



Figure 1. Dall sheep rutting habitat.

Dall Sheep Trophy Hunting in Alaska's Parks and Preserves: Biological Implications

By Francis J. Singer

The Alaska National Interest Lands Conservation Act (ANILCA) of 1980 designated 5 new parks and 5 new preserves that supported populations of Dall sheep, and added lands to a sixth, pre-existing park. As a result of this Act, about a quarter of the state's 70-75,000 Dall sheep were found within NPS boundaries. Subsistence hunting by local rural residents was permitted in the new areas and sport hunting was allowed in the preserves.

Congress mandated that wildlife populations in the parks be managed in a healthy and natural state, but Congress used these terms conceptually rather than definitively. Alaska continued to set seasons and bag limits, but with federal oversight to assure that the mandates were met. Concern was expressed that designation of the new parks, with their greater hunting restrictions, would focus greater hunting pressure on the remaining herds.

Dall sheep breed and spend the winter on open, windblown mountain slopes in Alaska (Fig. 1). Breeding takes place in early winter (mid-November through mid-December). Maintenance of adequate fat reserves follow-

ing the stressful rut is essential to both males and females for survival through the remainder of the harsh, northern winter.

Lambs are born in mid-May. Inadequate fat reserves for ewes equate to lighter birth weight in lambs; smaller lambs survive at a lower rate. Timing of lambing also is critical. Early-born lambs can perish in late winter storms, while late-born lambs may not obtain sufficient body size and mass to survive their first winter.

During this study in 1981-85, the State of Alaska permitted limited, all-age subsistence hunting of Dall sheep in a few park areas, and unlimited hunting of 7/8-curl or larger rams in national preserves. The scientific community proposed several hypotheses concerning potential negative effects of sport hunting removals of only the oldest rams:

1. The social disruption hypothesis: Most breeding by males is restricted by dominance hierarchy to the largest-horned 7 year old or older rams. The older rams court ewes in a more ritualized, less hurried, less aggressive fashion (Fig. 2). When older rams are har-

vested, the younger rams may harass ewes, thus wasting valuable energy reserves needed to survive northern winters.

2. The magnet effect of older rams on younger rams hypothesis: Rams will court ewes outside of the breeding season, and expend critical energy reserves; but rams typically segregate from ewes into separate habitats. This hypothesis states that older rams do not remain with ewe/young groups following the rut, and that younger rams will follow older rams rather than remaining with the ewes.

3. Immature ram incompetence hypothesis: Younger rams may breed ewes later or pregnancy rates may be lower than is the case with older rams.

4. Depressed survivorship in young rams hypothesis: Younger rams might die at a higher rate in hunted herds as a result of their increased role in breeding and depletion of critical energy reserves (Fig. 3). When older, more dominant rams are present, younger rams are excluded from most courtship and breeding activity.

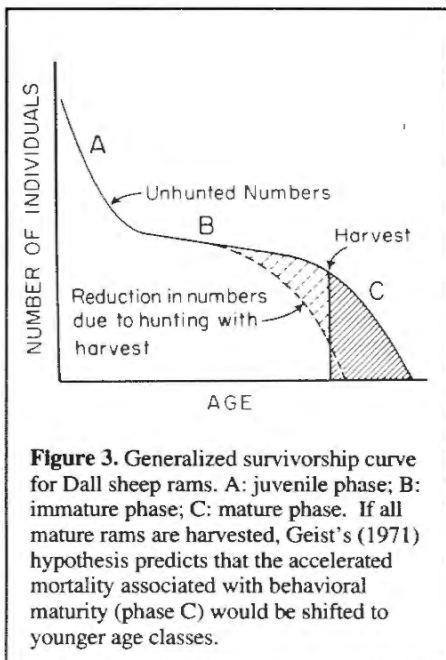


Figure 3. Generalized survivorship curve for Dall sheep rams. A: juvenile phase; B: immature phase; C: mature phase. If all mature rams are harvested, Geist's (1971) hypothesis predicts that the accelerated mortality associated with behavioral maturity (phase C) would be shifted to younger age classes.

