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Complications in Dall Sheep Management in Alaska: A Case of Agency Abdication?

WAYNE E. HEIMER,¹ Alaska Department of Fish and Game Sheep Biologist
(Retired) and Director, Foundation for North American Wild Sheep, 1098 Chena
Pump Road, Fairbanks, AK 99709, USA.

Abstract: Eighteen years ago, the Alaska Department of Fish and Game (ADF&G) essentially withdrew from Dall sheep (*Ovis dalli dalli*) management. This withdrawal was driven by a regulatory change which defined surplus Dall sheep for harvest as full curl rams. Subsequently, changes in prevailing weather put sheep populations in decline throughout the state. About the same time predator management was suspended. Eventually, the abundance and subsequent annual harvest of mature rams declined from an average of almost 1,200 to the all-time low of 650 rams. In 2004 declining harvests coupled with rumors of significant harvests of sub-legal rams lead to mandatory inspection of most harvested rams. This meant ADF&G and enforcement wardens were to determine whether harvested ram horns met legal harvest criteria. A number of “litmus tests” which were not accountable to the legal or geometric definitions were developed, and confusion reigned. Almost a quarter of the reported ram harvest in 2004 and 2005 was not recorded as inspected. Data indicated a violation rate of about 1%. Nevertheless, the Alaska Board of Game increased the demand on the Department to inspect and plug most harvested ram horns. In this paper, I suggest these actions were inappropriate for Alaska’s management needs. I also argue agency abdication of management responsibility, including user education to facilitate respect for regulations, led to this chain of events, and probably was causative. Managers are reminded that there is more to management than setting seemingly conservative seasons and bag limits.

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¹E-mail: weheimer@alaska.net

Over the last 20 yr, the Alaska Department of Fish and Game (ADF&G) had minimal success in influencing Dall sheep (*Ovis dalli dalli*) management decisions in Alaska. Changes were driven by biologically aware hunting interests outside ADF&G and generally (and unsuccessfully) were opposed by the Department. The first purpose of my paper is to chronicle and comment on the history of this development and show it is possible to change harvest regulations which are inimical to management success. Secondly, the paper may serve as a reminder to managers that successful regulation of wildlife harvests is best based on species biology which is adequately communicated to the public.

History

ADF&G withdrawal from sheep research/management. The most effective way to manage Dall sheep has been made a subject of controversy (Whitten 2001, Heimer et al. 2002). On one hand, the biologically aware public takes the view that sheep autecology is unique, and Alaska's Dall sheep should be managed according to what has been learned through specific research and empirical management trials such as Heimer and Watson (1990) and Heimer (1999). These studies indicate Class IV rams are the only sustainable biological surplus from a Dall sheep population living in an intact ecosystem where open hunting is allowed. Other harvest regimes in open entry hunting areas disrupt Dall sheep social behavior resulting in reduced production/survival/ recruitment and harvest of mature rams (Heimer 1990).

On the other hand, the established ADF&G-approved position is that Alaska's full-curl harvest restriction exists not for biological but for aesthetic reasons. Whitten (2001) wrote "Although many biologists disagreed with the Dry Creek [benefits of older ram presence] hypothesis, those ideas held immense appeal for traditional sport hunters because of their implication that [full curl] trophy hunting was the optimal harvest strategy for sheep. The Alaska Board of Game incrementally enacted more conservative horn curl regulations and by 1993, full-curl hunting for males only was normal for most of Alaska. *The Board still receives proposals from the public for more rigorous enforcement of full-curl-only management whenever sheep populations are faring poorly. (emphasis by the current author)* Disagreement and confusion continues among professional biologists..." [Alces 37: 484]. In summary, Whitten (2001) spoke for the

Department when he said "Numerous papers expounded on various aspects of the Dry Creek hypothesis and attempted to explain how abundance of large males moderated Dall's sheep social behavior and ecology, and was the key to population vitality. Findings on which those hypotheses were based were unsubstantiated. Harvest never removed all mature males. Depressed survival of young males in the Dry Creek population never occurred. Reduced productivity could not be linked to male abundance, but was correlated with weather. *Nevertheless, regulations allowing harvest of only full-curl males now apply in nearly all general hunts for Dall's sheep in Alaska. In retrospect, restrictive horn-curl regulations were not necessary for conservation of this mountain ungulate. However, full-curl regulations have served a useful purpose (emphasis added).* In the 1990s, attention and funding for wildlife management in Alaska gravitated more toward subsistence issues and to moose [*Alces alces*], caribou [*Rangifer tarandus*], and their predators. Money for sheep research and monitoring dwindled . . . *the unanticipated benefit of full-curl management has been a hands-off, self-regulating, popular, and inexpensive regime of harvest (emphasis added).* [ALCES 37: page 492, column 2 paragraph 2, lines 1-24 and 36-38]

