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**WILDLIFE MANAGEMENT AND ABORIGINAL RIGHTS: AN
ECOLOGICALLY SCALED BIOMASS APPROACH**

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ABSTRACT

Effective wildlife conservation and management require the conjunction of science and policy. When courts make policy, disjunction can occur because science and the judicial process operate along very different tracks. This paper addresses an emerging disjunction between the science of wildlife management and the Supreme Court of Canada's critically important policymaking regarding Aboriginal exemptions from harvesting regulations. The Court's jurisprudence is out of step with scientific developments to the extent that its jurisprudence of exemption rights: 1) relies on outdated ideas about the benign nature of subsistence predation to justify exemption rights, 2) incorporates an "ecological native" argument in situations where its principles are unlikely to hold, and 3) employs political rather than ecological scales to apply exemption rights. Fortunately, there is room within the Supreme Court's jurisprudence to bring science and policy closer together. We outline how this might be accomplished through an "ecologically scaled biomass approach" to aboriginal exemption rights.

Wildlife Management and Aboriginal Rights: An Ecologically Scaled Biomass Approach*

Because wildlife management occurs at the intersection of science and policy, managers must concern themselves not only with the applicable science but also with the political institutions that determine the extent to which good science can be implemented. In Canada, the relevant institutions include the Supreme Court, which is the leading policy maker on aboriginal hunting and fishing rights, an issue of increasing importance and controversy for wildlife management. It is well known that science and courtroom litigation run along very different tracks, using distinct methods of assessment. Whereas science emphasizes the representative generalization, litigation takes its bearings from the particular and often exceptional instance (Horowitz 1977, 44-5; Jasanoff 1995, 7-9). As an issue moves up the legal hierarchy of appellate and high courts, the generalizations needed for good policymaking loom larger, but the adjudicative context continues to pose challenges to the effective gathering and assessment of scientific evidence (Knopff & Morton 1992, 208-209 & 218-219). Moreover, the gravitational pull of precedent makes it difficult to change legal policy to accommodate new science. For these reasons, there is an ongoing risk of disjunction between policy and science when courts make policy.

Such a disjunction is threatening to emerge between the science of wildlife management and the Supreme Court's jurisprudence of Aboriginal hunting and fishing rights. These rights – based in treaties, ordinary law and policy, and the Constitution – take the practical form of exemptions from otherwise valid conservation regulations such as hunting seasons, bag limits, and age/sex restrictions. According to the Supreme Court,

* Acknowledgments (Pending)

exemption rights can be used to secure needs ranging from bare “subsistence” to a “moderate livelihood” but not to support purely recreational ends or large-scale, for-profit commerce (*Marshall I* 1999, 470 at para. 7; *Van der Peet* 1996, 610 at para. 195). That is, exemption rights serve the realm of (relative) “necessity” but not that of luxurious “surplus” or “leisure.” When the end is “sport” or “profit,” aboriginals are generally subject to the same regulatory limits as everyone else; when the end is subsistence or moderate livelihood, exemption rights come into play. Urgent conservation needs can trump even necessity-based exemptions, but such restrictions are permissible only if closure to all non-aboriginal hunting and fishing has not adequately addressed the conservation concern (*Sparrow* 1990, 1116 at para. 78). This priority of necessity-based exemptions over all other hunting and fishing is often understood to apply to each and every legally harvestable species; that is, if any harvesting of a species is allowed, aboriginals are exempt from any regulation of that species unless full closure is required. Moreover, exemptions and priority for a harvestable species are often extended to all parts of a jurisdiction that are not subject to complete closure.

This policy of exemption and priority relies on the fact that the famous “tragedy of the commons” associated with “exemption” from either property rights or regulation (Anderson & Hill 2004, 77-79) may not be triggered by communities sufficiently cohesive and small enough to enforce norms of restraint through interpersonal social control (Ostrom et al. 1999). Aboriginal peoples are typically presented as such communities. According to this “ecological native” argument (Krech 1999),¹ conservation of wildlife is threatened not by the restrained and necessity-based aboriginal

¹ Krech actually uses the term “ecological Indian.” We prefer the broader terms “native” or “aboriginal,” choosing “native” primarily because of the awkwardness of “ecological aboriginal.”

hunting and fishing, but by the sport, trophy or commercial take of non-aboriginal society (Chartier 2005).

