



In My Opinion

Maintaining Momentum for Conservation: Bighorn Sheep as an Example

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ABSTRACT Bighorn sheep (*Ovis canadensis*) and Dall's sheep (*O. dalli*) are among the iconic megafauna of North America. Both species generate great public interest and have received much attention from management agencies and conservation groups. Bighorn sheep, however, have suffered far more management setbacks than have their northern congeners and, as a result, have been the beneficiary of aggressive conservation programs. Nevertheless, both species face continuing challenges. Among those challenges are limited preparation of personnel, interagency competition, bureaucratic inertia, confounding legislation, public advocacy (or the lack thereof), political expediency, and interpersonal issues. To foster and maintain momentum for conserving wild sheep, I encourage managers to 1) enhance relationships with nongovernmental organizations, private enterprise, and the media; 2) work more closely with sister agencies to take advantage of opportunities or skillsets; 3) seize opportunities for enhancing conservation by working with agencies whose primary missions are other than wildlife conservation; 4) recognize the importance of private lands and role of private landowners; 5) take advantage of opportunities to involve academic institutions in conservation; 6) acknowledge skills and contributions of colleagues or coworkers, and fully use those talents; and 7) develop and maintain personal attitudes that enhance working relationships and build on past successes. Application of these recommendations likely will enhance the effectiveness of conservation of wild sheep, and for other species of North American wildlife as well. © 2018 The Wildlife Society.

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My purpose is to provide recommendations that, in my opinion, will enhance conservation successes of seasoned veterans and young professionals entering the field of wildlife management. These ideas accumulated during my career in conservation, which has spanned nearly 50 years. These recommendations will be widely applicable regardless of the taxon or project of interest, but I will rely largely on my long-term experience working with bighorn sheep (*Ovis canadensis*) for specific examples. Management and conservation of those iconic mountain ungulates—and all wildlife for that matter—are complicated by many factors and future successes are not assured. I hope that ideas presented will be useful for building and maintaining momentum, not only for bighorn sheep, but for wildlife conservation in general. In this essay, I 1) briefly review what I perceive to be primary challenges to the conservation of wild sheep, and 2) provide recommendations that will be helpful in building on what historically has been a largely successful conservation program.

SOME OF THE CHALLENGES

Literature abounds regarding preparation of professionals entering the field of wildlife management; this topic has been addressed in several special issues of the *Wildlife Society Bulletin* (Thompson 1995, Krausman 2000, Leopold 2001). Moreover, preparation was the subject of 2 special sessions at the 55th North American Wildlife and Natural Resources Conference in 1990. In an especially germane essay, Kessler (1995) advocated the importance of education extending beyond the classroom. Others also have emphasized that faculty with broad experience outside of the classroom can add to the education of young professionals in meaningful ways (Teer et al. 1990, Noss 1997), and knowledge gained through hands-on experience is an extremely important aspect of education (Baydack 2017). Thus, I was flabbergasted and flummoxed when that notion was summarily dismissed by others (“... universities are not extensions of agencies wherein the experienced agency biologist should be hired to teach students about the ‘real world’ of wildlife management”; Porter and Baldassarre 2000:512). Although I do not advocate that biologists with extensive agency experience be hired solely to teach wildlife students about the world they are about to enter, I do contend that greater attention to the ‘real world of wildlife management’ would

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have moderated my concerns and the need for these recommendations. It was, in large part, a paucity of 'real world' experience among many recent graduates that provided the motivation for this essay.

Over many years, and consistent with observations of others (Grumbine 1990), it has been my experience that interagency competition and bureaucratic inertia most often lead to inefficiency rather than meaningful progress, although notable exceptions have occurred in response to conservation crises (Keay et al. 1987, Bleich et al. 1991, Krausman 2017). Additionally, confounding or misleading federal legislation (e.g., U.S. Congress 1964, 1971, 1994), albeit well-intended, has, in some cases, produced untenable situations with respect to wildlife conservation, resolution of which is complicated because only Congress has the power to revise or amend legislation (Thomas 2004; Bleich 2005, 2016). Moreover, an uninformed public, when influenced strongly by some special advocacy groups and the tactics they use to achieve their objectives, confound efforts to conserve bighorn sheep and many other species (Whittaker and Torres 1998, Peterson and Messmer 2010). Further, some past successes of groups advocating for policies, regulations, or legislation based largely on protectionist or hands-off philosophies (e.g., Proposition 117, which banned the hunting of mountain lions [*Puma concolor*] in CA, USA) have been, in part, the results of political chicanery or actions of pandering politicians (Bleich and Pierce 2005, Bleich 2016). As a result, there is a pressing need for lawmakers to recognize effects of their actions on conservation and correct those benighted policies (Gabriel 2013). Finally, I believe that attitude, frequently expressed in the context of interpersonal competition or the desire to do something novel (Fig. 1), sometimes has a negative effect on progress, and can even be detrimental to the overall objective of wildlife conservation.

