BLACK BEAR PREDATION ON YOUNG CERVIDS - A SUMMARY

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Abstract

A literature search and personal communication with many field workers across North America, suggests that predation by black bear (Ursus americanus) upon neonate cervids may adversely affect recruitment in cervid populations. Such predation appears most important within the first two months following birth in moose (Alces alces), deer (Odocoileus spp) and elk (Cervus elaphus nelsonii).

Several studies in which predation has been systematically documented - mainly through tracking of radio-collared prey - are discussed. Various characteristics utilized in identification of the predator at the kill site are described, including the phenomenon of prey "skinning" (everting) and its implications with regards to bear scat and digestive tract analysis studies. Coincident seasonal habitat preferences by black bear and cervids are discussed. Various documented "eyewitness" accounts of black bear predation on moose, white-tailed deer and elk are summarized in map form. The implications of excessive (predator-kill) calf loss to a moose population in which a selective harvest system places greater stress on the calf segment are discussed.

Timing of Young Cervid Mortality

Various North American studies have indicated that while spring neonate production is adequate to support increments in big game populations, very often neonate numbers have fallen so drastically by the fall-winter period that expected population increments are not achieved.

On the Kenai Peninsula, Alaska, Chatelain (1950), found that calf percentages in the population dropped from 40 in late May to 27 to 23 in late July and December respectively, while Le Resche (1968), near Palmer, Alaska, observed that moose calf numbers decreased from 83 to 36 per 100 cows from May to October.

In a study of factors affecting calf elk survival in north central Idaho, Schlegal (1976) established that total mortality of calf elk from calving through October was 67.9 percent.

Gasaway et al. (1977), in the Tanana Valley, Alaska, recorded a decrease in moose calf numbers from 44 to 14 per 100 cows from June to November, 1975.

Kowal and Runge (1982) conducting aerial surveys in the Cumberland Delta area of Saskatchewan, found that moose calf numbers decreased by 60 and 76 percent respectively in two game management zones during the period from the end of May to September.

In Algonquin Park, Ontario, Addison (1981, 1982, pers. comm.) determined that there were 73 (8 of 11) and 88 (7 of 8) sets of twins per 100 moose cow-calf groups, while Wilton (1981, 1982) found that by early winter these ratios declined to at least 15 (5 of 34) and 25 (8 of 32) respectively.

Neonate Radio Telemetry Studies

In radio telemetry studies of neonates, black bear were found to constitute a significant source of mortality in moose (Ballard and Taylor 1978, Ballard et al. 1979, Franzmann and Bailey 1977), in elk (Schlegel 1976) and in mule deer (Smith 1983).

The examination of neonate carcasses for such evidence as puncture wounds, claw marks, subcutaneous hemorrhage, portions of carcass consumed and signs of adjacent predator activity such as hair on shrubs, faeces and beds often assisted in the positive identification of the predator.

In all these studies, plus others (Gilbert 1951, Norton 1983 pers. comm.), black bear commonly skinned (everted the hide of) their prey. This probably explains why studies of black bear food habits based on digestive tract and scat analysis (Table 1) have often failed to identify the importance of neonates in black bear diets. If no hair were ingested, none would remain.

TABLE 1

SUMMARY OF IMPORTANCE OF CERVIDS IN DIET OF BLACK BEAR IN NORTH AMERICA ACCORDING TO SCAT ANALYSIS AND DIGESTIVE TRACT CONTENT ANALYSIS

STUDY AREA	SPECIES FED UPON	TIME OF OCCURRENCE	IMPORTANCE (% OCCURRENCE)	SOURCE
Alaska	Moose Calf	May	1.5%	Chatelain, 1950
		June	16.2%	
		July-Aug.	26.3%	
		Late Aug.	0%	
Montana	Cervids	Spring	< 5%	Tisch, 1961
Ontario	White-tailed deer	Spring	11%	Kolenosky, 1975
	Moose	Spring	1.5%	
New Brunswick	White-tailed deer	June 15-24	< 10%	Zytaruk, 1978
West Virginia	White-tailed deer	-	6%	Cromer, 1982, pers. comm.
Washington	Deer Fawns	June	15%	Flowers, 1982, pers. comm.
Saskatchewan	Moose calf	Spring	25%	Kowal & Runge, 1982
Maine	Moose	Spring	4%	Hugie, 1982
	Moose	Annual	1.7%	
California	Mule deer	-	-	Sitton, 1982
New York	White-tailed deer	July-Aug.	20%	Warburton, 1982
Wisconsin	White-tailed deer	May	4.6%	Bertagnoli, 1983, pers. comm.
		June	0.8%	
		July	5.3%	
Quebec	Moose calf	-	< 1%	Crete, 1983, pers. comm.
California	Mule deer	Fawn drop & deer season	-	Grenfell & Brady, 1983
Wyoming	Adult Moose	May-June	9.3%	Hammond, 1983
	Adult Elk	May-June	2.0%	
	Elk Calves	June-Aug.	2.2%	
	Mule deer fawns	June-Aug.	0.8%	
Washington	Deer fawns	5 May-9 June	8.0%	Lindzey, 1983, pers. comm.
Wisconsin	-	May-Sept.	0%	Norton, 1983, pers. comm.
Ontario	-	Early summer	0%	Snider, 1983, pers. comm.