The notion that every harvestable species can sustain the priority hunting and fishing of exemption-empowered “ecological natives” anywhere its harvest is not altogether prohibited is out of step with modern science in three ways. First, while the distinction between the realms of necessity and surplus underlying the policy is intuitively attractive and in accord with a certain perspective in traditional ecology, it cannot withstand a key insight of more modern ecological science, namely that nature often fails to produce balance or long term stability. Indeed, even the unquestionably necessitous activity of non-human predators can threaten and sometimes extinguish prey species, highlighting the fact that subsistence predation is not always benign. The problem is compounded when one comes to appreciate how fuzzy the allegedly bright line between the realms of necessity and sport actually is. The sporting, cultural, and culinary “enjoyment” factors in even purely necessitous human predation are analogous to the prey specialization that sometimes occurs in otherwise generalist non-human predators; both can increase the destabilizing tendencies of subsistence predation. Second, neither empirical evidence nor contemporary ecological theory support the “ecological native” argument, a fact recognized by Chief Justice McLachlin, though not by all of her colleagues. Third, one of the most important lessons of modern ecological science is that scale matters, especially for conservation and management (Gordon et al. 2004; Lewis et al. 1996). The political scales used to define the reach of aboriginal exemption rights – i.e., treaties, traditional harvesting areas, provincial jurisdictions – are

rarely consistent with the ecological scales appropriate for the sound management and conservation of species and ecosystems.

To address these three difficulties effectively, the Court's entirely sensible limitation of exemption rights to the realm of necessity needs to be accompanied by a careful tailoring of those rights *within* that realm, where problems of over-exploitation can also arise. Science and policy are best brought together by applying necessity-based exemptions and priority not to each and every legally harvestable species, but only to more abundant species. This approach ensures an adequate biomass of game and fish to sustain the "for food" and "moderate livelihood" needs of aboriginals while permitting universal regulation to secure a maximum sustainable yield of less abundant species for aboriginal and non-aboriginal harvesters alike. Since "more" and "less" abundant are terms relative to local ecosystems, moreover, our recommended "biomass" approach will fail if species that are scarce in a particular ecosystem are subject to exemption-based harvesting because they happen to be abundant in a wider harvesting area defined in political or cultural terms. The biomass approach can succeed only if implemented at ecological rather than political scales. We thus call it the "ecologically scaled biomass approach" to aboriginal exemptions and priority. Fortunately, a recent Alberta Court of Appeal Judgment – *R. v. Lefthand* (2007) – found room within the Supreme Court's jurisprudence for this policy refinement, making it the law of the province, at least temporarily. Were the Supreme Court to confirm this development and extend it to the rest of Canada, the disjunction between science and policy would close.

The Supreme Court’s Distinction between Necessity and Surplus

In Table I, which summarizes the Court’s jurisprudence, the realm of necessity on the left side comprises two categories of hunting and fishing, “subsistence” and “exchange,” while the realm of surplus on the right is composed of hunting and fishing for “commerce” or “sport.” In general, the Court has found regulatory exemptions harder (and limits on them easier) to justify as it moves from left to right through the Table’s categories.

Category I, at the left end of the table, embraces hunting and fishing for direct, “subsistence” consumption. This need not be limited to consumption by the individual(s) who harvested the game or fish; in the communal context of aboriginal societies, those who hunt and fish can harvest sufficient quantities to meet the food needs of the band (*Sparrow* 1990, 1111 at para. 68). Whether individual or communal, the emphasis is on providing the immediate nutritional necessities of survival. In addition, Category I includes traditional uses of game and fish for ceremonial purposes (*Sparrow* 1990, 1101 at para. 45). These ceremonial purposes obviously extend beyond the normal “survival” connotations of “subsistence,” but we nevertheless use the latter term as convenient shorthand for the category as a whole.

Table I: Exemption Rights and the Distinction between Necessity and Surplus

	I Subsistence	II Exchange	III Commerce	IV Sport
A (Category)	<ul style="list-style-type: none"> • Direct consumption • Social & ceremonial 	<ul style="list-style-type: none"> • Small scale trade and barter • Not for profit 	<ul style="list-style-type: none"> • Large-scale trade • For profit 	<ul style="list-style-type: none"> • Recreation
B (Realm)	Necessity (subsistence + moderate livelihood/support/sustenance)		Surplus (luxury/leisure)	
C (Regulation)	Rights-based exemptions to regulation		No rights-based exemptions to regulation	

At the other end of the continuum (Category IV) is hunting and fishing for recreation or “sport.” The game and fish thus harvested might very well be eaten – indeed, they often are – but they are not needed to keep body and soul together in the sense of category I subsistence.