SOME RECOMMENDATIONS FOR ACHIEVING SUCCESS

Below are recommendations for building and maintaining momentum for the conservation of bighorn sheep. I hope

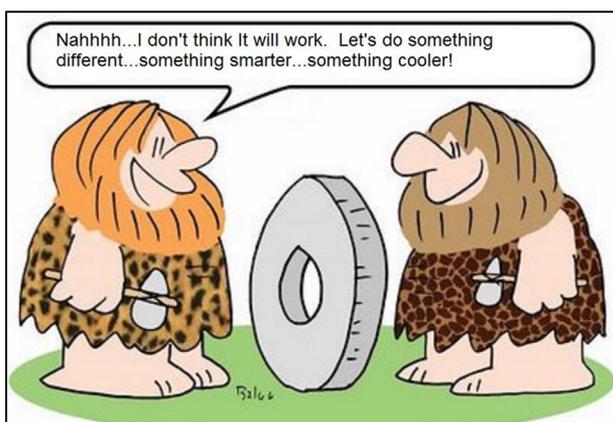


Figure 1. Doing something different or altering long-established methods that have been highly successful is not always necessary; image © Balooartoons.com 2009.

readers will consider these thoughts and further identify or develop ways to enhance the efficacy of our collective efforts to conserve not only North American wild sheep, but all species of wildlife.

Nongovernmental Organizations

During an early assignment, I became acutely aware of the role of the private sector in wildlife conservation. Since then, I have emphasized the importance of the public-private working relationship, which has been paramount in the conservation of desert bighorn sheep (Bleich et al. 1982a,b). The value of that relationship is evidenced by thousands of interested individuals, and numerous organizations founded primarily by the sporting public (Hurley et al. 2015). Although sometimes deficient in science, those organizations have been important sources of support and their interest emphasizes the value of public-private partnerships in the conservation of bighorn sheep and other wildlife. Many accomplishments involving nongovernmental organizations (NGOs) have been undertaken for the benefit of bighorn sheep and, in large part, the existing momentum continues because of grass-roots efforts that have augmented agency programs (Table 1).

As emphasized frequently by my mentor, the late Richard Weaver of the California Department of Fish and Game (CDFG), "It is not government that makes things happen; it is those outside of agencies that get things done." For example, the Society for the Conservation of Bighorn Sheep had, for nearly a decade, urged CDFG to initiate a management program for bighorn sheep. The California Legislature eventually passed a resolution requesting CDFG conduct a comprehensive, statewide inventory of bighorn sheep and to solicit advice of private conservation organizations in carrying out that assignment (Weaver 1969). Despite 85 years of total protection of bighorn sheep, CDFG had not done so, and the inventory came about because of long-term interest of an NGO (Bleich 2006). In another example involving a charismatic large mammal, the Committee for the Preservation of the Tule Elk (*Cervus canadensis nannodes*) eventually was successful in its quest for an intensive translocation program for that endemic California, USA, taxon (McCullough et al. 1996, Jessup et al. 2014).

Since my earliest exposure to the men and women that have advocated so long for bighorn sheep, I have followed Weaver's advice and sought opportunities to build relationships with NGOs. North American wild sheep have benefitted from the interest and actions of a multitude of organizations, and I have had the privilege of working with 13 local or national NGOs on behalf of bighorn sheep conservation. Become involved with local and national groups that have an interest in bighorn sheep and take advantage of opportunities they present to build momentum for conservation. As noted recently by Kobilinsky (2017a:16), "conservation through conversation" can produce meaningful results, and I believe the contributions of those interested individuals and organizations will become increasingly important. Nongovernmental organizations can

Table 1. Examples of assistance, support, or actions related to management and conservation activities benefitting bighorn sheep by individuals, representatives of nongovernmental organizations, or by public entities having primary responsibilities other than wildlife conservation.

