How Many Bears?

by John W. Schoen, Sterling D. Miller, Warren Ballard, and LaVern R. Beier

The often asked question, "How many bears are there?" is important but difficult to answer. Wildlife biologists in Alaska have recently tackled that question with an approach using high-tech radio telemetry and old-fashioned skill at spotting bears. The new technique we have developed is bringing results from across the state.

But first, why is it necessary to have reliable population data, particularly for bears? Though brown/grizzly bears were historically numerous throughout western North America, they have now been classified as threatened in the United States south of Canada, and their populations have declined throughout much of Canada as well. The reason for this decline was largely a result of habitat loss and the killing of bears perceived to be a threat to human safety or as competitors for resources. Because the brown/grizzly bear has a low reproductive rate, it is particularly vulnerable to over-exploitation. As human activities and developments increase in bear habitat, we need to monitor population status more closely in order to maintain sound population levels. Some of the same pressures which contributed to reducing bears elsewhere are also becoming evident in Alaska today. Thus the ability to effectively monitor Alaska's bear populations is becoming a management necessity and high priority.

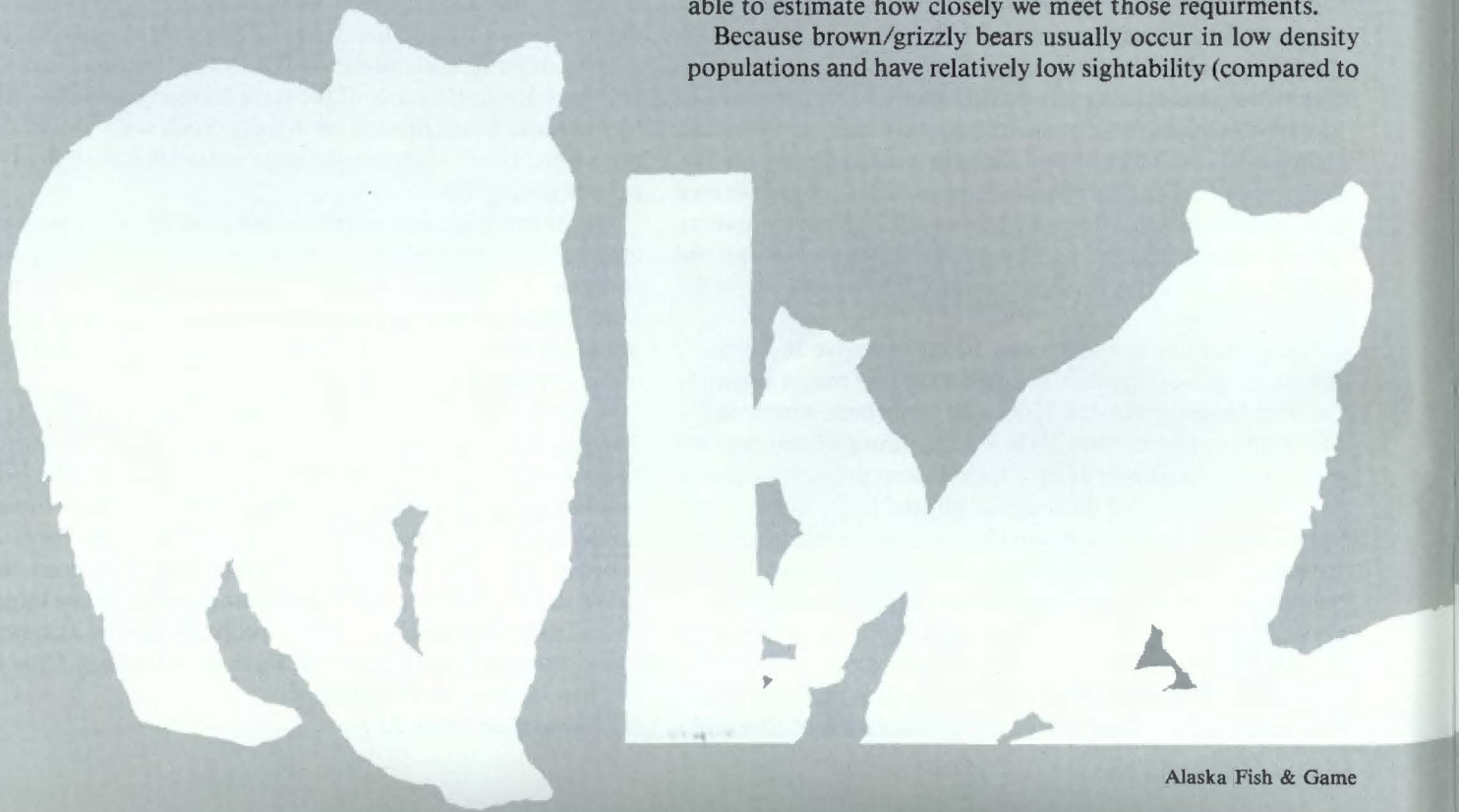
In the past, most bear management decisions have been based on skull and age data derived from sealing certificates of hunter-killed bears. Although these data are important, it is frequently difficult to directly apply this information to detect changes in population status. Only a small proportion of the population is harvested and that sample may not be representative of the total population (for instance, hunters choose large bears and regulations protect females with offspring). Additionally, by the time a declining trend in the population is detected, it may be difficult to reverse in a timely manner.