Between the extremes of subsistence and sport lie two categories that involve the trade of game and fish but differ in the scope of trading activity. Category II, which we dub “exchange,” includes the barter of fish and game for other goods, as well as the modest sale of fish and game for the money needed to secure what the judges variously describe as “support,” “sustenance,” or a “moderate livelihood” (*Van der Peet* 1996, 610 at para. 195). Here the judges have in mind a degree of “basic housing, transportation, clothing and amenities” (*Gladstone* 1996, 751 at para. 35; *Van der Peet* 1996, 649 at para. 279) that transcends the bare “subsistence” needs of Category I but does not extend to the profit-oriented accumulation of wealth characteristic of modern “commerce” (Category III).

Not surprisingly, the Court has found claims for exemption rights easy to justify for the subsistence hunting and fishing at the left end of Table 1 and correspondingly difficult to justify for the sport activities at the right end. The judges have been generally reluctant, however, to limit exemption rights to the leftmost category of bare subsistence. Wanting aboriginals to be able to take advantage of the expanded opportunities for comfortable existence afforded by modernity, they incline to the view that exemption rights should support “the modern equivalent of what the aboriginal people in question formerly took from the land or the fishery, over and above what was required for food and ceremonial purposes” (*Gladstone* 1996, 751 at para. 35; *Van der Peet* 1996, 649 at

para. 279) of Category I. At the same time, the Court sees real problems in extending exemption rights to the large scale trading activity of the modern market economy – hence the distinction between the limited exchange of Category II and the more extensive commerce of Category III (*N.T.C. Smokehouse Ltd.* 1996, 687 at para. 20).

In effect, the line between the two trading categories divides the overall continuum neatly into the two halves depicted by Row B of the table. In the left half (subsistence and exchange), hunting and fishing secure the absolute necessities of existence plus the additional comforts of a “moderate livelihood” or “sustenance lifestyle”; in the right half, commercial and sport hunting and fishing extend to the surplus, luxury, and leisure activities of modern life. For ease of reference, we have designated the left half of the table the realm of necessity (with the term understood in a relative sense as moderately exceeding the needs of bare survival) and the right half as the realm of surplus. With some exceptions (*Gladstone* 1996, 747 at para. 28), the tendency of the Court’s jurisprudence has been to justify exemption rights when they serve necessity but not when they serve “commercial” surplus.

The policy position depicted in Table 1 is intuitively attractive. Certainly the purely needs-based subsistence of Category I seems modest in scope and might be thought to pose little threat to wildlife populations. The pursuit of profit or recreational pleasure, by contrast, seems more limitless and threatening to the environment. From this perspective, the policy of aboriginal exemption rights on the left side of Table I appears entirely commonsensical, especially if “ecological natives” can be relied upon to exercise these rights responsibly. The assumptions inherent in this policy position, however, are not consistent with current scientific knowledge in at least two fundamental ways. First,

the available evidence does not support the implicit assumption that subsistence predation is always compatible with the persistence of prey populations; even subsistence predation can lead to over-harvesting, a problem compounded if the line drawn by the Court between subsistence and sport is not as bright as it initially appears. Second, neither empirical evidence nor contemporary ecological theory support the “ecological native” argument. We discuss each of these science-policy disjunctions in turn.

The Ecological Dangers of Necessitous Predation

The policy of exemption rights for necessitous hunting and fishing is supported by an older ecological tradition in which the adjective “ecological” connoted stable, systemic balance and equilibrium in the necessitous processes of non-human nature. Insofar as aboriginal hunting and fishing were similarly necessitous, they were compatible with sustainable ecological balance. Simply put, regulating needs-based aboriginal predation seemed, in this view, to be as superfluous – perhaps even as outlandish – as trying to license the “harvest” of non-human predators.

