

## DALL SHEEP HARVEST REGULATIONS IN ALASKA 1990

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Abstract: Dall sheep rams are harvested in Alaska as a result of 3 types of recreational hunting experiences: the opportunity to harvest trophy Dall rams, the opportunity to hunt mature rams under aesthetically pleasing conditions, and the maximum assured opportunity to hunt mature rams. In addition, some subsistence sheep hunting occurs for both sexes, and one limited-participation permit hunt for "any sheep" is currently offered. Restrictions on participation, transportation methods, and harvest vary according to management goals and objectives for each type of hunting experience.

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Dall sheep (*Ovis dalli dalli*) population maintenance and enhancement are the management objectives in most of Alaska, and harvest of mature rams is the dominant harvest management practice. This is the result of tradition, and the 1989 conclusion of the Alaska Board of Game (the regulatory authority for Alaska's wildlife), that only in unusual circumstances is either-sex harvest a viable hunting management strategy. The Board's position is in substantial agreement with the published working hypothesis for Dall sheep management (Heimer 1988).

## EXISTING REGULATIONS

In all of Alaska, except the Brooks Range, recreational hunting is limited to harvest of mature full-curl rams. According to current regulations, the term, full-curl, means:

- (A) that the tip of at least one horn has grown through 360 degrees of a circle described by the outer surface of the horn, as viewed from the side or
- (B) that both horns are broken, or
- (C) that the sheep is at least eight (8) years of age as determined by horn growth annuli.

In the Brooks Range, the legal minimum horn development required for recreational hunting is 7/8-curl. According to regulations, seven-eighths curl horn means that the horn tip "has grown through seven-eighths of a circle (315°), described by the outer surface of the horn, as viewed from the side, or with both horns broken." In the Brooks Range, where subsistence use follows aboriginal traditions, and in Game Management Units 11 and 14C the legal definition is "any sheep."

Most hunters are limited to 1 sheep per year. Subsistence hunters in the Brooks Range may take 3 sheep per year. In the permit-controlled

trophy hunt (Heimer, 1985), successful permit hunters are limited to 1 full-curl ram every 4 years.

## BIOLOGICAL/GEOMETRIC RATIONALE

### Recreational Hunting Management Rationale

Data gathered in Alaska show that Dall sheep population productivity is significantly and positively correlated with higher ram ratios ( $P < 0.01$  from Nichols 1978;  $P < 0.02$  from Heimer and Watson, unpubl. data). Other data relating ewe fecundity to environmental variables indicate ram abundance as the most probable cause of this relationship (Heimer and Watson 1986a). Additionally, inference from the behavioral biology of mountain sheep in rut suggests this strong correlation is a plausible result of the presence of more adult rams (Geist 1971). Finally, sustainable ram harvests have increased to previously unexpected levels following changes from 3/4- to 7/8- and then to full-curl harvest regulations in Alaska (Heimer and Watson 1990). Consequently, harvest regulations where population maintenance or growth is a management objective are now designed to assure that ewe fecundity, ram abundance, and age structures are not significantly affected by human hunters.

The behavioral ecology of Dall sheep appears to require the effective presence of Class III and IV rams (Geist 1968) for maximal productivity and survival. Heimer and Watson (1986a, 1986b) observed that compromised ewe fecundity accompanies maximum 3/4-curl harvests (which virtually eliminated Class III rams and lowered ram:100 ewes ratios below 20:100). This decreased fecundity was reversed and subsequently increased to match that of a lightly hunted (at full-curl) population following establishment of the 7/8-curl regulation. The restriction of harvest to 7/8-curl rams protected all rams in Classes I, II, and III and led to observed ram:ewe ratios averaging approximately 40:100. Harvests from these populations increased following experimental restriction to full-curl regulation (Heimer and Watson 1990). Consequently, the Alaska Board of Game has limited recreational harvest to Class IV (full-curl) rams throughout the state except for the Brooks Range.

### Geometric Rationale

Dall rams grow horns throughout life, and these horns typically describe a helix, like the threads on a machine bolt. When viewed down the axis of this helix, the outer surface of a full-curl horn describes a circle. As seen from this aspect, the tip of a full-curl ram's horn will "meet" the anterior edge of horn base where it emerges from the hair. Full-curl rams fall into Geist's Class IV, rams which are physically and behaviorally mature (Geist 1968).

The average time required for Dall rams to reach full-curl horn development is 8 years (Heimer and Smith 1975), hence the inclusion of the 8 years of age criterion in the legal ram definition. Age 8 years also corresponds to the age at which ram mortality typically increases in mountain sheep (Geist 1971:295). In summary, rams are made available

for harvest only after they have reached full physical and behavioral maturity and have a relatively high probability of natural death. At this point, the average ram has achieved 94% of its maximum expected horn development (Heimer and Smith 1975).

The "both horns broken (broomed)" criterion is included because a significant fraction of Dall rams do broom both horns and might not be available for harvest except under the age criteria if this provision were not included. The frequency of broomed horns among Dall rams increases with age, and it is unusual for a Dall ram to have both horns broken before the age of 8 years or Class IV status (W. Heimer, unpubl. data).

