristics such as vegetation type, level of human activity, and denning habitat. The areas labeled A, B, and C were judged best for bear survival; the areas labeled 1, 2, and 3 were considered unsuitable bear habitat.

All information on dead bears received from park rangers, forest service rangers, I.B.G. members, and others was closely checked and verified. The carcasses of 45 bears were collected and transferred to the Apennine Ecological Study Center to determine the cause of death. To standardize methods, dates of carcass recovery were considered as dates of death. In only 3 cases were carcasses judged older than 1 year. In 13 of 45 cases, it was not possible to determine cause of mortality.

RESULTS AND DISCUSSION

Forty-five bear mortalities were identified: 9 bears were killed in accidents (train or car), 18 were poached, 5 died of natural causes, and 13 died of unknown causes. Higher mortality, especially from poaching and accidents, occurred outside the Park (Table 1).

Although bears are present in areas A, B, and C, (Fabbri et al. 1983), the population density is prob-

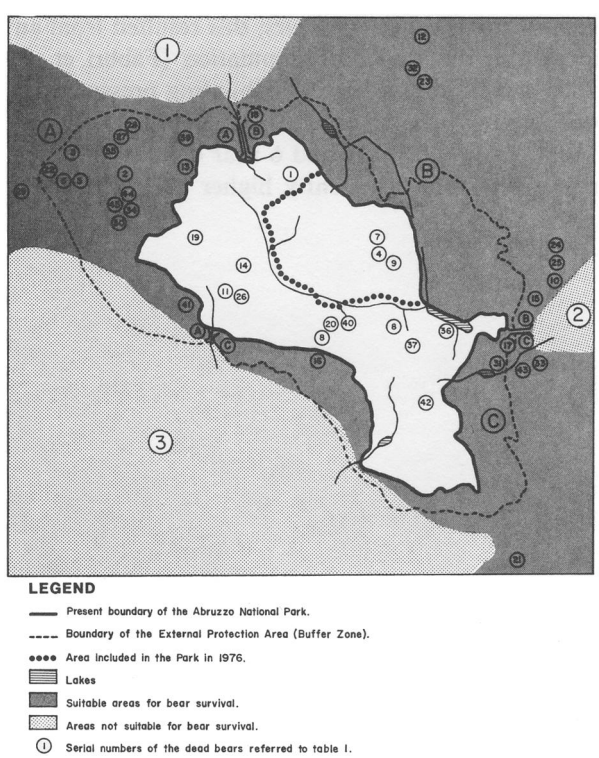

Fig. 1. Locations of brown bear remains found between 1970–84 in Abruzzo National Park and vicinity, Italy.

[a] Scientific contribution from Abruzzo National Park, Special Series.

Table 1. Causes of brown bear mortality in areas A, B, and C, and in Abruzzo National Park, Italy, 1970–84.

Areas	Bears killed*	Mortality causes			
		Poaching	Accidents	Unknown	Natural
A	16/48.5%	9	3	3	1
B	11/33.3%	1	6	4	—
C	6/18.2%	3	—	3	—
A+B+C	33/100%	13/39.4%	9/27.3%	10/30.3%	1/1%
Park	12	5	—	3	4

*Number of bears/percent of total mortality.

ably less there than in the Park. It is impossible to be more specific because no census has been conducted in these areas; we know only that bears are present.

It is possible to identify a mortality risk gradient for brown bears living outside the Park. Sixteen bear mortalities occurred in area A (Fig. 1); this is 35.5% of the total ($N = 45$), and it is 48.5% of the total dead bears found outside the Park ($N = 33$). We think the bear mortality rate for area A is alarming. Over half (56.3%) of the bear deaths in this area resulted from poaching, and only 1 (6.3%) resulted from natural causes. Poaching in this area has increased over the last 4–5 years; this resulted from an increase in the wild boar population (Fabbri et al. 1983), which in turn increased hunting pressure and poaching.

In areas B and C, 11 and 6 bear deaths occurred, respectively. The apparently higher bear density in these areas (Boscagli, unpubl. data), suggests a higher risk for bears living here. The presence of a railroad in area B contributed to the high number of accidental mortalities (54.5% of the dead bears in B). Including this area in the Park (Fig. 1) has reduced the risks caused by poaching. After 1976, we had no evidence of mortality from poaching or unknown causes in area B. In area C, we observed no special problems.

To provide greater protection for bears, we suggest including area A within the Park boundaries, which would greatly reduce illegal harvest. In area B, the P.N.A. and the Railway Service are studying 2 possible solutions to accidental mortality of bears: building electric or ultrasonic barriers at bear crossings and planting vegetables and alternative food resources to attract bears at strategic points.

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