Because of these problems, an important priority of bear research and management has been to develop a technique for directly estimating bear numbers and measuring population changes. Such a technique was recently developed by Sterling Miller, Warren Ballard, and Earl Becker of ADF&G as part of the State-sponsored studies on the feasibility of the proposed Susitna River Dams. This procedure uses a modified Lincoln or Peterson Index which is a mark/recapture technique for estimating animal numbers.

The technique requires marking a sample of the population, then surveying the population and counting the number of marked and unmarked animals seen. This information yields an estimate of population size. For example, if we mark 10 animals in a population, then do a survey in which we count a total of 20 animals out of which 5 were marked, we would have observed 50 percent of our marked population. By adjusting our 20 animal survey by a 50 percent observability index, we would estimate the total population to be 40 animals.

This is, of course, a very simple example. There are a number of requirements which must be met in order to make an accurate estimate. The major requirement of this technique is that there is no movement (immigration or emigration) into or out of the survey area. We used radio collars to determine how many bears remained inside the study area. Two other requirements—that animals have equal sightability and that resightings are independent—are not as simple to control, but we are usually able to estimate how closely we meet those requirments.

Because brown/grizzly bears usually occur in low density populations and have relatively low sightability (compared to



moose, caribou, or deer, for example), it was necessary to develop a method to cumulate survey data over several days of effort. The mark/recapture technique developed for bears does this by cumulating results over multiple surveys. This new methodology has been applied in half a dozen areas throughout Alaska since its development in 1985. Schoen and Beier used this technique in their study area on northern Admiralty Island during the summer of 1986 and again in 1987. The results were very consistent between years and indicated the density of brown bears in this area was approximately one bear per square mile (the highest recorded density in the world). The particular application on Admiralty Island is designed to measure the effects of the Greens Creek Mine development (located in the middle of the study area) on brown bears. Following the baseline density estimate, researchers can replicate this estimate again in 10 to 20 years or following completion of the mine project to document what, if any, changes in the bear population may have occurred.

It is interesting to compare the 1987 estimate of 136 bears on northern Admiralty to an estimate made over 50 years ago in the same general area by Frank Dufresne and Jay Williams. They surveyed streams and, by identifying tracks of individual bears, estimated a population of 149 bears. Though their estimate was more subjective and not repeatable in a statistical sense, the similarity between estimates suggests there has been little change in the density of bears from 1932 to 1987.

The mark/recapture technique for estimating bear densities has also been applied twice in southcentral Alaska by Miller. There, he showed a decline in bear abundance in Unit 13 following liberalization of hunting regulations. These data and other considerations resulted in the adoption of more conservative bear hunting regulations.