The italicized portions from Whitten (2001) indicate that changes to the minimal harvest size regulations for Dall sheep in Alaska were made in spite of official ADF&G opposition. Actually, this opposition was strident (Alaska Board of Game 1989a). In retrospect, the sequence of events shows ADF&G withdrew from Dall sheep management with establishment of the full-curl ram harvest regulation in 1989. In an interview published in the Alaska Foundation of

North American Wild Sheep (FNAWS) newsletter, an ADF&G Research Coordinator confirmed the position that sheep were “self-managing” under the full-curl regulation (Gordon 2003).

Population declines-weather. Two yr after ADF&G withdrew from Dall sheep management, Dall sheep populations began a notable downturn across most of Alaska. From fragmentary data gathered by ADF&G Area Biologists, the unexpected statewide decline appeared to be weather-mediated failure of lamb production during the early 1990s as “lee side” mountain weather seemed to change for the worse where sheep were concerned.

Alaska’s better sheep habitats lie within mountain ranges dominantly oriented east/west across Alaska, and perpendicular to prevailing northward air movement from the Gulf of Alaska. Heimer et al. (1994) reported average ten-fold greater population densities on optimal “lee side” or snow-sheltered north-facing habitats of Alaska’s prime sheep habitats. As information on the statewide lamb production failures of the early 1990s was synthesized, an explanatory hypothesis suggested that alterations in the warm Pacific Current in the Gulf of Alaska either produced more storms or set storms on atypical tracks that missed typical geographic snow barriers and produced unfavorable weather on the prime habitats (Heimer 1995).

The failures probably were not density-dependent in the classic sense, but were functions of transiently increased environmental resistance due to unfavorable weather effects on lamb production. Dall sheep show increased post-mature adult mortality during and lower productivity after winters with deep snow accumulation (Watson and Heimer 1984, Heimer and Watson 1986a). From

these findings, we reasoned lamb production failures are most likely due to deep snow precluding access to higher quality food plants late in gestation thus contributing to lowered birth weight. Low birth weight has a strong negative correlation with neonatal survival (Scotten 1997). Hence, unfavorable weather effects should be expected to influence population productivity more than density-mediated nutritional stress Heimer (1983). Even dense populations where quality of forage is most likely to be limiting produce spectacularly high lamb:100 ewe ratios when environmental resistance is transiently lowered (Heimer and Watson 1986a). Populations which might otherwise appear to be at carrying capacity produce lambs at the rate of 70 to 85 lambs:100 ewes instead of the average 30 to 40 lambs:100 ewes when winters are “light” and “green up” is early.

Population declines - predation. Wolves (*Canis lupus*) have been considered a major force in Dall sheep population control since Murie (1944), and are a major component of environmental resistance to Dall sheep population growth (Heimer 1999). Coincident with the changes in weather in the early 1990s, predator management (control) was suspended. Additionally, coyotes (*Canis latrans*) emerged (or perhaps re-emerged) as a major source of Dall sheep mortality, particularly among lambs (Scotten 1997).

Trapper harvest records dating back to the first quarter of the 20th Century indicate coyote presence in Alaska, but do not seem to reflect high abundance (Rearden 1998) or great significance as a Dall sheep predator. In contrast, Scotten (1997) showed coyotes were responsible for a quarter of lamb deaths in the Alaska Range. Subsequently, Pruhs (2004) showed predation on Dall sheep was higher during periods of higher coyote

abundance inferred from highs in hare (*Lepus* spp.) populations in the eastern Alaska Range. Hence, it appears increased predation on Dall sheep likely is a function of increased coyote abundance.

