

## Appendix:

### DETAILS AND FALLOUT FROM DALL SHEEP SUBSISTENCE MANAGEMENT IN THE WESTERN BROOKS RANGE, AUGUST 1998: "REAPING WHAT'S BEEN SOWN"

by Wayne E. Heimer

#### HISTORY

Both state and federal laws require several steps in providing subsistence preference.

*First, the populations supporting subsistence use must be identified.*

*Second, calculation of the harvestable surplus from each population supporting subsistence use is required.*

Calculation of harvestable surplus requires specific knowledge of population size, recruitment to the population, and population mortality. These parameters are extremely difficult to measure. Determining them, in a major drainage or within a few discrete, impacted populations is incredibly expensive. Making these measurements over a large area is practically impossible, and the resulting projections are always arguable. Additionally, the determinants of harvestable surplus vary from year to year depending on environmental resistance components (weather, predation, and harvest by humans). Finally, calculation of sustainable harvest also assumes the habitat produces a predictably stable amount of food. For Dall sheep this may be a reasonable assumption. However, the lag time (9-10 years) between birth and maturity for Dall rams in the Brooks Range further complicates this calculation.

*Third, both state and federal subsistence laws require knowledge of subsistence needs.*

Determining an accurate "need number" requires careful work because it is in the interest of local users to maximize this figure.

Once the three prescribed data sets are in hand, the subsistence law's recipe for granting preference to recognized subsistence users require subtracting the *subsistence need* from the *harvestable surplus*. If any of the surplus remains, it is to be allocated to non-subsistence users. If local subsistence users don't want "outsiders" harvesting game in their area, it suits them to represent "subsistence need" as greater than it actually is. Hence, it seems risky business to simply ask rural residents how much they need.

## Subsistence law procedure and “the Kaktovik program”

*Identifying populations:* When the state first provided legal subsistence uses of Dall sheep for Kaktovik in the Brooks Range (where it had been openly practiced for decades even though technically illegal), managers were readily able to identify the areas where use had been centered during recorded history. It had been common knowledge for decades that sheep populations on the Hula Hula River supported historic and recent use by Kaktovik residents. These sheep ranges (about 50 miles from Kaktovik) were identified as the impacted populations.

*Calculating the harvestable surplus:* Biologists disagreed sharply over what constituted the harvestable surplus of Dall sheep. One school of thought argued that Dall sheep are ungulates, and must therefore be subject to general principles of ungulate management. These principles are based on the assumption that ungulate populations grow until limited by their density at carrying capacity. Simply, this assumption predicts populations below carrying capacity will grow (by producing “surplus individuals”) until they become so dense that female productivity declines due to lack of food. When this happens, recruitment declines, the population ceases to grow, and appears stable in numbers. In populations at carrying capacity, theory predicts reducing the population will result in increased population growth rate (by again producing “surplus individuals”). According to this construct, any reduction of static populations (which are presumed density-limited) will result in a compensatory increase in productivity (and recruitment) as the population strives to again attain carrying capacity.

This is the dominant theory in wildlife management and it is taught as a principle in wildlife management schools. It has proven generally reliable in temperate ecosystems without predators for members of the deer family, and has predicted well for species introduced into ideal habitats with no predation.

However, Dall sheep in the Brooks Range aren't deer, they don't live in a temperate-zone ecosystem, and they are subject to unchecked predation. These facts led me to question the relevance of “carrying capacity theory” to Dall sheep in the Brooks Range. I, along with other biologists, reasoned that basic adaptational differences to differing habitat types (stable Vs cyclically-changing) and distinctively different animal families (*Bovidae* Vs *Cervidae*) argued against a compensatory sheep population increase simply because harvest of ewes had lowered the population below the observed, apparently stable level.

I reasoned that sheep reproductive biology is different from deer because sheep are adapted to habitats with stable plant communities while deer are adapted to successional habitats. Biologists call these unchanging plant communities “climax ecosystems.” Because sheep live in climax ecosystems, they should be adapted to the resulting stable food resource. Sheep adaptations to a stable food source include exclusive single births (never twins or triplets as in deer on super-abundant forage) and apparent universal ovulation at 18 months of age. In deer, ovulation as yearlings is uncommon, usually limited to populations at low density where food is super-abundant. These same density/nutritional conditions result in increased multiple births among deer.

There is no evolutionary (inclusive fitness) advantage for an animal adapted to a climax habitat to have the explosive population growth potential to exploit a transient nutritional bonanza. Hence, Brooks Range sheep should not be expected to respond to population reductions in the same way as deer in temperate ecosystems. In short, reducing sheep populations through ewe hunting shouldn't be expected to result in compensatory population growth (through the unavailable options of even earlier ovulation or multiple births) in an effort to re-attain carrying capacity. Consequently, I argued, the only certain harvestable surplus from sheep populations should be mature rams.

