Mapping and Monitoring Asiatic Black Bears in Sichuan, China

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Whereas the trade in bear parts appears to remain rampant in China, the trend in the Chinese population of Asiatic black bears is uncertain (and politically controversial), for two principal reasons: (1) the level of illegal killing may be sustainable, and (2) a reforestation program ("Grain to Green") initiated in the late 1990s, combined with the creation of more Nature Reserves (a doubling over the past 5 years), has increased the area of potential bear habitat. How can we find out what's really happening to bear numbers?

Various crude population estimates have been made for Asiatic black bears in China, but these were based on flimsy data (sign, interviews, and official opinions). Certainly none of these estimates are sufficiently rigorous to provide a basis for monitoring population trend. Instead, we believe that population trend may be effectively monitored through changes in geographic distribution. Although the geographic distribution of this species in China is roughly known, finer-scaled information, derived from on-the-ground surveys, is needed for monitoring.

Realizing that it was impractical to undertake a mapping project for the whole country, we limited the scope of this project to Sichuan Province, in south-central China (see map). This province is particularly interesting because it is a stronghold for black bears, due in part to many Nature Reserves (established for other species such as giant pandas, takin, and golden monkeys) that afford rugged forested habitats and better control of poaching. The province also has lowland areas where bears are less well protected and where they often

become involved in conflicts with farmers growing crops, such as corn, and raising livestock. Thus, there are likely to be areas of high density contrasting with areas of low density and recent extirpation. Secondarily, the province is interesting because the northwestern edge of the range for black bears overlaps the eastern edge of the range of brown bears.

Our study has two basic goals: (1) to map the range of black bears, basically as presence/absence data in grid cells, and (2) to identify the primary factors that impact presence/absence of bears.

The main difficulty in conducting such an endeavor is the sheer scale. The province is so large (485,000 km^2) that sign surveys throughout potential bear range would be impossible without a very large investment of people and time – it took 170 people 3 years to conduct transect sign surveys for giant pandas within a much smaller range within the province. We dealt with this issue on several levels. First, we used a rather coarse grid (15 x 15 km); second we limited the survey to only grid cells with at least 20% forest cover; and third we stratified the cells into low, medium and high quality bear habitat (based on mean elevation, forest cover, and road density, taken from available GIS layers) and selected 40% of each of these strata to survey (yielding 372 survey cells). Finally, instead of randomly searching for bear sign in every selected cell, we utilized local knowledge.

Local knowledge can be very helpful, but it is not always reliable. Our approach was to first locate an area within the designated cell that had the best potential habitat, and then find local villagers to interview (see photo). We asked not only whether bears were present, but also about perceived population trends, aspects of bear natural history, crop damage and other conflicts, and poaching. Generally we conducted many independent interviews in each survey cell.

In order to corroborate bear presence, we asked a willing and knowledgeable local person to take us to some place with bear sign — typically a tree with definitive claw marks or a bear "nest" (see photo); often we found several signs in a clump. In all cases where the majority of local people indicated the presence of bears in the area, someone was able to show us some bear sign. Occasionally, though, the sign was so far away (several hours' walk) that it was actually located in an adjoining cell.

Only in situations where local people were uncertain about the presence of bears, or where they indicated that bears were absent, did we need to conduct our own sign surveys. Here we did strip transects (20 x 100m), preferably in a forest with oak or chestnut trees (as acorns and chestnuts are prime fall foods, and climbing marks last for several years). We examined every tree within the transect for bear claw marks. We did up to five such transects: if bears were present, then (based on data that we collected in another phase of this study), the probability of non-detection after 5 transects in a mature deciduous forest was <1%. If bear sign was found in fewer than 5 transects, we classified the cell as having bears, and moved on to the next one.

We surveyed 47 cells in 2005, and 129 cells in 2006; these surveys involved 823 interviews. The increased production in 2006 was the result of splitting the 2005 survey effort into two teams, once they had gained sufficient experience. Among the 176 cells surveyed so far, there were only 16 in which bears were not detected. These 16 cells were distributed mostly along the northwestern (high elevation) and northeastern edge of the purported distribution. The absence cells along the northeastern edge coincided with the region of highest human density and agricultural development. As we move out of the rugged

mountainous areas with our survey effort in 2007, we anticipate encountering more cells without bears.

There's one big irony in this — while all of us are concerned about the conservation of this species, and thus feel good when we find evidence of it's persistence in places with marginal forest quality and continued evidence of poaching, we also have ample evidence that in many such places bear numbers are declining. Most interviews start with villagers reporting less bears than there were 10 years ago. That's where our coarse sampling regime is bothersome. We recognize that many of our presence cells have only a small patch of habitat with a few individuals. Although we have no intention of producing any sort of population estimate from this work, some might surmise just from the presence data that bears are doing far better than they really are. Hence, it would be helpful to find more absence cells. On a positive note, we believe this will ultimately be a good monitoring tool, as we can now identify several areas that will probably lose their bears if populations continue to decline.

Maybe one of the most compelling findings so far is the correspondence between the field data (bear sign) and the information obtained from interviewing the local people. From this we cannot conclude that the local people are also providing accurate information about bear conflicts and poaching (as these subjects are a lot more sensitive than simple presence-absence), but we find it interesting that there has been significant uniformity in the responses to these questions. If, indeed, the local people are portraying the poaching situation accurately, then the future of Asiatic black bears in China, the country with undoubtedly the largest numbers of this species, does not look promising.

Collaborators on this project include Dajun Wang (Peking University), Ji'en Gong (Sichuan Forestry Office), William McShea (Smithsonian Institution), and Dave Garshelis

(Minnesota Department of Natural Resources). Our funders include Earthwatch, Animals Asia Foundation, World Society for the Protection of Animals, Friends of the National Zoo, and the IBA.

Figures

Map of China showing Sichuan Province (*no fig. caption needed*)

Liu Fang (left edge of photo) interviewing Yi people about bears. Interviews were not always one on one.

Examining bear claw marks and nest located by local people.