Type of activity	References
Habitat assessment	Sudmeier (2017)
Habitat enhancement	Suminski (1987, 1990); Bleich (1990, 1998); Bleich and Pauli (1990); Bleich et al. (1982 <i>a, b</i>), Bleich et al. (2006 <i>a</i>)
Habitat protection	DeYoung et al. (2000), Krausman et al. (2001), Brewer (2003), Brewer and Hernandez (2011), Dertien et al. (2017)
Population assessment	DeForge (1980); Holl and Bleich (1983, 2009); Torres et al. (1993); Rubin et al. (1998); Holl et al. (2004); Monteith et al. (2013); Jorgensen (2015); Sudmeier (2017)
Application of technology	Hill and Bleich (1999)
Population management	Watson (2013), Edwards et al. (2014), Bernatowicz et al. (2016)
Translocations	Campbell (1984), Bleich et al. (1990), Torres et al. (1993), Urquidez et al. (1999), Krausman et al. (2001), Krausman (2017)
Conservation on private lands	Krausman et al. (2001); Brewer (2003, 2018); Brewer and Hernandez (2011)

get things done when government cannot; do not hesitate to build relationships with those groups.

In addition to my words of encouragement, I also offer a word of caution. I believe that many agency biologists view NGOs primarily as a source of funds, rather than as partners in conservation. Ironically, the reverse also is true, with some organizations viewing agencies as “cash cows.” Nevertheless, these organizations are acutely aware that the conservation of wild sheep is well-funded by most agencies, and lack of agency funding has been identified by wild sheep biologists as unimportant relative to disease, habitat quality, predation, or competition (Bleich 2009). Moreover, NGOs are quick to catch on and, when it becomes obvious that they are viewed primarily as sources of funds rather than as cooperators in conservation, formerly productive relationships can be harmed. For the benefit of wild sheep, I believe it is more productive to seek needed funds from within one’s agency rather than simply seeking alternatives elsewhere, even though the latter may be less complicated. There are tradeoffs associated with every action and, in instances where financial support is sought from an NGO, it is best to approach any such request as a collaboration rather than merely a request for funds.

The Media

During my career I spent many hundreds of hours responding to queries from the press and the public (Henke et al. 2017). A willingness to interact with individuals and organizations is of paramount importance in overcoming challenges and forging opportunities to build and maintain momentum for conservation programs involving a charismatic species like bighorn sheep (John 2017, Kobilinsky 2017*a*). Among lessons learned is that the public and the press can be your ally or your enemy, and it is best to assume they will be your ally. Never miss an opportunity to speak to a civic group, reporter, school group, or conservation organization, and always return phone calls; if nothing else, people will know that you are, at the least, responsive. Much of the public believes no government employee works so hard that they do not have time to return a phone call, and failure to do so can ruin credibility and be disastrous to important programs. Moreover, every interaction with the public, whether through the media or individual contacts, presents an opportunity to educate others regarding conservation.

Private Enterprise

Opportunities to build relationships with private enterprise should not be overlooked. For example, a strong and professional relationship with purveyors of equipment can lead to big returns in terms of pricing or a willingness to produce a custom product. Further, close relationships with contractors can lead to opportunities for special consideration when an out-of-the-ordinary request is made. Moreover, personal relationships with skilled operators providing survey, capture, or transport services can lead to an accommodation of special needs, or the cheerful rescheduling of an activity on short notice. In particular, a close working relationship with pilots is especially desirable. When they understand exactly why you are asking them to do something and fully realize their efforts have meaningful consequences for success, they will be even more supportive of efforts to maintain momentum for conservation.

Collaboration With “Sister” Agencies

Working closely, even if not always in agreement, with other resource management agencies is a necessity. I believe biologists in federal agencies are largely sympathetic to the frustrations that state wildlife biologists feel with respect to the often illogical, ecologically unsound, or frustrating constraints associated with some federal legislation (Bleich 2005, 2016). At the least, there likely will be individuals with whom to share your grievances. Moreover, access to decision-makers willing to make calls in the best interest of bighorn sheep, rather than fretting about potential lawsuits that could arise as a result of their decisions, may present itself. Benefits of close relationships with biologists in federal or state agencies having primary responsibilities for habitat management are too numerous to mention, but often lead to successful programs of which all involved can be proud. Among those organizations are the Federally Recognized Indian Tribes of the United States and the First Nations of Canada, many of which have played important roles in the cooperative management or conservation of bighorn sheep across western North America.