Although carrying capacity advocates argued for the traditional approach to ungulate management, there were no compelling empirical data to support carrying capacity theory for Dall sheep in the Brooks Range. Similarly, because our "climax adaptation argument" is a *post hoc* rationalization for the way things are (which means it's beyond simple experimental verification), there were no specific data supporting it either. Hence the choice was arbitrary.

The "carrying capacity" viewpoint prevailed. It was, after all, familiar (and more acceptable than a modern inclusive fitness argument to ADF&G leaders who still remembered learning it as a wildlife management principle). My suggestion that Dall sheep in pristine ecosystems are exceptions to the accepted principles of ungulate (deer) management (in low predation ecosystems) was new at the time, and is still disregarded as unsupported conjecture by many classically trained wildlife managers.

In accepting the "carrying capacity model," ADF&G leadership assumed the harvestable surplus from a sheep population included significant numbers of ewe sheep, and that such harvests would not notably compromise the long-term use of subsistence users. At that time, I had not yet assembled or articulated the historic, modern, and anecdotal ewe harvest accounts given earlier.

No effort was made to estimate or actually determine the harvestable surplus from the sheep populations on the Hula Hula River when the "Kaktovik program" was established in 1980. Sheep were then quite abundant, and non-subsistence users were limited to harvest of 7/8 curl or greater rams.

Despite anecdotal information that subsistence harvests had "used up" one unusually vulnerable Dall sheep population on the Hula Hula River (S. Pederson, ADF&G Subsistence Div. Fairbanks), no systematic effort was made to assess the impacts of subsistence harvest (other than the voluntary but mandatory reporting) from the exploited sheep populations. The emphasis was to be on defining the subsistence need by allowing "unconstrained" harvest and tallying up the number and sex composition of the sheep taken by Kaktovik residents.

This methodology was in contrast to simply asking local residents how many they had taken in the past or how many sheep they'd like to have in the future. For this reason, (defining subsistence need based on reported actual use) the initial sheep subsistence season was 7 months long, and the bag limit was 3 sheep of any sex or age. Still, feeling a responsibility to provide some protection for the sheep populations of the Northeast Brooks Range, ADF&G established an overall harvest quota of 50 sheep. This figure was considered more than adequate provision

for subsistence opportunity based on what was known about past harvest levels by the village of Kaktovik. This was a first, faltering step toward implementing the subsistence preference law. Unfortunately, it was also the final step.

### **Cloning the “Kaktovik Program”**

The original rationale for the “Kaktovik program” was to offer a liberal season, and see how many Kaktovik residents took from the sheep-rich Northeast Brooks Range. However, once the Kaktovik subsistence harvest had been legally recognized, other Brooks Range villages demanded similar preference. To meet these demands, *the experimental “Kaktovik program” was implemented as though it were a functional management scheme* throughout the Brooks Range (Arctic Village/Wiseman, the South Central Brooks Range, Anaktuvuk Pass, and ultimately the Western Brooks Range) without regard to whether it made biological sense or was sustainable. Hence, none of these seasons were ever rationally based on what is actually biologically sustainable. All these hunts involve extensive (typically seven-month) seasons for ewe sheep, voluntary reporting, and from Anaktuvuk Pass eastward, the most liberal bag limits in the history of regulated sheep management.

When this social experiment reached the Western Brooks Range, managers realized sheep populations there couldn't support the potential harvest provided by the original “Kaktovik program.” Consequently, the bag limit was reduced from three to one sheep, but ewes remained available for harvest because subsistence hunters had “always” taken ewe sheep. This was a social, not biological, decision.

Except where subsistence is involved, the only justification for harvesting Dall sheep ewes is to lower population sizes where local managers don't think predators (and other components of environmental resistance) are keeping population densities low enough to protect their ranges. *In these places, ADF&G area management biologists assume (based on carrying capacity theory) there are too many sheep for the range, and justify ewe hunts to lower population densities.* Carefully controlled ewe harvests are allowed on Round Mountain on the Kenai Peninsula and in the Chugach Mountains behind Anchorage as expressions of this rationale. *Only where subsistence sheep hunting dominates is biological relevance superseded by social and political agendas. In these subsistence areas, there is no intent to suppress resident Dall sheep populations. Paradoxically, sustained subsistence opportunity demands the populations be maintained or enhanced.*

## **MANAGEMENT CONSIDERATIONS**

### **Biological Reality:**

Unfortunately, biological relevance asserted itself in the Western Brooks Range. Bad weather in the late 1980s and early 1990s resulted in sheep population declines across Alaska, including the Brooks Range. In sheep-rich areas, subsistence sheep harvest managers made no management responses to these population declines. In the Wrangell Mountains and Northeast Brooks Range, many sheep remained despite populations being lowered by about 30 percent. In these

units, ADF&G managers don't consider the reported level of ewe sheep harvests biologically significant to the overall, area-wide populations. Hence, these ewe seasons persist to serve the same social and political justifications originally given for their establishment.