The increase in abundance probably resulted from general expansion of coyote populations and ranges in many areas of Alaska. Specifically, conversion of about a quarter of a million acres from boreal forest (poor coyote habitat) to open fields (good coyote habitat) in the flats just north of the central Alaska Range probably accelerated coyote expansion. The original plan driving this conversion was for agricultural production of barley (*Hordeum* spp.) for export. However, the optimistic projections of Alaskan agronomists were not met. Instead of becoming amber waves of grain against the purple mountain's majesty, these generally fallow open fields became prime habitats for grasshoppers (Orthoptera), voles (Microtinae), and coyotes. The presence of wolves did not preclude the dramatic expansion of coyote populations. Dall sheep became a preferred prey item for coyotes colonizing mountain habitats.

Consequently, lower lamb production and increased predation led to declining sheep populations. Initially centered on lambs and younger sheep, and with no ongoing monitoring of Dall sheep internal population dynamics (Heimer 1994), the decline was not apparent until ram classes which "should" have been shot by hunters failed to show up in reported harvests. Annual harvests declined from an average of about 1,200 rams at full curl in the mid to late 1980s, to the low of 650 rams. Present harvest seems to have stabilized at about 2/3 of the former average (~800 rams/yr over the past several years).

Management Effects

Without a systematic inventory program or other field data, ADF&G was in no position to take or defend a management action. Having adopted the position that full-curl regulations rendered Dall sheep "self-managing," alleged declining sheep populations and smaller harvests were not a concern for the Department. However they did raise alarm among sheep hunters. ADF&G was surprised. In the Alaska Range, coyote research showing intense predation on lambs resulted from public complaints about the sheep decline near Fairbanks. No management responses resulted from ADF&G.

With respect to predation, coyote harvest regulations did not keep pace with the emergence of abundant coyote populations becoming a dominant mortality factor for Dall sheep. The bag limit for hunting coyotes (2/yr) was one fifth that for wolves, thus facilitating coyote expansion. Several proposals to increase coyote harvests were offered by the public. In 1999 and 2001, W. Heimer and R. Chaney presented proposals to the Alaska Board of Game which encouraged hunting of coyotes (Gordon 2004). Still, the interest in coyote hunting and trapping was insignificant in the face of the overall influence of burgeoning coyote populations on depressed Dall sheep populations.

Biological, social, and economic effects of management inaction. As the number of rams available for harvest decreased, ram harvests declined and hunter dissatisfaction grew. The scarcity of harvestable rams also exacerbated the competition between professional guides who specialize in guiding non-resident hunters, and resident sheep hunters. Alaska residents may hunt sheep every year by purchasing a resident hunting license. Consequently, while harvest

success is important, they can always “try again” next year, perhaps in a different area. However, the professional guide who is limited to a specific area of operation and does not have this option. Guides must succeed for their clients or their reputation, business, and livelihoods likely suffer.

As mature Class IV rams became less abundant and competition between resident hunters and guides intensified, rumors that guides were taking sub-legal rams became so pervasive that ADF&G and enforcement wardens often were informed. Still, no proactive management or enforcement action was taken by appropriate agencies. Consequently, sheep hunters took action in the form of the Alaska FNAWS Board of Directors proposing mandatory inspecting and plugging of all harvested Dall sheep horns. This practice is common to most other jurisdictions with wild sheep jurisdictions, and was seen as likely to prevent harvest of sub-legal rams. Plugging sheep horns has its roots in the illegal sale of bighorn trophies, and is based on the rationale that if every horn is registered by its plug and the associated identifying data, it will be impossible for thieves and poachers to sell.

ADF&G resisted mandatory plugging of Dall ram horns, with the rationale that there was no documented problem with sale of horns from Alaska and that theft and sale of Dall sheep trophies was insignificant on the broad societal scale. Additionally, ADF&G argued the sheer volume of work involved in inspecting, plugging, and record keeping for almost a thousand sets of horns each year was not worth the cost, given that no defined problems existed.

The defense against plugging was successful as long as the ADF&G position was argued effectively before the Alaska Board of Game. However, as the

Department defended its position less vigorously, public support increased due to increased sophistication by plugging program advocates. They gathered statistics from an area where harvest of immature rams was allowed by permit and argued the same harvest rate occurred across Alaska. Additionally, they took their data to local Fish and Game Advisory Committees. It should be noted that the extrapolations did not meet the normal rigorous standards the Board of Game expects from ADF&G. Statistical principles were violated, particularly those relating to sample sizes and extrapolation from a unique area to the whole state; but no notice was taken.