#### ENFORCEMENT/PROSECUTION

During the last 20 years, an average of 2 arrests per year were made for taking rams less than 3/4 or 7/8 curl (Lt. R. Boutang, Div. Fish and Wildlife Protection, pers. commun.). There are no records of conviction after trial for sublegal 3/4- or 7/8-curl horn violations. Under full-curl regulations, 3 hunters were arrested for taking undersized rams in 1989 and 4 in 1990. None of the hunters charged with these violations has elected to stand trial. All of these cases where prosecutors were willing go to trial have been resolved because the defendants were persuaded to plead guilty.

The low number of arrests for violation of minimum horn size regulations probably reflects the vast size of Alaska relevant to the force of enforcement personnel, the tradition of compliance with regulations among sheep hunters, the abundance of legally harvestable rams, and the vague legal definitions of 3/4- and 7/8-curl horns. The apparent increase in number of arrests under the full-curl regulation is a result of enforcement personnel feeling more confident in arresting violators. Also, prosecutors are more likely to pursue a case to trial because the definition of full-curl is much less subjective (Lt. R. Boutang, Div. of Fish and Wildlife Protection, pers. commun.).

#### INTERPRETATION TO HUNTERS IN THE FIELD

In the past, the 3/4-, 7/8-, and full-curl regulation have been interpreted to hunters in the field through a line diagram in the regulation book. However, these sketches have been of poor quality and confusing to hunters. They have also compromised prosecutions in the past. These sketches have been replaced by photographs.

During 1984, the first year of experimental full-curl hunting, a significant number of notably young, small rams were taken (approximately 15% of the reported harvest). Following a hunter information program, consisting mainly of distributing a brochure to hunters (Appendix A), the number of small rams fell to approximately 2% of the reported harvest even though the harvest increased by 49%.

#### PRAGMATIC CONSIDERATIONS

##### Subsistence Hunting

Subsistence hunting is legislatively mandated in Alaska, and the subsistence hunting regulations have been essentially unchanged since 1980 (Heimer 1985). When these regulations were first established, no information on the effects of subsistence hunting was available. In the presence of a legislative mandate and the absence of data, it was assumed that the effects of subsistence hunting would not negatively affect sheep populations, and subsistence harvest quotas consistent with perceived need were established. A voluntary harvest reporting program was established to monitor subsistence harvest of sheep. Until recently, there has been little obvious indication that the assumptions of 1980 were incorrect. I think this is because subsistence hunting for Dall sheep is not widely practiced and has not been closely studied. The reasons it has not been closely studied include the facts that it is largely confined to National Parks where wildlife management is not an option, that subsistence hunting is a politically sensitive subject, and that it is a low priority given its localized nature.

#### 7/8-Curl and Any-sheep Seasons

Establishment of hunting regulations in Alaska may be the most democratic exercise of wildlife management in the world. Any person, agency, or interest group may submit regulatory proposals to the Alaska Board of Game, and all proposals are considered by the Board according to a predetermined schedule. The Alaska Department of Fish and Game submits proposals, advises the Board of their biological/management relevance, and often makes recommendations for acceptance or rejection of the proposals submitted by others. After consideration of all inputs, the Board of Game, a politically appointed "citizen's board", establishes the regulations it determines to be best. Under this system, regulations are established for a variety of reasons. Some serve biological rationale and promote attainment of clearly defined management objectives. However, some regulations occur as results of the democratic process and have less clear-cut management relevance. Professional managers should view these regulations as "benign noise" which accompanies the "true signal" ideally defined by carefully laid management plans. The 7/8-curl regulation in the Brooks Range and any-sheep season in management Subunit 14C near Anchorage illustrate the complexity of regulatory decision making under the Alaskan system.

The 7/8-curl regulation persists in Alaska's Brooks Range, not because of a compelling biological justification, but because of a common public misperception that Brooks Range sheep are slow-growing and small. The common misconception is that because the Brooks Range is the northernmost sheep habitat in Alaska, sheep living there must be on the ecological as well as the geographic margin of their range. Hence, this premise predicts the Brooks Range should produce rams with smaller, slower growing horns. This folklore has been perpetuated by popular writers who have published it in the hunting press (e.g., Gilcrest 1986). In fact, size and quality of ram horns from the Brooks Range are average compared with other areas of Alaska (Heimer and Smith 1975).

Data published by these authors indicate the mean expected volume, the best indicator of size, for average Alaskan Dall rams at maximum



development is 2,151 cc. The expected maximum volume calculated for rams from the Brooks Range averaged 2,111 cc. Hence, by this measure, rams from the Brooks Range are only 40cc smaller than the average Alaskan Dall ram. Heimer and Smith (1975) found 7 of 18 areas within Alaska produced rams which were smaller than rams of the Brooks Range. However, Brooks Range rams do have relatively slow early horn growth, but compensate through prolonged rapid growth later. The age at average maximum growth (Heimer and Smith 1975) is 5 years for all other areas in Alaska, but 6-7 years in the Brooks Range. The result is rams of average size and typical horn development. Consequently, there is no biological justification for maintaining the 7/8-curl horn regulation in the Brooks Range.