When its low-density sheep populations declined, ADF&G's Nome Region no longer enjoyed this luxury; the Western Brooks Range was, by comparison, "sheep-poor" from the beginning. Hence, sheep managers in the Western Brooks Range had to deal with the *biological complications* of socially-generated ewe harvests. In its official account of the sheep decline in the Western Brooks Range, ADF&G blamed weather events but failed to mention liberal seasons and ewe harvests, probably for the same reasons other subsistence sheep managers haven't responded to population declines. The reported ewe harvest was viewed as biologically insignificant.

Failure to include harvest of ewes as a possible contributing factor may represent an interestingly selective perspective. In explaining the decline, ADF&G apparently decided to be inclusive enough to speculate that disease might (with predation) have compounded negative weather effects, but not inclusive enough to suggest ewe hunting might also have been a contributing factor. It is, of course, technically fair to speculate about disease (because anything *could* happen), but there are no pathological data suggesting disease was a factor.

*[Author's note: During sheep surveys documenting the decline, ADF&G biologists found several intact dead sheep. Rather than using ADF&G specialists in wildlife disease to see if there were a disease problem, local managers opted to use local veterinarians trusted by local residents. Whether wildlife disease specialists networking with other world-class experts would have found something the local vets missed is unknown. The sheep carcasses were sufficiently decomposed that no conclusive results could be obtained. At least no results have ever been published, and ADF&G disease specialists have no knowledge of unpublished positive findings. Neither do I. Hence, it appears that no disease agents were ever identified, and the cause of these isolated deaths remains unexplained and open to speculation. Even though ewe hunting (typically practiced specifically to lower mountain sheep populations) was obviously occurring, the ADF&G summary of the decline failed to include this traditional subsistence harvest practice as a possible contributor to lower population numbers. Instead, it invoked the theoretical possibility disease may have contributed to the decline. I consider this further evidence that social management considerations in Western Alaska pre-empted biological ones. WH]*

### **Management Reality:**

Even the most socially or politically correct subsistence harvest management plans and regulations require eliminating human use when its continuance threatens population welfare. Hence, the unsustainable subsistence harvest of ewes in the Western Brooks Range had to be curtailed after the population declined. This did not require a complete closure of sheep harvests as first begun by ADF&G in 1991. Here's why:

Dall sheep responses to bad weather in the Alaska Range have been well documented (Watson and Heimer 1984). These data showed bad winter weather affected sheep population dynamics primarily through lamb production failure. Additionally, most adults of advanced age (nine years and up) died; but survival of sheep in their prime years (two through eight) was not greatly affected. Sheep survey data from the Western Brooks Range during the decline suggested a similar pattern. Because sheep in their prime maintain high survival, there should still have been a biological surplus of full curl rams when ADF&G began to close ram seasons in 1991 (lamb production and ram recruitment had apparently been good prior to the bad winters, and it takes nine to ten years for a ram to reach full curl in this area).

Managers in the Nome region realized this biological fact, but decided on a total closure because they anticipated explaining (to their local constituents) that ewe hunting couldn't be allowed, but that hunting for mature rams (disdained as "trophy hunting" by the locals) could still take place, would be socially unacceptable. In spite of this sensitivity to local feeling, there was still a surplus of adult rams in the early 1990s.

ADF&G's print media account (Fairbanks Daily News-Miner Aug. 4, 1988) pointed out that ewes, not mature rams, are the preferred subsistence food. Ewes are usually easier to harvest, and are better eating (they are fatter than rams because they are pregnant (and near term) in April when most subsistence harvest takes place). That is, ADF&G managers chose not to allocate the known harvestable surplus. Local users didn't normally prefer eating mature rams, and managers were certain local residents would not approve of allocating these mature rams (even though they were not preferred subsistence food) to "trophy hunters," (who preferred to harvest (and eat) mature rams). Here it is noteworthy that much of the mature ram harvest was taken by local non-subsistence hunters participating in the normal fall harvest period (which is now understood as non-subsistence).

The cumulative effect of all these management-relevant factors was that the first closure was *not* the biologically risky ewe harvest, but harvest of mature rams in the Baird Mountains. The subsequent management choice was complete closure of Dall sheep hunting in the Western Brooks Range. Local residents were told that when the sheep populations recovered, they could resume traditional harvest practices. Until then, there would be no sheep hunting.