Predation Studies

The deaths of 25 (47%) of 53 elk calves radio-collared in an Idaho study (Schlegel 1976) were attributed to black bear. Moreover, during June and July, 1976, 73 black bears were trapped, tagged and removed from the study area. The three year calf-cow average up to the bear removal was 21 calves/100 cows. For the two winters following the bear removal (1977 and 1978), the calf-cow ratio was 61 and 51 calves/100 cows respectively, but by 1979, this ratio had dropped to 27 calves/100 cows. Also in 1979, 6 of the black bears originally removed from the study area (in 1976), were recaptured in the study area, one having returned 138 straightline miles.

Sixteen (34%) of 47 moose calves radio collared in an Alaska study (Franzmann, Schwartz and Peterson 1980) were predated by black bear, while Smith (1983) found in Utah that mule deer (Odocoileus hemionus) fawn mortality due to black bear predation was 9.3% (5/54), and was limited to the first 3-4 weeks post partum.

Ozoga and Verme (1982) working with white-tailed deer (Odocoileus vinginianus), in a 252 ha enclosure in Michigan concluded that predation on as many as 12 fawns born within the enclosure in 1973 and 1980 could have been carried out by 3 black bear subsequently trapped within the enclosure.

Seasonal Habitat Preferences of Black Bear and Cervid Species

The chances of black bear predation on young cervids may be enhanced by the fact that both predator and prey species often prefer the same habitat types during the spring and summer periods. For example, bear, white-tailed deer and moose cow-calf groups prefer early seral stage growth adjacent to mature and intermediate forests (Bennett et al. 1943, Kolenosky 1975 and 1978, Hugie 1982, Norton 1983 pers. comm., McCaffery et al. 1974, Kowal and Runge 1982). Such habitat selection would place both species in the same area when neonates are most vulnerable.

Schlegel (1976) does not feel that black bear move to the (elk) calving areas specifically to prey on the calves. He feels that the regulating factor which probably superimposes the elk and bear in the same elevational zone is plant phenology.

Personal Opinions

While some feel that black bear in sufficient numbers can severely limit neonate cervid recruitment through systematic predation (Chatelain 1950, Coggins 1983 pers. comm.), others feel that bear predation is random in nature and does not constitute a major limiting factor (Norton 1983 pers. comm., Hernbrode 1983 pers. comm., Lindzey 1983 pers. comm.).

Witnessed Observations of Black Bear Predation

Personal communications from many game agencies across North America documented 35 witnessed accounts of predation, the locations of which appear in "Figure 1", which also illustrates the locations of research projects that have proven black bear predation on neonate cervids to be important.

Discussion

After examining the literature it becomes apparent that the black bear not only is capable of capturing and killing young cervids, but has done this to such an extent in some areas as to constitute a factor limiting cervid populations. Black bear predation on young cervids has been documented in studies and witnessed by a sufficient number of individuals to indicate that it occurs to varying degrees across the entire range of the black bear in North America.

Before a problem involving black bear predation can be recognized, it may be necessary to establish whether or not neonate losses are significant. This may involve radio telemetry or other cost intensive survey techniques.

Digestive tract and scat analysis studies could possibly lead to erroneous conclusions, since black bear often evert the hide of their prey and thus may not ingest large quantities of hair.

Black bear habitat selection during the spring and summer periods often coincides with that occupied by various cervid species. While some feel that bear will purposefully seek out the areas where neonate cervids are likely to be found, others feel that it is the coincidence of similar habitat preferences, coupled with the opportunistic nature of the black bear which leads to predation.

In areas where moose characteristically feed on aquatics, black bear may frequently be observed feeding on grasses in the meadows which are often found adjacent to aquatic feeding sites. This proximity of one species to the other coupled with the fact that cow moose often leave their calves in adjacent cover while they feed on aquatics, may set the stage for a successful predation attempt.

As previously mentioned, moose twinning rates in the Algonquin Region of south central Ontario declined by an average of 59% (79% to 20%) from the spring to early winter period in the years 1981 and 1982.

In the fall of 1983, the Province of Ontario embarked upon a Moose Selective Harvest System whereby all hunters are allowed to harvest a calf moose, but only those hunters possessing a special permit are allowed to harvest a bull or a cow.