Inspection program sponsors were able to use the selected statistics to generate an anti-guiding backlash among some local Fish and Game Advisory Committees. Advisory committees advise the Alaska Board of Game about regulatory proposals which the Board either adopts or rejects. Committees are made up of local residents with interest and knowledge of fish and game resources in their area, and advisory committees often reflect local biases. Hence one strategy for getting *ad hoc* regulations passed is to gather support from local advisory committees to influence the statewide Board of Game.

As a result, the Board of Game passed a modified version of the proposal which required inspection and sealing, but not plugging, wherever ram horn restrictions applied. The system was not uniform because some subsistence sheep harvests essentially are unregulated (Heimer 1986, 1998a, 1998b) and inspections were not required for subsistence-harvested sheep. Enforcement wardens vigorously supported this regulation. They anticipated getting signed documents that would facilitate court prosecutions from any

hunters ADF&G referred as potential violators. The new regulation required certification and a record by ADF&G assessing whether each harvested ram met legal criteria. Horns which failed were referred to enforcement wardens for further action.

Inspection program sponsors were disappointed to learn that the basic policy of enforcement wardens is to be “hunter friendly” and the wardens did not adopt a zero tolerance policy: If a ram was at least 7/8 curl but not full curl, a verbal warning would be issued; if not more than 7/8 curl, a written warning was considered appropriate; if not at least 7/8 curl, the hunter was to be issued a citation to appear in court as a violator (G. Folger, AK Bur. Wild. Enforc. Supervisor, Fairbanks, pers. comm.). Similarly, enforcement wardens did not get what they wanted, because acceptable horns were simply sealed with a green “spaghetti fish tag” while horns referred from ADF&G got a red “spaghetti fish tag.” There was no hunter-signed document which might be argued as an admission of guilt. No additional data of potential management use were recorded. Horns could be inspected either at ADF&G offices or by enforcement wardens. ADF&G kept records of how many horns staff inspected; wardens did not.

ADF&G was unhappy because it lost to lay hunters before the Board of Game, and the Department had to do what it considered meaningless and unnecessary work. Inspection program sponsors were unhappy at the lack of a zero tolerance enforcement policy. Enforcement wardens were unhappy because there was no hunter signature on what amounted to a confession to be used in prosecution. ADF&G also was somewhat embarrassed because having been conspicuously inactive in sheep management for the

previous 15 yr, it lacked personnel familiar with the rationale or definition of full curl ram harvests.

A Summary of Changing Legal Definitions. In 1974 creation of the Tok Management Area, where trophy management was the primary objective, resulted in Alaska's first definition of full curl. It was not established in regulation by the Board of Game, but simply added as a condition of the trophy permit issued by ADF&G. As crafted by the ADF&G sheep biologists, a full curl was defined as “the horn of a mature mountain 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”. Other information accompanying the early Tok Management Area permits stated that “to be legal, rams must have a full-curl or larger horn or have both horns broomed (naturally broken). A full curl ram has horns which have grown through 360 degrees when viewed looking down the axis of the horn spiral”. Photographs and drawings were included.

Comparatively high harvest rates from the Tok Management Area, as well as accumulating research findings drove experimental full-curl harvests in other game management units. The legal definition promulgated through the Alaska Board of Game as Hunting Regulations #25 for experimental full-curl harvests of mountain or Dall sheep was the same as used in 1974 (Alaska Board of Game 1984).

In 1988 the full curl definition was modified to read as “full curl horn means 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”. ADF&G included sketches or photographs in the hunting regulations depicting full-curl ram

horns. These visual aids were of variable quality and utility for hunters charged with finding legal rams to harvest.

In 1989, the full-curl regulation was expanded across most of Alaska because harvests increased up to 35% with its implementation in experimental areas (Heimer and Watson 1990). This change occurred despite maximum resistance from ADF&G leadership, which rejected data indicating increased maximal rates at full-curl harvest. These data indicated maximal harvests of 3/4 or 7/8 curl rams were inimical to maximum sustainable ram harvests (Heimer et al. 1984, Heimer and Watson 1986b; 1990). In an effort to maintain traditional intuitive maximum harvest philosophy and regulatory prerogative, ADF&G persuaded the Board of Game to implement Alaska Hunting Regulations #30, that read "Full curl horn of a male (ram) Dall sheep means A: That the tip of at least one horn extends up to or above the level of the posterior base of the horn when viewed at a right angle 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 growth annuli" (Alaska Board of Game 1989b). This was ADF&G's last successful sheep management initiative before the Alaska Board of Game for 18 yr.