### **Legal Considerations:**

Despite the social awareness of regional ADF&G managers, both state and federal subsistence laws said (and still say) that as long as there is a biologically sustainable harvest, it is to be allocated to humans. Hence, it seems likely the Department and the Alaska Board of Game may have been violation of both state and federal subsistence laws. Even the US Department of the Interior, which frequently, and righteously, asserts its "rural preference mandate" failed to challenge ADF&G's social conscience. The uncontested total closure stood.

### **Further Developments:**

Weather eventually normalized somewhat, ewes were seen with lambs, and some were recruited to the populations. Still, the populations did not show notable growth. Environmental resistance to population growth, (including predation--and perhaps the hypothetical disease which still *could* be there) was apparently limiting population growth. Slow growth should be expected for sheep populations because they don't have the ability to grow explosively in the face of normal environmental resistance just because food is abundant.

Where there is "normal" environmental resistance in the form of predators and weather, sheep populations grow slowly. Nevertheless, with improved weather, the sheep populations began to look better. As a result, local users began to press for resumption of sheep hunting as had been promised when the harvest season was closed.

### **Political Reality:**

Given the local demand for resuming sheep hunting, ADF&G managers decided to appropriate the harvestable surplus of mature rams they had previously with-held. Perhaps maintaining a closed sheep season until the public was ready for restriction of harvest to mature rams was a master-stroke of social management, but it may also be interpreted as paternal manipulation of the local residents. In either case, the good news was, the local public was apparently ready to learn that harvest of mature rams is biologically safe even when ewe harvest can't be allowed.

The bad news, was that by the time managers got around to allocating the sustainable harvest of full-curl rams, the federal government had pre-empted state management on federal lands. Additionally, up to seven years of normal age-associated mortality had claimed most of the harvestable surplus available when the weather turned bad. This meant the currently available surplus of rams was considerably less than it had been in 1991 because there had been several years of failed recruitment and continued predation in the meantime. It also meant that total harvest of these full-curl rams carried a higher biological risk than it would have if phased in during 1991. Nevertheless, ADF&G managers began to work through the allocation process, which requires a great deal of public involvement.

Part of this public involvement required ADF&G to identify the number of Dall sheep required by subsistence users and recognition of this "need number" in codified regulations by the Alaska Board of Game. Instead of relying on the 12 years of subsistence harvest data it had collected (in which it had sufficient confidence to use it for calculating non-subsistence allocations prior to the decline) to define subsistence need, the Department of Fish and Game, opted for community interviews by subsistence resource specialists. These social scientists conducted interviews to coax the extent of past use from local residents...even though such past use might have been technically illegal. Results of this exercise resulted in the Alaska Board of Game certifying the subsistence needs from the Western Brooks Range at a maximum of 60 sheep per year.

*[Author's note: I find acceptance of this figure biologically astonishing. Prior to the population decline, the total population of the area was estimated at about*

900 adult sheep. Hence, a 60-sheep annual harvest would have been a rate of almost seven percent per year. Reported subsistence harvest data and Subsistence Division village surveys show ewes typically compose about 40 percent of subsistence-harvested sheep. If applicable here, this would have produced a ewe harvest rate approaching four percent. All population modeling I've ever done suggests there is no harvestable surplus of ewes from a stable Dall sheep population (such as the Western Brooks Rang population appeared to be prior to the decline). ADF&G media releases suggest predation contributed to the decline so I conclude the ecosystem isn't predator-free. Hence, I'd expect even light ewe harvests to lower overall population sizes. A four percent harvest over 12 years of open subsistence seasons should have lead to a notable decline.

Furthermore, the subsistence need defined through community interviews was 6.4 times the mean reported subsistence harvest during the 12 years the subsistence hunt was open; and defined the need at three times the highest subsistence harvest ever reported. Hence, there was a grand disparity between what local residents told interviewers they had taken in the past (which if actually and consistently taken should have caused the population to decline—even without effects of bad weather) and what harvest records indicated as contemporary use. WHJ

Once the state had established allocation of the harvestable surplus of mature rams, a few local residents on the Federal Regional Subsistence Advisory Council had their way with the Federal Subsistence Board which ignored the state's work, compliantly "rubber stamped" the Regional Council's recommendation, and nullified the state's regulations on federal land (most of the Western Brooks Range).