Observations

Between 1981-85, with co-workers Ed Murphy (U/AK), Karen Laing (then of NPS), and Lyman Nichols (AK Dept. of Fish and Game), I studied demography, survivorship, and breeding behavior in hunted and unhunted Dall sheep herds in Alaska. Our studies were conducted in two areas that were not hunted—Denali NP and Alaska's Cooper Landing Closed Area. Each area had nearby area where all legal (7/8-curl or larger) rams were removed each season by hunters as soon as they reached legal horn size.

We observed that young rams harassed ewes slightly more than did older rams. Young

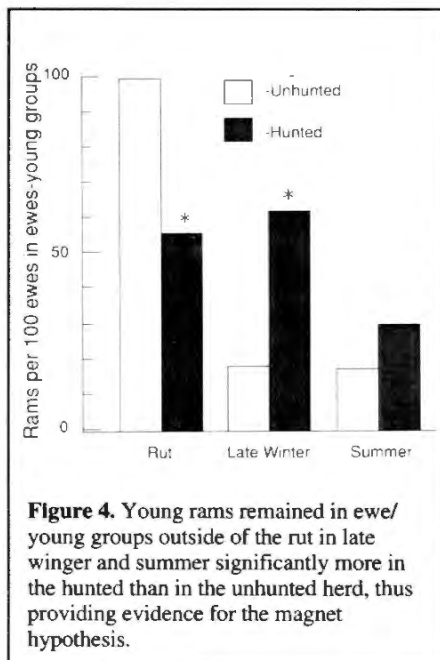


Figure 4. Young rams remained in ewe/young groups outside of the rut in late winter and summer significantly more in the hunted than in the unhunted herd, thus providing evidence for the magnet hypothesis.

rams performed twice as many butts, one-half as many twists (a ritual display), and chased ewes more than did older rams. Ewes were twice as likely to run away from an approaching young ram as from an older ram. However, actual energy expended by ewes, expressed as courtship time per hour of observation, was identical between hunted and unhunted herds, since (as a result of the ram harvest) proportionately fewer rams per ewe were present in the hunted herd.

We observed evidence for the magnet hypothesis; more young rams remained with the ewe/young groups throughout the winter in the hunted herds (Fig. 4).

No evidence was observed for immature ram incompetence. Lamb production and survival to yearling age were identical in hunted and unhunted herds. Lambing dates were nearly identical.

No evidence of depressed survivorship of younger rams was observed in hunted herds.

Conclusions

We concluded that under the 7/8-curl harvest regulation, Dall sheep populations in national preserves in Alaska met all the presumed criteria of a healthy population. Ewe energy expenditures, young ram mortality rates, and production of young were equivalent between hunted and unhunted populations. Some elements of natural selection, however, were missing from the hunted populations. There were fewer rams per ewe and thus less competition among rams for breeding opportunities. Ewes consistently accepted the courtship activities of the largest-horned rams in all groups, and this sexual selection likely had strong adaptive significance. For example, breeding with a dominant ram may increase the prospects of the lamb's also being a dominant individual with better survival chances. Removal of all the large-horned rams in a herd, therefore, may minimize male competition for mates and thereby influence natural selection.

Since completion of this study, the state of Alaska has raised the minimum size for harvest from 7/8- to full-curl in all the state except for the Brooks Range, thus further reducing concerns for the health of hunted Dall sheep populations in national preserves.

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Reports Available from Singer

Murphy, E.C., F.J. Singer, and L. Nichols. 1990. Effects of hunting on survival and productivity of Dall sheep. *J. Wildl. Manage.* 54:284-290.

Singer, F.J., E.C. Murphy, B.A. Cooper, and K.K. Laing. 1991. Activity in a hunted and unhunted herd of Dall sheep in Alaska; a review of the biological and management implications. Biennial Symposium of Northern Wild Sheep and Goat Council (in press).

Singer, F.J. and L. Nichols. 1992. Trophy hunting of Dall sheep in Alaska: A review of the biological and management implications. Biennial Symposium of Northern Wild Sheep and Goat Council (in press).

Singer, F.J. and K.K. Laing. 1992. Effects of trophy hunting removals of rams on rut behavior of Dall sheep. Unpublished ms.

Recommended Reading

Geist, V. 1971. The evolutionary significance of mountain sheep horns. *Evolution* 20:558-566.

Figure 2. Dall Sheep in twist display toward adult ewe, Usibelli Mine study area, Alaska.