Academia and Agencies Can Be Friends

The management of wildlife resources is far more than the mere application of previous research, and its complexity requires original thinking (Bailey 1982). As a result,

increased cooperation between universities and government agencies is desirable, and administrators are urged to recognize the benefits of such collaborative efforts (Gaillard et al. 2000, Bleich et al. 2006*b*). I strongly encourage agency personnel to be receptive to working with those in academic institutions because those relationships can lead to unexpected progress and unanticipated successes. In the same way, I urge academic personnel to be receptive to working with those in agencies. Benefits of such relationships are becoming more evident, but level of cooperation varies among agencies and universities; suffice to say, however, that such relationships can be synergistic.

Professors, research scientists, undergraduate students, and graduate students are important resources and can help build support for agency programs while simultaneously providing expertise—opportunities to work with them should not be overlooked. Likewise, agency personnel can provide expertise and opportunities that otherwise would not be available to academic personnel (Kessler 1995). Agency personnel have provided innumerable opportunities for students and their academic advisors to become involved directly with conservation, and collaboration with universities or U.S. Geological Survey Cooperative Fish and Wildlife Research Units can be an important conduit for agency hiring. Many young people affiliated with university programs have gone on to further our knowledge or management efforts for all wildlife, but particularly with respect to the conservation of bighorn sheep.

Collaboration With “Nonwildlife” Agencies

I have attempted to follow Dick Weaver’s leadership with respect to agencies whose primary missions are other than wildlife conservation. Such organizations often have the resources, and the authority for land management, to facilitate management programs on behalf of bighorn sheep and other species (Kobilinsky 2017*b*). Agencies that have primary missions not oriented specifically toward wildlife conservation can be meaningful partners in building and maintaining momentum for the conservation of wild sheep.

To the extent possible, develop a solid working relationship with personnel in those agencies. For example, close collaboration with the Metropolitan Water District of Southern California led to the translocation of bighorn sheep to the Whipple Mountains of southeastern California, a range from which they had been extirpated several decades previously. Working cooperatively with the Department of Defense led to the opportunities to reestablish bighorn sheep in the Eagle Crags and the Argus Range, at the China Lake Naval Weapons Center, and translocate bighorn sheep to the Bullion Mountains at the Marine Corps Air and Gunnery Range (MCAGR). Ongoing work at MCAGR has resulted in construction of 6 wildlife water developments, substantial westward expansion of bighorn sheep in the Bullion Mountains and, ultimately, restoration of gene flow across >100 km. Unless one recognizes the benefits of working closely with such organizations, mountain sheep conservation could be shortchanged because potential opportunities are overlooked.

Privately Owned Lands

In most jurisdictions, wild sheep occur primarily on lands owned and managed by federal agencies. Nevertheless, the potential value of some private lands to conservation is indisputable (Leopold 1930, Watson 2013, Brewer 2018). In states where most land is private, management activities or conservation efforts are dependent upon landowner cooperation to ensure viability of wild sheep populations. Among such states are Texas (Brewer (2003), Nebraska (Bleich 2010), and North Dakota (Wiedmann and Hosek 2013), USA, each of which has active management programs involving large expanses of lands in private ownership. Even in states where public land is abundant, owners of large private holdings have cooperated with government agencies to facilitate translocations or habitat enhancement projects (Krausman et al. 2001, Brewer and Hernandez 2011, Goldstein and Rominger 2011). Moreover, landowners have the potential to benefit bighorn sheep through their good will and cooperation in managing domestic livestock, but they also have the potential to preclude or inhibit conservation (Heinse et al. 2016). Thus, good working relationships with landowners are essential to building, and especially to maintaining, momentum for the conservation of wild sheep. Please find the time to get out of your vehicles and talk to these people.

Coworkers

Take advantage of skills or talents possessed by your coworkers and always give credit as appropriate. Some of them will be academically oriented, others will be service oriented, and most of them will have skills that you will be glad they have at some point during your efforts to benefit wild sheep or their habitat. Employees often become comfortable in their offices while working alone, and they sometimes fail to realize that the coworker next door or in an adjacent cubicle has ideas or skills that would be beneficial to the conservation of bighorn sheep. For example, a colleague or officemate that works primarily on bats may have ideas that are equally applicable to the conservation or management issue that you are facing; bighorn sheep biologists should not restrict their conversations to other sheep people. In other examples, I have had employees or coworkers that would qualify as journeyman welders, electricians, or plumbers if employed in the private sector. Each of them could have been making tremendous salaries outside of government but they chose the most honorable of careers: wildlife conservation. Some could not tell me the difference between a chi-squared test and a *t*-test, but when I needed a welder to repair a broken trailer or a plumber to fix a broken pipeline I did not consult a statistician.