*[Author's note: "Rubber stamping" of Regional Council proposals has been a Federal Subsistence Board pattern since 1995 when the chief solicitor for Ada Deer's Bureau of Indian Affairs told the Federal Board it had to follow the directions of the Regional Councils unless the Federal Board could give specific reasons why it shouldn't. This solicitor's opinion lifted language from ANILCA Title VIII Sec. 804 (which deals with state—not federal—management) and applied it to the Federal Subsistence Board. Since receiving this solicitor's opinion three years ago, the Federal Subsistence Board has established a pattern of passing Regional Council proposals with only cursory consideration of the biology involved or subsequent management impacts. Reference to published proceedings of the Federal Subsistence Board (esp. from Spring 1995) should convince anyone doubting this assertion. WHJ]*

## THE PRESENT CONTROVERSY

The result of Federal Subsistence Board "rubber stamping" the Regional Council's proposal was a difference in allocation. By some cryptic process, the state had established the harvestable surplus this year at 40 mature rams. This figure begs analysis in that it is significantly greater



than the maximal full-curl harvest theoretically predicted as sustainable from a stable Dall sheep population of the size remaining in the Western Brooks Range. The latest published data from the Western Brooks Range (through 1995) indicate a mean post-decline population of 570 adult sheep. Five percent of this population (the calculated maximum sustainable harvest of full-curl rams) would be 29 rams. The allocation figure, 40 rams, is 1.4 times this theoretically projected maximum sustainable harvest.

*[Author's note: Use of data through 1995 is permissible for these calculations because yearling recruitment, if any, during the last three years would not greatly influence the availability of full-curl rams. It takes three to four years for a ram lamb to be recognized as a ram from aircraft and years for 10 years for a ram lamb to reach full-curl in this area. If the 40-ram harvest limit is attainable, it will apparently require heavy harvest of standing stocks of full-curl rams. WH]*

According to the 1995 survey data, the number of 7/8 curl and greater rams totaled 36 for the entire area. Data on full-curl ram numbers are not available. The Nome Region is unique among ADF&G regions in that it has never enumerated full-curl rams (even though the full-curl regulation was implemented there in 1993). Rams between half-curl and 7/8 curl totaled 143 in 1995. If these figures are accurate, and if the harvestable surplus is 40 rams, there must have been little mortality among full-curl rams (whose average age in this area is 10 years) during and following the population decline (further suggestion of an unallocated harvestable surplus in the early 1990s). Alternatively, recruitment above what might normally be expected would also have had to occur to produce a present harvestable surplus of 40 full-curl rams. Neither high survival among rams aged more than 10 years or unusually high recruitment is consistent with a weather mediated population decline. Again, it appears that even if the 40-ram harvest allocation is realizable, attaining it will require virtually complete harvest of all full curl rams in the Western Brooks Range.

*[Author's note: I am troubled by the 40-ram harvestable surplus because of its coincidence with the arbitrary 40-sheep quota which existed after downward adjustment from the standard 50-sheep harvest ceiling cloned from the experimental "Kaktovik program" 16 years ago. The "Kaktovik program" carried a protective overall harvest quota of 50 sheep from a population exceeding 2,000 adults. This "standard" quota was eventually extended to Arctic Village, Anaktuvuk Pass, and the Western Brooks Range. After I highlighted the biological risk of this relatively large quota in the sheep-poor Western Brooks Range, Nome Region managers and the Alaska Board of Game reduced the quota to 30 sheep. Local residents protested this reduction, and it was subsequently increased to the 40 sheep now on the books. Because the calculations detailed above suggest the 40-ram quota is too high to be sustainable by a population of 570 adult sheep once possible standing stocks are depleted, I'm concerned that the arbitrary ceiling on overall harvest may have been administratively mistaken for the sustainable harvest. WH]*

Prior to the Federal Subsistence Board's actions, local residents appeared satisfied with the state's program. Through the state process, 11 rams from the 40-ram quota had been allocated for non-local, non-rural users. Those local residents involved in the state process did not complain. However, at least some local residents on the Federal Subsistence Regional Council decided they wanted all 40 rams, and told the Federal Subsistence Board so...hence the "rubber stamping" wherein the federal system reallocated all 40 rams to "their recognized hunters."

Because of this federal action, ADF&G leadership felt it had to either cancel its non-subsistence permits or limit their use to state lands. Canceling state hunts (even subsistence hunts) because of federal actions dates from assumption of wildlife management in Alaska by the federal subsistence management system. The state has repeatedly closed its seasons because of federal subsistence allocations.

Because of the narrow focus federal managers place on their perceived mandate to provide subsistence allocations for rural residents, the federal system has a history of "doubling up" the allowable harvest because the federal system refuses to recognize that state hunts actually provide subsistence foods. In cases where "doubling up" the harvest would have been harmful to the affected population, the state has typically canceled its season (realizing that subsistence users will still eat—even if they do it on a federal permit), and that stubbornly sticking to the legal state seasons could result in biological overharvest.