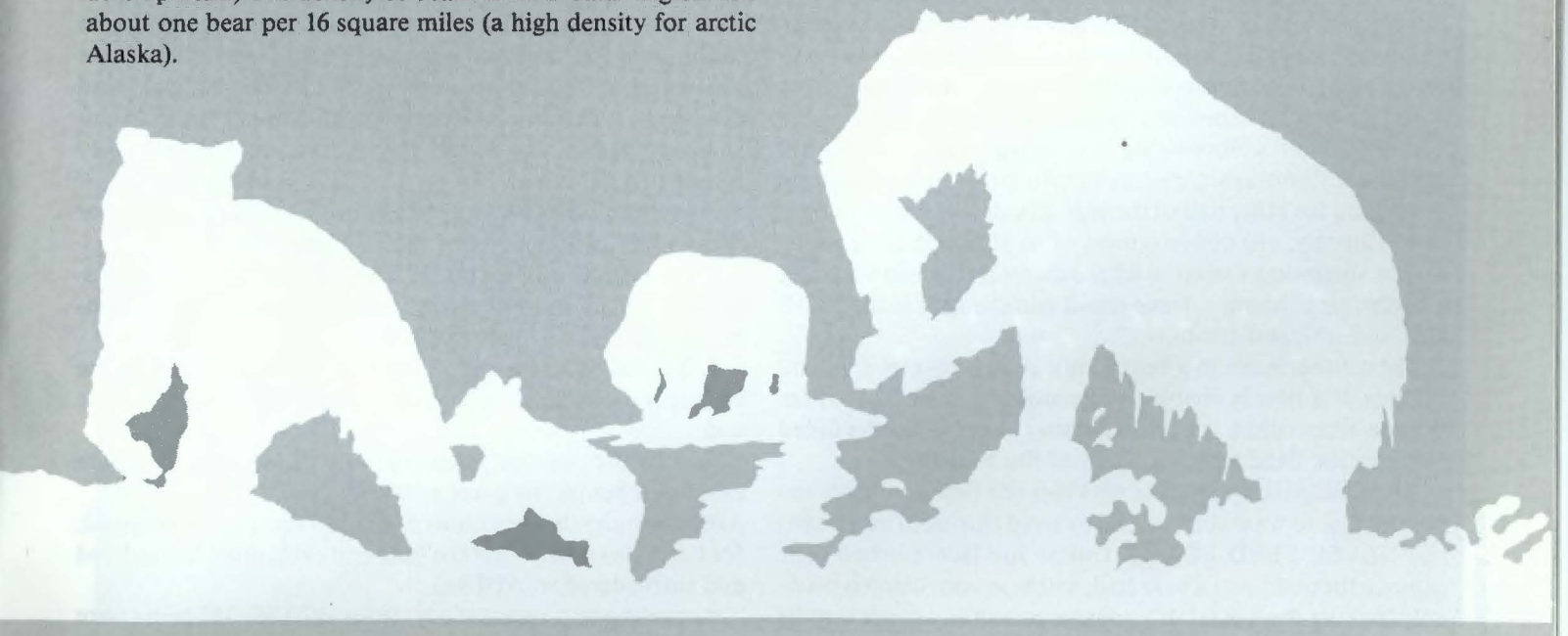
In northwestern Alaska, Ballard (in a cooperative ADF&G-National Park Service effort) completed a density estimate along the Noatak River which includes the Red Dog Mine. (As on Admiralty, this estimate was made prior to major mine development.) The density of bears in the Noatak region was about one bear per 16 square miles (a high density for arctic Alaska).

In addition to these studies, Roger Smith and Vic Barnes completed a cooperative ADF&G-U.S. Fish and Wildlife Service (USFWS) density estimate in two different areas on Kodiak Island, one of which contains the Terror Lake Hydro-Electric Project. Estimated densities on Kodiak were close to those observed on Admiralty. Also, Harry Reynolds has used this technique in the Alaska Range of interior Alaska. A bear density study in the Black Lake region of the Alaska Peninsula jointly proposed by ADF&G, the Park Service, and USFWS is still in the planning stage.

In Alaska, brown/grizzly bears are widely distributed throughout a diversity of habitats. As a result, field effort, project costs, and techniques also vary geographically. For example, on Admiralty Island, the census was conducted over five days in a 140 square mile area with one supercub, one helicopter, and a field crew of two. In contrast, five survey aircraft, one telemetry aircraft, one helicopter, and a field crew of 14 were necessary for the seven day survey of the 700 square mile area of the Noatak region.

To date, there is general satisfaction with this new approach for estimating bear numbers and density (which varies from one bear per square mile on Admiralty Island to one bear per 35 square miles in a portion of the Susitna Basin). The technique (unlike many earlier methods) is both objective, and repeatable and provides an opportunity for statistical comparisons. However, it is also expensive in terms of flight time and personnel and, based on Reynolds's and Miller's work, it may have limited application in low density populations. While recognizing the limitations of this approach, we are optimistic this census method will increase our ability to monitor Alaska's bears and ensure that brown/grizzly populations remain healthy throughout the state.

John W. Schoen, Sterling D. Miller, and Warren Ballard are Game Biologists, and Lavern R. Beier is a Fish and Game Technician serving with the Division of Game, ADF&G.



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