This broad definition technically allowed for harvest of mature rams as well as any ram having a horn tip extending above the level of the posterior base of the horn when viewed from the side. Technically, this meant any ram less than half curl or more than full curl was legal for harvest. After several failed prosecution attempts, the Attorney General's Office wrote ADF&G and the Board of Game stating that the definition was so broad as to be unworkable (J. O'Bryant, pers. comm.) and recommending a change. After another contentious Board

meeting, Alaska Hunting Regulations #31 changed the definition to "full curl horn of a male (ram) Dall sheep 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" (Alaska Board of Game 1990).

In spite of difficulties applying the definition in the field and in court, the definition remains unchanged.

Discussion

Practical Full Curl Definitions--Or Not. Most legal definitions of harvestable rams are based on the notion that ram horns grow in a circular pattern. Generally they do. Consequently, it is common regulatory practice to define ram harvest criteria as portions of the circle of horn development where hunting opportunity is sufficient to generate harvest pressure that could be inimical to management success. Hence we have seen regulations allowing harvest of 1/2 curl, 3/4 curl, 4/5 curl, 7/8 curl, and full curl rams (Demarchi 1978).

Geometrically, ram horn is a solid, most correctly described as a conical helix, while a circle is a construct of plane geometry. This introduces complexity with respect to viewing perspective. "Seeing the circle" of a ram horn requires projecting the solid conical helix onto a plane from a uniquely appropriate point in space. To successfully make the projection from geometrical solid to planar construct requires the observer to view the horn down the center of the horn helix. When viewed from this perspective, the outer surface of the horn typically describes a circle. While hunters and other sheep aficionados have been successfully performing this projection in the field for

decades, setting a legally definable standard to horn development for anticipated use at trial in the United States court system proved challenging for the biologists at ADF&G. In response to this challenge, they defined several "litmus tests." These tests proved problematic because they did not account for differences between plane and solid geometry.

Stick Test. The first test was whether the tips of an unbroomed set of ram horns intersect a line drawn (or a stick placed) across the basal surfaces of the horns where they adjoin the skull. This test has its origins in the Merchant jig used in the Yukon Territory (Merchant et al. 1982). The attractiveness of the Merchant jig lies primarily in its "go/no-go" digital nature. Any set of ram horns either passes or fails. There is no subjective judgment involved. Note that even though the Yukon definition uses the term full curl, as defined by the Merchant jig, the defined thinhorn minimum horn size for harvest essentially is equivalent to Alaska's earlier 7/8 curl definition. Consequently, the Alaska definition of full curl requires a ram ~2 yr older than a typical Yukon full curl, and 45° more projected circular growth.

The Merchant jig seems to work well in Yukon where judgment is arbitrarily and objectively made by the apparatus, and any offending hunter is guilty if the horns do not satisfactorily "dance [with] the jig." My experience as a consultant in an appeal of a jig-defined sub-legal Stone's (*Ovis dalli stonei*) ram indicates that in the Yukon system, the jig essentially convicts the hunter, whose only recourse then lies through the appellate court.

In Alaska, the system is notably different. The hunter may be charged if a set of horns does not appear to meet legal criteria, but the burden of proof beyond

reasonable doubt lies with the state. This system is not well suited to digital criteria like the Merchant jig. Nevertheless, the appeal of an objective pass or fail test led to several proposals to establish the "Yukon full-curl" as the Alaska standard. However, the *de facto* Alaskan 7/8 curl ram, and compromised maximal harvest at that level (Heimer and Watson 1990) is not compatible with Alaska's statutory language regarding how wildlife shall be managed.

It is unlikely that definers such as the Merchant jig pass/fail test are compatible with the U.S system of jurisprudence. Further, I argue that objective tests are inappropriate because essentially they try to provide a "digital" solution to an "analog" phenomenon. Finally, I suggest misapprehension of these factors as well as the success of the Merchant jig in Yukon led ADF&G managers to establish the stick test. To my knowledge, it has never been introduced or challenged in a court trial in Alaska.