With such severe neonatal calf losses, it is possible that the new harvest system could add to reduced recruitment rates, thereby resulting in a prolonged population response time to the new management technique.

If a significant proportion of the neonatal calf losses are attributable to black bear predation, then it may be possible to decrease the response time to the new moose harvest program by increasing the harvest of certain segments of the black bear population. Before this may be accomplished, however, a better understanding of which segments of the bear population are inflicting predation losses must be gained.

Some Unanswered Questions

The black bear is generally considered to be omnivorous in nature and is known to eat a wide variety of plant and animal material during the spring, summer and fall (Bennett et al. 1943, Tisch 1961, Willey 1978, Grenfell 1979, Sitton 1982).

The digestive tract of the black bear would seem to indicate that it is best suited as a carnivore. Indeed Kolenosky (1978) states, "the ability of bears to assimilate grasses, sedges and leaves adequately has been questioned as they have no caecum and no apparent digestive adaptation to permit cellulose breakdown." Certain species such as rabbits and hares have been able to adapt a basically "simple" digestive system to the assimilation of cellulose through the use of reingestion, pseudo-rumination or coprophagy which consists of reingesting pellets which have already passed through the digestive tract (Southern 1940, Hamilton 1955, Lechleitner 1957, Heisinger 1962). Since it appears that bears have not developed a similar adaptation, the addition of easily digestible animal protein to the bear's diet at a time of year prior to the availability of easily digestible vegetable protein, such as berries and mast, would seem to be desirable or even necessary if bears are to obtain sufficient nutrition during the spring - early summer period.

Add to this the basically carnivorous tooth development of the bear, a potentially lethal set of claws, a speed which is said to be able to exceed 60 km/h (Kolenosky 1984 pers. comm.) and the picture of a competent predator emerges.

Finally, regarding the matter of scat analysis studies, if the hair is removed from the average wolf scat, very often there is virtually nothing remaining. This appears to imply that a large proportion of the flesh consumed is assimilated by the body of the wolf. Is it not possible then that in the situation where a bear has consumed flesh from its prey, but has everted the hide, thus ingesting very little hair, that virtually no scat material would result?

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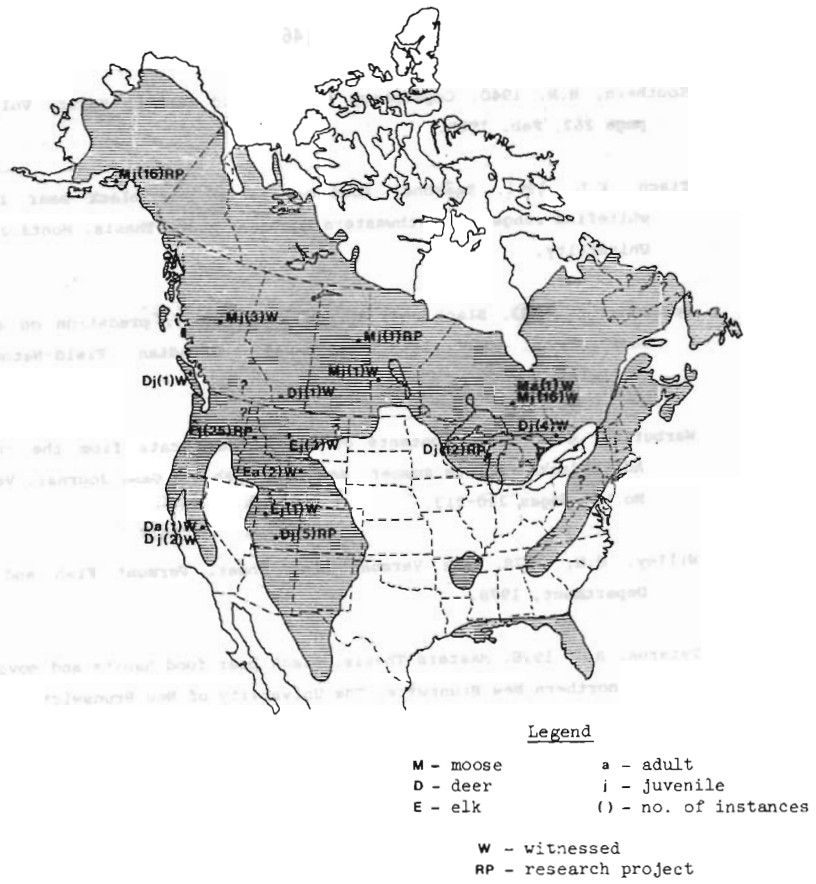

Figure 1: Black Bear range in North America[1] showing approximate locations of verified black bear predation on Cervids.

[1]Source: Big Game of North America, published by Stackpole Books, 1978 and Kolenosky 1984 pers. comm.