This accountability to conservation carries several consequences for the state:

First, in protecting the resource in the face of federal intractability, the state abrogates its legal right to manage Alaska's wildlife.

Second, closing state seasons furthers the Alaska Native perception that the state has lesser interest in providing for subsistence users than the federal system. This perception has further implications because of the political influence Alaska Natives have on the direction and level of federal involvement in managing Alaska's wildlife and fish.

Third, the state "shoots itself in the foot" with this policy because it hides the negative impacts and obscures the biological bankruptcy of the federal subsistence management system.

Few Alaskans, legislators, or federal judges realize the significant negative impacts which would have occurred had ADF&G not consistently placed resource health above the state's management prerogative.

Perhaps because the Nome Region has led the way in social biology, or perhaps because of the established "ADF&G tradition" of closing state seasons to protect wildlife populations from overharvest (Kilbuck caribou and Game Management Unit 23 muskoxen are well-documented Nome Region examples), or perhaps because the Nome Region has a complex emerging history of "comanagement" with its constituents which demands harmonious relations with local power

brokers, ADF&G managers moved rapidly to adjust the state's harvest plan for sheep in the Western Brooks Range.

Unfortunately in the case of sheep, adjusting the state harvest plan didn't make biological sense. Mature, full-curl, rams have been conclusively shown to be the consistently available harvestable surplus from Dall sheep populations. The state went to full-curl regulations statewide in 1989 (except for the Brooks Range which followed in 1993) because of this biological fact. Hence, closing the non-subsistence season or restricting use of the 11 non-subsistence permits for full-curl rams to state lands (after it had allocated 29 permits to meet the defined subsistence need) because of presumed biological harvest concerns requires some explaining.

ADF&G biologists asserted a virtual absence younger rams (because of failed recruitment during bad weather years) "in line" behind the full-curl rams allocated for harvest. ADF&G survey data do not support this assertion in a compelling fashion; neither is the 40-ram quota consistent with it. Nevertheless, in the judgment of ADF&G leadership, it would have been biologically irresponsible to allow the potential harvest of eleven "extra" full-curl rams if subsistence users had taken all 40 full-curl rams allocated to federally recognized rural residents. ADF&G leaders reasoned that such an event might leave some populations with no mature rams.

*[Author's note: Research has established that Dall sheep populations without mature rams suffer low lamb production and subsequent low survival of young rams. Hence, even though the survey data through 1995 did not clearly support the Nome Region's staff assertion that there are no young rams coming into the full curl cohort, there is some conceptual justification for their concern. WH]*

In addition to not being supported by published data, and inconsistent with the apparently high 40-ram quota, this argument appears a selective invocation of sheep biology to justify limitation of non-subsistence users. Remember, ADF&G first failed to acknowledge the effects of ewe harvests in low-density sheep populations, and then withheld allocation of a more abundant full curl ram resource than presently exists (beginning in 1991) because local managers thought it too hard to explain to local residents. Perhaps sheep managers in the Western Brooks Range are now more cognizant of the relevance sheep biology than in the past, but their past emphasis has clearly been on social rather than biological management.

Furthermore, considering that all 11 non-subsistence permits are now "crowded" into a state-owned tract of land in the DeLong Mountains (along with whatever subsistence harvest—both state and federal—might take place there), raises the question of whether a biological justification for restricting harvest to state lands might not place sheep populations on state lands in the DeLong Mountains at greater risk of full-curl ram overharvest than leaving things as the state originally planned.

The ceiling on ram harvest was limited to 40 rams. Now the state has (presumably on the basis of biology) provided that up to a fourth of them will be taken from much less than a fourth of the total Western Brooks Range sheep habitat, the area which already has the greatest ram shortage. ADF&G's 1995 survey data indicated no 7/8 curl or greater rams in the Wulik Peaks area (where

state lands are), and only 15 younger rams between 1/2 and 7/8 curl. If these rams were normally distributed among the six sub-7/8 curl age classes, there could now be up to five legal, full-curl, rams available in the Wulik Peaks.

Eleven hunters might be satisfied by five rams (or even one ram) because non-subsistence hunters expect little more than the opportunity to hunt and some reasonable expectation of success. Still, it would be out of character for ADF&G to allocate more permits than have this reasonable probability of success. Perhaps factors other than biological management drove the state's decision.

Subsistence hunters may be expected to expend unusual effort this season to make the political point that they do, indeed, need large numbers of sheep. The new federal regulations will allow use of aircraft for subsistence hunting in the Brooks Range for the first time this winter...for subsistence harvest of full-curl rams. This invites greater expenditure of effort (and money), and should be expected to increase harvest. Expending extra effort to document alleged subsistence needs is not unprecedented. It has been funded as a cultural maintenance program in the Northeast Brooks Range for Arctic Village residents for several years, and Western Brooks Range users appear to have done it in the past. In 1985, when the quota had been reduced from 50 sheep to 30 sheep, the reported harvest jumped from the previous average of three sheep to 21 sheep. Subsequently the quota was raised to 40 sheep, and from 1986 to closure of subsistence hunting, the reported harvest averaged 16 sheep per year.