The influence of the commercial-use industry also contributed to the Alaska Board of Game's reluctance to implement a full-curl regulation in the Brooks Range. Some members of the guiding industry maintained their livelihoods would be compromised if they had to limit harvest to full-curl rams according to their understanding of the full-curl regulation when the issue was first debated (Alaska Department of Fish and Game 1989).

Another example of democratic process is the any-sheep season in the Chugach Mountains. Repeated aerial surveys indicate sheep population sizes in this area of the Chugach Mountains near Anchorage have increased. As a result, some managers, applying the classical assumptions of cervid management, assume these ranges are overstocked or approaching nutritional carrying capacity. Hence, they recommended population reduction.

This area (Subunit 14C) is climatically influenced by the maritime weather of nearby Cook Inlet, and some managers consider these sheep populations likely candidates for a natural weather-mediated catastrophe. Consequently, managers with a maximum-use orientation suggested liberalized seasons and bag limits be established to allow human use of the standing crop before it could be decimated by weather events.

Yet another consideration is that this area produces outstanding mature rams as trophies. Given unprecedented numbers of sheep counted in the area, some biologists advanced the argument from Geist (1971) that ram trophy size will be maximized when ewe populations are well below nutritional carrying capacity. These biologists also favored population reduction.

Others pointed to the absence of data on range condition, lamb production, yearling recruitment, adult survival, and change in ram trophy quality which would suggest an impoverished population on an overexploited range. In spite of population growth, overall sheep densities on these ranges appear close to the mean reported for North American Dall sheep, 1.6 sheep/sq km (Hoefs and Cowan 1979). These biologists also cited studies which indicate horn size and quality in Alaskan Dall sheep are not functions of density-dependent nutritional constraints (Heimer 1983; Heimer and Watson, unpubl. ms.).

Further complicating this decision was the fact that accomplishing a purposeful and significant population reduction in this area through hunting is a practical impossibility. These populations live within a state park where nonconsumptive use is a high priority and participation in hunting is already regulated by a limited-availability permit drawing (Heimer 1985).

After considering of all these perspectives and weighing anticipated public reaction, the Alaska Department of Fish and Game decided not to propose any changes from the existing season limiting harvest to mature rams. Still, a proposal to reduce the density of sheep in the area was submitted by members of the Alaskan public. After deliberating, the Alaska Board of Game, for the reasons it considered most relevant, established the either-sex season for permit holders, and the season ran as scheduled. Hunters, in addition to taking a typical harvest of 49 rams with 7/8-curl or larger horns, took 31 smaller rams and 15 ewes in 1989. Clearly, this harvest from a population estimated at 2,500 sheep did not effect a significant overall population reduction. Increased public benefit accrued to those hunters (many of whom hunted with bow and arrow) who were successful in taking a sheep which would have been protected under more restrictive regulations. Still, the future of this approach to sheep harvest and population management is uncertain because of the general disfavor it has awakened among hunters who believe strongly in the traditional rams-only approach to harvest.

Try as sheep managers may to direct management along rational or data-based paths according to well-defined management plans, differing interpretations of data and unforeseen developments are certain to arise. These circumstances require constant vigilance and ever-expanding knowledge on the part of managers and users alike and maintain wildlife management in Alaska as a dynamic and perpetually interesting human enterprise.

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## APPENDIX A

## HORN "TIPS" How to Identify a Full Curl Ram (or the size of any ram)



The Alaska Game Regulations define a full curl horn as "the horn of a mature male Dall sheep, the tip of which has grown through 360 degrees of a circle described by the outer surface of the horn, as viewed from the side or with both horns broken."

Ram horns (which are never shed) grow in a helix, like threads on a bolt, out from the head. For a ram to be full curl, the outer surface of the horn as viewed from the side must describe this perfect circle.

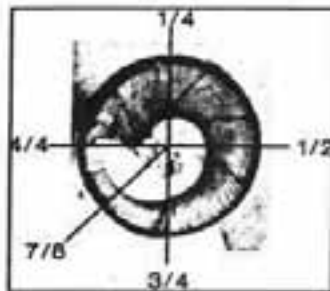


Full curl horn describes a circle.



Horn must be viewed along the axis of the curl to see the perfect circle.

It takes an average of 8 years for the ram's horn tip to form a circle as seen from the side. Rams with both horns broken are included in the definition of full curl. These rams are usually very old and they will die before their horns will again grow to full curl.



You can determine the degree of curl of any sheep horn by looking for the outline of the perfect circle and seeing how far around that circle the tip has grown. A 7/8 curl ram will have horns which describe 7/8ths of a circle. Three quarter (3/4) and 1/2 curl rams will have horns describing smaller portions (arcs) of the circle. Very young rams have 1/4 curl horns, similar to those of ewes.

It is important to look for the perfect circle. Less-than-full curl horns can be viewed from an angle which makes the the horn tip line up with the base. When viewed this way, the outer surface of the horn will NOT form a perfect circle. Instead, it will form a flattened circle, or ellipse.



This horn is not full curl.

If you are not sure the ram you are watching meets the minimum legal horn size for your hunting area,  
**DON'T SHOOT.**