Most ecologists no longer subscribe to this perspective, however. As Robert Krech (1999, 23) notes, the modern discipline of ecology, finding “proof” of “balance, stability, or harmony” to be “elusive,” has “abandoned these and other long-held assumptions in favour of chaotic dynamics in systems, and long-term disequilibrium and flux.” An example of the “chaotic” or stochastic dynamics referred to by Krech is the fact that even the kind of necessitous hunting on the left side of the table can endanger prey species, often unpredictably and sometimes to the point of local extinction (Festa-Bianchet et al. 2006).

Certainly animal predators, which are the archetypal subsistence hunters, have been shown to endanger populations of prey on local or regional scales. Indeed, given the opportunity, some single-prey predators will drive a local population of prey to extinction even if it means the local predator population has doomed itself to subsequent extinction in the absence of its only prey (Huffaker 1958). Where alternative prey species are available, a generalist predator sustained by high populations of one species need not subvert its own survival by decimating comparatively small populations of other species (Kinley & Apps 2001; Robinson et al. 2002; Rominger et al. 2004). The problem is compounded when individual predators of the generalist class come to “specialize” in a threatened species (Festa-Bianchet et al. 2006; K. Knopff & Boyce 2007; Ross et al. 1997). The resulting reduction or elimination of a species in the local ecosystem can potentially destabilize the system as a whole (Schmitz et al. 2000; Valone & Schutzenhofer 2007).

If non-human predation can threaten species and destabilize eco-systems, so can human subsistence predation (Alvard 2000; Wilson 1993, 244-245). A strong or exclusive selection for particular species based on human cultural or culinary preference can have the same negative effects as the analogous prey specialization among non-human predators. Resources that are of high value (be it due to culture, trade, or optimal foraging strategies) are usually the first to be depleted by subsistence harvest, even where other potential prey are available (Rowcliffe et al. 2003) and where sustainable choices might be made instead (Alvard 1993). The problem is compounded for humans when technology improves hunting efficiency, making it viable to continue to target a valued species even as availability declines. Indeed, Supreme Court jurisprudence encourages

the use of technological advances for aboriginal subsistence harvest, even where such technology is normally illegal (*Morris* 2006). In short, culture compounded by technology can result in local tragedies for certain species even where the total available biomass of potential prey is capable of meeting subsistence needs in a sustainable fashion (Alvard 1993; Franzen 2006; Holt 2005; Newfoundland and Labrador. 2004; Siren 2006). It has even been hypothesized that human subsistence hunting explains the Pleistocene megafaunal extinctions (Barnosky et al. 2004; Prideaux et al. 2007; Wilson 1993, 247-253) though this theory remains controversial (Guthrie 2006; MacPhee et al. 2002; Wroe et al. 2004).

In sum, the view that “necessitous” hunting and fishing needs no intervention to prevent over-exploitation is not supported by the evidence. Intervention may be required to protect locally threatened species even from the purely subsistence activity of both human and non-human predators. True, we do not attempt the absurdity of issuing regulatory licenses to non-human predators; instead humans intervene in more dramatic fashion, with lethal culls of predator populations being a common practice (Hayes et al. 2003; Reynolds & Tapper 1996). In the case of human predation, we act through regulatory seasons, age- and sex-specific bag limits, or the complete closure of a hunt.

The fact that even subsistence predation sometimes needs regulatory intervention does not in itself imply that we should resort immediately to such regulation whenever a prey species is threatened, however. When human subsistence is truly at stake, an understandable first reaction is to tighten restrictions on the non-subsistence human predation, leaving subsistence activities alone unless absolutely necessary. This is the position of the Supreme Court of Canada, as summarized by Glenn and Drost (1999,

183): “aboriginal fishing for food, ceremonial and social purposes must be given absolute priority over commercial and sport fishing, with the latter thus bearing the brunt of the conservation measures” (see *Sparrow* 1990, 1116 at para. 78). If there is the need for some restriction, in other words, it should come first through the progressive limitation and ultimately closure of non-aboriginal hunting (*Sparrow* 1990, 1116 at para. 78). Only as a last resort, in ecologically dire circumstances, can the aboriginal hunt also be closed altogether (*Sparrow* 1990, 1119 at para. 81).