The bottom line is that employees and coworkers have individual talents, and it is appropriate to realize those differences and take advantage of their skills. Over the years I have had several employees that were not self-starters, and others that were very opinionated; one seemingly viewed arguing to be on par with an Olympic event. Nevertheless, each of them completed tasks assigned to them effectively, efficiently, and completely. Treating your coworkers and,

especially, your employees with respect has the potential to pay big dividends, not only for working relationships and efficiency, but for building and maintaining momentum for conservation.

Attitude

Above all, an attitude that reflects your commitment to building and maintaining momentum is most meaningful. Indeed, Leopold (1933) noted early on that attitude is an important attribute for those entering the field of wildlife conservation. Humility also is a highly desirable personal trait (Kessler 1995), and often is a reflection of one's attitude. Moreover, hearing what others have to offer before making a decision or starting anew is admirable, can prevent much in the way of frustration, and help build relationships. Indeed, there are benefits to be gained in that past mistakes can be avoided, and past successes can be built upon.

It is important for wildlife biologists to remain on the cutting edge of technology, but doing something novel or changing long-established methods that have been highly successful is not always necessary (Fig. 1; Bleich and Thompson 2018). Nevertheless, our profession has witnessed an increase in the application of Maslow's (1966) hammer (i.e., everything looks like a nail) and a concomitant tendency for individuals to fall in love with the solution instead of the problem, rather than vice-versa (Boudreau and Rice 2015). For example, an attraction to the bright, shiny object—technology in this case—and its application to wildlife science seemingly has become the rage, but sometimes at the expense of failing to consider its necessity, added costs, or biological significance (Roberts 2011, Latham et al. 2015).

It has been my experience that the immediate application of novel and sometimes unproven technologies has been substituted by many for intensive field work or a passion for learning. Improved computational and analytical capabilities and availability of remote data gathering technologies have allowed science to advance, but frequently with a near-absence of field work. That trend has resulted in 2 scenarios: an apparent fascination with the tools and not the problem, and increased isolation of biologists from the natural world. As a result, biologists lose opportunities to witness interactions among study subjects and their environment. I also believe the de-emphasis of natural history courses at many universities has resulted in a decrease in passion for, and curiosity about, the natural world that Leopold (1933) emphasized were so important to professionals in our field (Bleich and Oehler 2000). Throughout North America those characteristics have been paramount in building and maintaining momentum for the conservation of bighorn sheep.

The increasing trend toward technology, particularly among young people entering the field of wildlife conservation, begs the question, "What ecological questions will be addressed and answered?" (Latham et al. 2015:144). An absence of critical forethought or planning all too often has occurred and resulted in advanced technology being employed simply because it was available, rather than being necessary, to meet an objective (Nichols and Williams 2006,

Hebblewhite and Haydon 2010). Moreover, simply assuming that use of advanced technology can be a substitute for rigorous field work can be a danger (Elbroch et al. 2017). The unnecessary application of technology to explore poorly thought-out questions and putting technology before biology (Hebblewhite and Haydon 2010), or reinventing programs that previously were highly successful can be especially problematic. The public may perceive such behaviors as incompetence or arrogance, both of which are counter-productive to conserving bighorn sheep.

As commented by a colleague who reviewed an early draft of this paper, these points can be succinctly summarized. When wildlife biologists—whether experienced or newly minted—did not or do not grasp "Ecology 101," pursuit of the bright, shiny object seems more likely. It is necessary to understand the culture of conservation and history of work accomplished to date in the location of interest because failure to do so exacerbates the tendency to "ignore what has been done before" and alienates stakeholders. And, rarely is there adequate consideration of the long-term research required to inform questions appropriate to conservation and management of large mammals.

Identifying interdisciplinary problem-solving as an objective in a course or program is of value, but demonstrating interdisciplinary problem-solving in practice is essential (Kessler 1995). Learning from others has many advantages, and not taking advantage of such opportunities stymies success and can result in total failures even within long-standing, successful programs. Any perception of arrogance or incompetence will result in nothing but grief with the press, the public, administrators, employees, academics, other agencies, landowners, or contractors. Among those most apt to be concerned with such behavior are the NGOs that have played—and continue to play—a pivotal role in the conservation of bighorn sheep or other species.

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