Line of the Circle test. As defined by ADF&G, the line of the circle appears to be a lay term for a tangent to the circle projected from the horn helix. By Euclidian definition, the tangent is perpendicular to a radius of the circle "tangent to" the circumference of that circle. In this test, the inspecting biologist was to view the horn from the side and imagine a line perpendicular to the radius of the horn circle at the anterior base of the horn, and another line perpendicular to a radius at the horn tip. If the tangents (lines of the circle) were congruent, that is, fell on top of each other, the horn was judged to be full curl.

Perhaps coincidentally, this test is virtually identical in approach and findings to simply viewing down the axis of the outer surface of the horn helix, which projects the "circle of horn growth" in the

vast majority of rams. A true full-curl horn projects to a planar circle when viewed so the horn tip lines up with the anterior base. If the horn is not full curl, the resulting projected planar figure is not a circle. For reasons not presently understood, the human eye is very good at identifying circles, and few hunters make mistakes if given proper orientation. This orientation essentially has been absent from ADF&G communications for 15 yr. Still, documented hunter error from the sealing project was insignificant. This speaks highly for Dall sheep hunters in Alaska or very poorly for enforcement of the sealing requirement.

Age and Brooming. Rams in Alaska are legal at a minimum age of 8 yr by horn annuli. This allows harvest of rams that are old but may not be full curl in horn development. Eight years is the mean age at full curl in Alaska (Heimer and Smith 1975). Hunters are discouraged from trying to determine age in the field, and this criterion exists primarily as a safety net for hunters who shoot mature rams whose horns might not meet the full curl definition.

Heimer and Smith (1975) determined the chances a ram will broom (break by fighting) both horns before Class IV status (8 yr or full curl) are remote. Hence, Dall rams in Alaska are legal for harvest if both horns are broomed. Age determination is somewhat subjective, and the difference between a badly worn horn tip and a lightly broomed horn is even more subjective. These hunter protection criteria appear well suited to the US/Alaska system of jurisprudence, and represent no concern for well informed, patient hunters.

Appropriate Management Actions?

In the fall of 2006, the Alaska Board of Game required that Dall ram horns from areas where regulations define a minimum legal horn size must be plugged as well as inspected. Measurements common in other jurisdictions requiring plugging, such as photographs and segment lengths and diameters, are not required. This increased burden placed on ADF&G despite its strident objections may further buttress the hypothesis that ADF&G withdrawal from active sheep management created a management vacuum that was filled by non-professionals. I believe something should be done to put the agency charged with managing this important resource back in the position of management leadership for 2 basic reasons.

Legally, ADF&G is mandated (through the Commissioner's office) to manage the resource for the benefit of the economy and general well-being of the people of Alaska. Agency withdrawal from active management should be administratively corrected. Socially, while specific hunting interests stumbled into the dominant manager role, they were ill-equipped to do so. Successful management requires professional-level knowledge and informed public participation from research to regulations.

If the Roosevelt Doctrine is followed, these responsibilities demand active agency participation in promulgation of biologically sound harvest regulations. For maximum effectiveness, a management program also must interpret these regulations to the public so they generally are understood as necessary for conservation. At the deeper level, successful management results from public acceptance of biologically-driven regulations in which the public can make a collective societal investment. When this happens, regulations essentially become

self-enforcing. In contrast, regulations imposed for arbitrary reasons or defined as arbitrary do not assure management success. I suggest that the low violation rate was likely a remnant of former sheep harvesting mores rather than the threat of prosecution. These sorts of mores develop when the public embraces the notion that regulations exist because they facilitate sharing of commonly-owned resources as defined by Alaska law. Law-abiding Alaskans forego wanton harvest on the premise that it is in their best interest to do so. They presume that sharing living resources through harvest restraint due to seasons and biologically-based bag limits will produce adequate abundance for harvest and personal use at a later time.

For this to work, the agency must begin with biologically-driven regulations clearly articulated to the consuming public. Successfully alleging regulatory change is biologically driven, and hence in the best interest of the resource and the public, requires agency credibility. Credibility will be best established by agencies which take an active interest and conspicuous efforts in monitoring, researching, and managing the resources entrusted to their care and management. Agency success also requires communicating these activities to the public along with the rationale for restrictions on human activities. After all, law only eliminates the worst in human behavior; it does not assure the best.

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