This “all-or-nothing” principle for limiting aboriginal hunting – i.e., limiting others but not aboriginals unless complete closure is truly required – is again intuitively attractive. After all, who wouldn’t give necessity priority over surplus, leisure, and especially “sport”? But what if “necessity” and “sport” cannot be as starkly separated as Table 1 suggests? On reflection, in fact, they turn out to be two sides of the same coin.

On its face, certainly, subsistence is a matter of the most urgent necessity, while “sport” hunting seems a pursuit of utterly recreational leisure. As already indicated, however, most so-called sport hunters eat what they harvest, and for the many who are not wealthy freezer full of game and fish is a genuine economic benefit. By the same token, those who most clearly hunt for subsistence purposes generally also enjoy the thrill of the chase. No one who has owned hunting dogs or watched a well-fed house cat on the prowl can deny the sheer, non-necessitous joy of the hunt in the animal world (Baker et al. 2005; Woods et al. 2003). Nor would evolutionary theory lead one to expect anything else; an animal that took no pleasure in the hunt would suffer obvious survival and reproductive disadvantages. The element of “sport,” in short, seems difficult to expunge

from even clearly subsistence hunting, just as a subsistence dimension usually inheres in apparently recreational activity.

There is, of course, a view that it is the mark of modern, civilized humanity to overcome the enjoyment of hunting (Fabian 2003; Hunter 2002; Macpherson 2005). However, it is difficult to reconcile this anti-hunting view with the legal celebration of hunting as integral to the modern persistence of aboriginal cultures (*Powley* 2003, 246 at para. 18 & 281 at para. 41; *Sparrow* 1990, 1094 at para. 29; *Van der Peet* 1996, 549 at para. 46). Hunting can be a life-sustaining activity to be sure, but in the case of aboriginal communities it is understood to be much more than that. Of the life-sustaining activities available to them, hunting and fishing are the ones said to define aboriginals as peoples, supplying them with part of their central identity, not just in the past but today as well. To deserve such elevated status, even an activity of economic necessity must surely also offer serious possibilities of enjoyment. No doubt there are subsistence activities of sheer drudgery but they tend not to enjoy identity-defining status, and, in any case, hunting and fishing are rarely, if ever, understood as necessitous drudgery by hunters and fishers themselves, even those who clearly engage in these activities for subsistence purposes. As Justice Erb put it when granting the “for food” exemptions to Indians who had caught fish contrary to conservation regulations during a Band fishing derby, there is nothing in the law “to suggest that food fishing rights cannot be exercised in an enjoyable manner” (*Houle* 2006, 733 at para. 33; *Martin* 2007, para. 18).

The inevitable recreational or “sporting” dimension of hunting and fishing compounds the challenge posed to the distinction between innocuous subsistence hunting and environmentally dangerous recreational hunting by culturally based prey

specialization. Influenced by the “sporting” dimension, an exemption-empowered hunter might pass up the readily available deer and make the extra effort to bag the trophy specimen of a locally rare and more stringently protected species. Who is to say that the much rarer bighorn ram, whose head incidentally adorns the hunter’s wall, was not taken primarily for the meat it contributed to his freezer? After all, if both the deer and the ram will nourish equally well, why not choose the more challenging and satisfying prey, thus optimizing the overall hunting experience? It isn’t just cultural or culinary preference that can lead human hunters to over harvest particular species; the thrill of a challenging chase can also add value to such species in a way that fuels a local tragedy of the commons.

The Ecological Native?

Of course, we could set aside concerns that exemption-empowered Aboriginal peoples might over-exploit fish and game if the “ecological native” contention holds and the harvesting restraint of indigenous peoples can be relied upon. This “ecological native” perspective finds support in the jurisprudence of some Canadian Supreme Court judges (*Badger* 1996, 821 at para. 97; *Marshall II* 1999, 555 at para. 32; *Sparrow* 1990, 1114 at para. 74 & 1119 at para. 82; *Van der Peet* 1996, 587 at para. 138 & 621 at para. 214), especially those who understand the distinction between the two middle categories of Table 1 as one between commercial and non-commercial forms of trade. For these judges, the category we have called “exchange” is inherently non-commercial, which is to say not for profit (*Van der Peet* 1996, 607 at paras. 189-194, 623 at para. 218). It is the modern equivalent of the kind of exchange traditionally represented by barter – that is, exchange inherently restrained to the pursuit of a “moderate livelihood” rather than

pursuing profit-oriented wealth and surplus. This is the kind of moderate exchange traditionally practiced by aboriginal peoples, and which they have a right to practice still.