Even if unusual effort is expended, the additional harvest allocated to non-subsistence users would probably have been biologically insignificant. Three and perhaps four of the non-subsistence permit holders are nonresidents who must hire a guide. Nonresidents typically have an 80 percent success on guided sheep hunts. If all four nonresidents hunted, statistics predict three rams harvested. That leaves seven resident permit holders. I know of one who will not hunt there because of the controversy. That leaves six potential resident hunters. Alaskan resident sheep hunters typically have a 38 percent success (or did before sheep populations declined). If this held for the six remaining permit holders we could anticipate harvest of up to another two rams. This optimistically calculated five-ram harvest would not have been the end of the world. Only if they all came from a single population with only five mature rams, and only if there were no 7/8 curl rams in the population would there have been *even a transient lowering* of lamb production in the affected group because of ram harvest by non-subsistence users.

*[Author's note: We found the presence of 7/8 curl rams assured normal breeding age and frequency among ewes in the Alaska Range. WH]*

A projected five-ram full-curl harvest, three of which must be taken within a restricted guide area on state land, for which no guide had hunters (J. Jacobson Registered Guide pers. commun.) couldn't possibly have compromised subsistence harvest opportunity to an "unreasonable" level. (Subsistence laws prescribe "reasonable opportunity for success" for recognized subsistence hunters.)

Considering these data and projections, a biological justification for closure makes no sense at all, and if restriction of the “unlucky eleven” cannot be justified on the basis of biology, the only other possible justification is prevention of user conflicts.

*[Author's note: A legal case brought by air boaters excluded from moose hunting in Minto Flats, Alaska, has (pending appeal) established user conflict as an acceptable, but non-biological reason for excluding a class of hunters from participation. Hence, I hypothesize political maneuvering on the rural preference issue as a more robust explanation. WH]*

## COMMENTARY

If it is possible for power brokers to orchestrate a high profile, but basically inconsequential action (only 11 non-federally recognized hunters were affected) which demonstrates the horrors of “dual” or federal management, there is reasonable expectation the Western Brooks Range sheep management controversy can be used as political leverage by those advocating amendment of the Alaska Constitution to implement preferential policy. Amendment of the state’s constitution to allow rural preference (or non-rural discrimination depending on where you live) has been the proposed “solution” to state/federal conflicts for several years. Alaska’s senior Senator is the champion of this movement, and Alaska’s Governor his strongest ally. Naturally, because the Commissioner of Fish and Game is appointed by the Governor, the Alaska Department of Fish and Game supports the Governor’s position. Amendment advocates have, thus far, been unsuccessful in forcing the Alaska legislature to place an amendment allowing preference/discrimination on the ballot in spite of two special legislative sessions called by the Governor specifically for that purpose. These efforts failed in spite of expenditure of a \$400,000 media campaign to force the legislature toward the amendment position. Still, the issue is not settled, and orchestrating a high-profile federal intervention (even one with no biological relevance) would serve the amendment advocates (including the Commissioner of Fish and Game) well politically just before November’s general election. This seems a particularly likely possibility given the stridency and power of Alaska Native legislators from the Nome region.

*[Author's note: I feel slightly sheepish about advancing what may seem like a “conspiracy theory,” but because the biology of the situation makes so little sense, I’m driven to consider other explanatory hypotheses for the Department’s actions. WH]*

## CONCLUSIONS

**First**, this problem arose because subsistence sheep management was based on social/political comfort/correctness instead established biological facts. Additionally, both state and federal subsistence laws were set aside. Clearly, some managers (particularly at the higher levels in ADF&G) were/are more interested in local and statewide resource politics than in providing for harvest of biologically surplus animals. This shouldn’t be a shock. Politics have always been a

component of wildlife management, and Alaska's present Governor has used fisheries and wildlife management for political advantage more than any Governor in Alaska's history.

*[Author's note: I've worked for all of them. WH]*

**Second**, whatever the details may be, it is clear that the Department (i.e. the Commissioner, i.e. the Governor) did not defend Alaska's sovereign right to allocate wildlife in this instance. Alaska's Governor rolled his Fish and Game Department over for the federal system without an apparent whimper. Altering the state's regulations wouldn't seem so odious if there were some plausible biological protection or realistic allocation issue involved. There isn't.