Chief Justice McLachlin, revealingly, understands the situation quite differently. She sees “little point in labeling [monetary transactions in category II] something other than commerce” (*Van der Peet* 1996, 630 at para. 236). Instead, she distinguishes between two forms of “commerce” – that oriented to “basic sustenance” and that oriented to “wealth which would exceed a sustenance lifestyle” (*Gladstone* 1996, 756 at para. 41). On one level, this looks like a purely terminological quibble, since McLachlin agrees that exemption rights apply only in category II. It is more than a terminological quibble, however. Since both forms of exchange are “commercial,” they differ mainly in degree rather than in kind. For McLachlin, the pre-modern limitation of aboriginal exchange to what she calls “sustenance” commerce is explained by lack of opportunity for “wealth accumulating” commerce. Simply put, the technology and markets that characterize the latter kind of commerce did not exist in the pre-modern context (*Van der Peet* 1996, 630 at para. 237). In this view, aboriginals are not fundamentally more restrained than other humans in responding to wealth accumulating incentives and opportunities; they just lacked the incentives and opportunities at earlier times – in effect, they were subject to the external regulation of nature and existing technology. For McLachlin, there is no reason to suppose they would not respond to those incentives now; they simply do not have the right to respond to them by way of regulatory exemptions beyond the level of “sustenance” commerce (*Van der Peet* 1996, 649 at para. 279).

But what of the traditional social controls that might effectively enforce traditional conservationist norms in sufficiently small and cohesive communities? The

problem in the case of aboriginal exemption rights is that they are available to aboriginals of all walks of life and can be exercised on public lands over very wide expanses of territory. For example, the Natural Resources Transfer Agreement (NRTA) gives Indians in Alberta, Saskatchewan, and Manitoba the right to hunt and fish “for food” on all public lands in these provinces, a provision that has been interpreted (*Frank* 1978) and is typically applied (*Martin* 2007, para. 22) to extend to Indians from anywhere in Canada who happen to be “in the province.” Thus, the same resources are being accessed by a wide variety of people—city dwellers, Indians on reserves, Métis, rich and poor—many of whom can use modern transportation to travel outside local hunting and fishing grounds. Under these circumstances, a cohesive community does not exist to set or enforce rules concerning the use of a resource, adding weight to McLachlin’s skepticism about the “ecological native.”

McLachlin’s view that Canada’s aboriginal communities were traditionally conservationist by circumstance rather than by nature is supported by accumulating evidence of how indigenous conservationist practices in many parts of the world gave way to disastrous tragedies of the commons with the advent of new incentives and opportunities (Johannes 1978; Stearman 1995; Zimmerman et al. 2002). Even without such incentive structures, aboriginal subsistence harvest has been shown to lack inherent conservation properties, and short-term gain is often preferred to long-term conservation benefit in open access systems (Alvard 1998; Wilson 1993, 253). Ironically, this evidence is consistent with a view of the “ecological native” updated to reflect the modern, less balanced and more chaotic science of ecology. As Krech (1999, 23) observes, the shift in

ecological thought has “profound” implications “for assumptions about the very people perceived as part of nature”:

In a balanced harmonious, steady-state nature, indigenous people reproduced balance and harmony. In an open nature in which balance and climax are questionable, they become like all people, dynamic forces whose impact, subtle or not, cannot be assumed.

If aboriginals are indeed “like all people” – i.e., if one cannot rely on the inherent restraints of “ecological natives” to sufficiently overcome the common human temptation to overharvest – the policy of exemption rights needs to be carefully defined and limited. The Court has already recognized and addressed the economic temptation to overharvest by refusing to allow exemption rights to support large-scale commerce. It remains to similarly address the causes of over-exploitation that operate even in the realm of relative necessity, namely, the cultural and/or thrill-of-the-chase reasons to emphasize the harvest of particular species. We suggest that an “ecologically scaled biomass approach” to the issues of aboriginal exemption and priority might be a reasonable resolution to the problem. There is room for such an approach within the current legal framework of exemption rights and it also can support the use of “maximum sustainable yield” management techniques that benefit all hunters and fishers, aboriginal and non-aboriginal alike.

An Ecologically Scaled Biomass Approach

The doctrine of aboriginal priority holds that conservation needs cannot intrude on necessity-based aboriginal exemptions unless complete closure of all harvesting is required. Only if full closure of the harvest is required for conservation reasons can the aboriginal harvest also be closed, and if less than full closure will suffice, non-aboriginals must bear the full brunt of any partial closure, even if that means having an aboriginal-only harvest. But if aboriginals are just as inclined as anyone else to the disproportionate take of particular species for culinary, cultural, and/or thrill-of-the-chase reasons as well as economic ones, their priority rights become problematic even within the realm of necessity. Why should a non-aboriginal be denied the challenge of hunting bighorn sheep in favour of an aboriginal hunter's priority when the subsistence needs that justify the priority could more easily be met by hunting abundant and more readily available deer? Why should both not be subject to similar limitations with respect to bighorn sheep? Indeed, it might seem particularly galling to see a limited hunt that would be perfectly sustainable if based on universally applicable limits shut down altogether because of the threat posed by an exemption-empowered aboriginal harvest (Edmonton Journal 1999).

But can the minority of exemption-empowered aboriginals really pose a threat to a particular species? If the subsistence behavior of non-human predators is any guide, the answer is yes. If dramatic reductions in local bighorn sheep populations can be caused by a very small number of cougars (Festa-Bianchet et al. 2006; Ross et al. 1997), it follows that a small number of unregulated subsistence hunters can have the same effect if, like the cougars in question, they choose disproportionately to take a relatively scarce species.

The situation is obviously quite different with respect to more abundant species, which can sustain heavier harvesting pressure. Such species are typically also regulated, but fewer constraints are applied and the priority of aboriginal exemptions from the remaining and laxer regulations is less problematic. Accordingly, we should reject the widespread assumption that aboriginal exemption and priority applies in a blanket fashion to each and every harvestable species. According to this blanket approach, the “scarcity” of any species “is not [an] issue” as long as “the Crown is in fact allowing harvesting of *the species* to occur under its own regulations” (Chartier 2005 emphasis added), meaning that the species in question can sustain the priority of aboriginal exemptions. The more scientifically justifiable alternative is to use the overall biomass represented by all available species to allocate exemptions among them. This biomass approach has recently been adopted by the Alberta Court of Appeal in *Lefthand* (2007): “The focus,” said Justice Slatter, “should be ensuring that there is some suitable, ample, and reasonably accessible source of food available at all times of the year, especially at, but not limited to, a subsistence level” (*Lefthand*, para. 88). Under this approach, aboriginal hunters and fishers would be exempt from the seasonal harvesting restrictions usually applied even to abundant species but not necessarily from the seasonal constraints set for species requiring stronger conservation measures. The same logic applies to other regulatory limits, such as bag limits or age and sex constraints for particular species. Here, too, aboriginal exemptions and priority are best approached in terms of ensuring sufficient biomass for moderate needs to be met, with complete exemption applying only to more numerous species, thereby enabling the effective management of less numerous ones.

Whether a species is less or more abundant in ways that might affect the sensible application of aboriginal exemption rights depends on the geographic scale of the harvest. The fact that appropriate spatial scales must be considered for the management and conservation of species and ecosystems is central to modern ecological science (Gordon et al. 2004; Lewis et al. 1996). A variety of natural and anthropogenic factors typically causes the abundance of animals to vary greatly within their range (Boyce & McDonald 1999; Johnson et al. 2004). Thus, the fact that a species is abundant and can sustain a harvest in one region within its range does not imply that similar harvests can be sustained everywhere within its range. Indeed, even where a particular age-sex class might sustain a harvest, this does not mean that other age-sex classes can also support a harvest (Saether et al. 2001).

There is the potential for conflict between the ecological scales needed to successfully apply the biomass approach to aboriginal exemptions and the political factors determining where those exemptions apply. No aboriginal communities enjoy exemption rights absolutely everywhere, and political factors are necessarily used to define the limits. Canadian aboriginals, for example, do not enjoy exemption rights in the United States or Australia. Within Canada, the potential reach of exemption rights is determined in some cases by treaties, in others by traditional hunting and fishing areas, and in still others by provincial boundaries. The exemption-rights zones thus established are almost always much larger than the ecologically based management scales suggested by science. Policy must thus resist the temptation to conflate politically defined exemption-rights zones and ecological management zones when applying exemption rights.