**Third**, this lesson showcases not only the heavy-handed arrogance of the federal managers, it also shows the many flaws in both state and federal subsistence allocation systems. Two of these flaws dominated this scenario:

Under the pretense of increasing local participation in management decisions, the federal system turns management of local resources over to local "lay managers" (Regional Subsistence Council members) who have only one legally defined function...advising the U.S. Secretary of Interior of their needs. These councils have no management mandate, no conservation mandate, and no common use mandate. However they typically display an evident, and sometimes virulent, bias against "outsiders." *Because of the composition and balance of power in these local Subsistence Advisory Councils, a single influential individual can effectively nullify the entire state management effort.* What this means is that a few prominent local citizens appointed by the US Secretary of Interior dictate management decisions. This case may be a striking example.

Typically, local residents, regardless of race prefer excluding outsiders. This is particularly dangerous to conservation because the folks most likely to generate a shortage through overuse (because they live locally and depend on local resources) are empowered to maintain that shortage by dictating local management decisions. If they do not choose to manage for resource abundance, which must be shared under law, but instead opt for local "sufficiency," they will never have to face outsiders using "their" area.

Additionally, the Federal Subsistence Board accepts what it calls "traditional ecological knowledge," as equal to (or in many cases superior to) scientific biological facts. This, of course facilitates "management" by the local residents who resent any use of "their area" by outsiders. In this case, the state's finding that the subsistence need is "up to 60 sheep" seems to have been presented to the Alaska Board of Game without critical, biological scrutiny. Certainly, an empirical measurement of subsistence need holds greater promise of accuracy than asking the beneficiaries of the system to define their need.

**Fourth**, it demonstrates one hazard of amending the Alaska Constitution. The reason we're told we must amend is so that we can clone the federal system (for implementation as the state system) to provide "federally mandated" rural preference. Were we to do so, there is little reason to anticipate it would lead to better conservation than when the same local folks dominate state management using the mechanics by which they now dominate the federal system.

## **THE BIGGER MANAGEMENT PICTURE**

I suggest ADF&G's loss of "the will to manage biologically" is a major factor in this type of scenario. Persistent federal pressure coupled with political interference at even the most basic management level by the Governor's office (particularly when the Governor is beholden to Alaska Natives who prefer the federal system) has sucked the Department's former commitment to practical biological management right out of the agency. This loss of will to manage biologically provides an adequate explanatory hypothesis for the generally compromised conservation such we see in subsistence management of Dall sheep. The Western Brooks Range sheep management situation has been an ongoing illustration since 1982.

Loss of will to manage was facilitated by regional fragmentation of the Department beginning as far back as 1969. From statehood to 1969 the Department was organized by statewide species project. This didn't make sense then because we didn't know enough species biology to manage at that level. Also, some local management challenges were not amenable to solution by a statewide species project system which was often unresponsive to local concerns. As a result, the Department was reorganized into regions with area offices. Statewide species projects were scrapped.

Over time, the regional (and area) offices became progressively more autonomous. What we now see with respect to the Western Brooks Range sheep situation is the most specific example of this trend. Species biology (perhaps considered as "extra-regional input") was set aside to facilitate getting along with local power brokers (in this case NANA Regional Corporation) which are immensely powerful both politically and economically.

### ***The pitfall of autonomy***

While "decentralization" sounds good, it carries inherent risks: Given the autonomy "enjoyed" by the region, the residence of the regional staff within the community, and the absence of "higher authority" (such as a statewide species plan or accepted biological standard) to "blame" for locally unpopular decisions, compromised biological management is inevitable. It is natural for managers assimilated, or sufficiently pressured by their community to accede to local desires...whether biologically sound or not. After all, they have to live there...and they also benefit from excluding outsiders.

*[Author's note: ADF&G harvest records show the some of the biologists who manage these sheep have taken what might otherwise be considered trophy rams during the winter season. Here, I must emphasize this is entirely legal because biologists cannot be excluded from participation just because they are employed*

*as public servants. Because they live in the area like everyone else they are legally entitled to federal subsistence preference and participation in the winter hunt based (which is solely based on residence location). The fact that they may choose to harvest mature rams is perhaps laudable, at least they aren't having a negative impact on population growth. WH]*

These pressures inevitably (in an autonomous region) lead to "localized management" to benefit local residents at the expense of other Alaskans.

While public service agencies like ADF&G should be responsive to the publics they serve, the evolution of regionalized management as evidenced in this example, has probably reached the point it is counter-productive to maintaining the proven record of success of constitutionally mandated conservation. I suggest reorganization of the ADF&G regional system would be beneficial. Management based on biology and accountable to law probably wouldn't have kept the weather favorable for sheep, but there is every reason to believe it would have precluded development of the present problem.