If, because of such conflation, exemption rights are allowed to persist in an ecologically relevant locality where a species is threatened because that species is sufficiently abundant to sustain a harvest elsewhere in the exemption-rights zone, the local population of the species may be subject to overexploitation. For example, the fact that the NRTA allows Indians to hunt and fish “for food” on public (and some other) lands throughout each of the Prairie provinces need not mean that they can harvest a species anywhere in that substantial zone just because that species may be legally taken somewhere within the zone. Alternatively, if conservation concerns in one locality demand that even aboriginal harvest must cease throughout the political jurisdiction, then harvest opportunities may be lost in places where carefully regulated hunts could be sustained. Clearly, the distinction between more and less numerous species on which the biomass approach to exemption rights depends should be applied at appropriate ecological rather than political scales. Again, the Alberta Court of Appeal’s *Lefthand* judgment moves in this direction, maintaining that a treaty right to hunt “throughout” a specified area did not mean that every treaty Indian can “hunt or fish everywhere” within the area. Restrictive regulations would apply in some locations as long as harvesting was reasonably available nearby (*Lefthand* 2007, para. 101).

One beneficial result of this ecologically scaled biomass approach to aboriginal hunting and fishing rights may be to allow species requiring regulation to be managed for maximum sustainable yield by all hunters and fishers, operating under the same rules. Advanced adaptive management techniques make it more possible than ever before to maximize human harvest over the long term (Conn & Kendall 2004; Nichols et al. 1995). However, harvest-maximizing models are highly sensitive to a number of factors—e.g.

age-sex structure of animals killed (Jensen 2000) – which must be carefully regulated to optimize the annual take. Moreover, all major factors affecting mortality or growth, such as non-human predation (Nilsen et al. 2005) and seasonal and environmental variability (Xu et al. 2005), must be incorporated into the models. Poorly estimated parameters can greatly diminish the usefulness of model predictions. Estimating non-human ecological parameters is difficult enough; harvest by unmonitored, exemption-empowered human predators exacerbates the issue. Estimation difficulties that compromise models intended to maximize harvest are easily overcome in the human case by the implementation of regulation and monitoring. Using this information to improve long-term yields is beneficial even if aboriginal subsistence harvest is the only management objective. As Justice Slatter put it in *R. v. Lefthand* (2007, para. 88), an overly dogmatic insistence of aboriginal exemptions “is not in the interests even of the aboriginal hunter.” The aboriginal “right to hunt for food,” he observed, “is a communal, multi-generational right that must be protected in the long term, and thus must be managed.”

Conclusion

Contemporary ecological science confirms that unmanaged predation by even small numbers of subsistence predators (human or non-human) can destabilize local ecosystems by significantly threatening particular prey species. The destabilizing phenomenon of strong prey selection or specialization occurs among non-human generalist predators and is extensive among their human counterparts – aboriginal and non-aboriginal alike – for cultural and “thrill-of-the-chase” reasons. Management is needed to counteract the resulting threats to less numerous species that are

disproportionately harvested by predators. Accordingly, the policy of aboriginal exemption and priority is best understood at a biomass level, with regulatory exemptions applying only to the more abundant species that can readily sustain the extra harvest occasioned by “for food” and “moderate livelihood” exemptions. Less abundant species would be subject to advanced management regimes, without exemption, in order to prevent population decline and ensure a maximum sustainable yield for both aboriginal and non-aboriginal hunters and fishers. Because “more” and “less” abundant are relative terms, varying with local circumstances, this biomass approach needs to be applied at ecological relevant scales within politically defined exemption-rights zones. In *Lefthand* (2007), the Alberta Court of Appeal established something like this approach as the law in Alberta, situating its judgment squarely within the Supreme Court’s jurisprudence. It is beyond the scope of this essay to assess the jurisprudential adequacy of the Alberta court’s decision. We note only that, while the three participating judges wrote separate opinions, none dissented on the result or preferred the blanket approach to aboriginal exemptions to the ecologically scaled biomass approach. Will the welcome conjunction of science and policy represented by this Alberta development persist in that province and spread to the rest of Canada? That question awaits an answer by the Supreme Court of Canada.

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