CREE TRADITIONAL ECOLOGICAL KNOWLEDGE AND SCIENCE: A CASE STUDY OF THE SHARP-TAILED GROUSE, *Tympanuchus phasianllus phasianllus*

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Abstract/ Résumé

This paper attempts to evaluate the validity of Indigenous knowledge using the Sharp-tailed grouse as a test case. It shows that Cree traditional ecological knowledge is factual and often quantitative in nature. Limitations exist in the distinction between observations and interpretations. Traditional ecological knowledge can be added to data bases and can facilitate resource co-management.

A travers une étude particulière de la gelinotte à queue fine, l'article examine la validité des connaissances autochtones. Il montre que les connaissances écologiques traditionnelles des Cree sont basées sur les faits et elles sont souvent de nature quantitative. Il y a des limitations dans la distinction entre l'observation et l'interprétation des faits. On peut ajouter les connaissances écologiques traditionnelles à la banque des données et cela peut faciliter la cogestion des ressources.

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Introduction

Recent events such as the Sparrow decision in British Columbia have forced First Nations and government agencies to consider alternative resource management strategies (Berkes, 1994). Co-management has been suggested. This strategy ideally amalgamates local-level management systems with state-level agencies (Berkes, 1994). State-level management is based upon scientific data while local-level management uses traditional ecological knowledge. Traditional ecological knowledge can be defined as:

> a cumulative body of knowledge and beliefs, handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment (Berkes, 1993:3).

Further, the medium through which transmission of this knowledge occurs is oral in nature (Colorado, 1988).

The legitimacy of oral traditions has recently suffered a set-back as illustrated by the land claim case of *Delgamuukw v. British Columbia* where ChiefJustice Allan McEachern questioned the literal truth of oral testimony given by Elders and the Gitksan and Wet'suwet'en hereditary Chiefs (Cruickshank, 1992). This belief that oral traditions are not objective and factual is not limited to the judicial system but is also evident in the scientific community (see, for example, Doubleday, 1993; Greer, 1992; Usher, 1993). If co-management is to work effectively, it must be shown that traditional ecological knowledge has "scientific" merit, being in some sense "factual" rather than just anecdotal. Adding to this, Johannes (1993:36) states that

> A flagrant deficiency in much of the literature describing traditional ecological knowledge is the absence of any effort to determine its validity...So how does one gauge the reliability of one's informants? I ask a series of relevant questions to which I already know the answers. I also ask a series of questions that sound plausible but to which the informant could not possible know the answers. An unequivocal 'I don't know' in response to the latter provides some assurance that the information given by the informant will be reliable.
>
> Because even the best experts are sometimes wrong, it is useful to differentiate between observation and interpretation. While observation of natural phenomena may be acute, the conclusions drawn from them may not be accurate.

In this paper, I examine the validity of Cree traditional ecological knowledge through a case study of the Sharp-tailed grouse. The methodology used in

this study is similar to that described above by Johannes (1993), and will be discussed in detail later.

Study Area

The western James Bay region of northern Ontario is a dynamic system of wetlands and muskeg. This region is populated by Native Canadians (Cree) who inhabit seven communities: New Post, Moose Factory, Moosonee, Fort Albany, Kashechewan, Attawapiskat and Peawanuck. Fort Albany was chosen as the focal community for several reasons including the ready availability of accommodations (accommodations are more difficult to secure in other communities), and the fact that I have worked extensively with Fort Albany First Nation on other projects and found community support to be high, a factor which is essential when conducting research in the north and in First Nation communities. As well, Fort Albany is geographically remote as it is a fly-in community. The residents still speak Cree predominantly and live a more traditional lifestyle than more southern, western James Bay First Nations such as Moose Factory.

Methodology

The participants in this study were not chosen randomly. As Colorado points out, "all Elders have life experiences to share but some have specialized training and knowledge" (1988:56). The seven Elders from Fort Albany who were identified and agreed to participate all had extensive bush experience. Demographically, the participants consisted of six males and one female. The average age was 70.4 years with a range of 56 to 84 years.

The methodology employed was similar to that described by Nakashima (1993). Semi-directive interviews (with interpreters) were held from May to October, 1995, to collect data concerning the Sharp-tailed grouse in terms of a series of related ecological topics such as habitat, diet and reproduction.

The 8harp-tailed grouse was chosen as the study case for several reasons, including the fact that northern Sharptails are indigenous to the region and knowledge of the general biology of this bird could not have been extracted by the participants from such sources as television and books. As well, Sharptails are of interest because, during the breeding season, males of the species show gregarious behavior and form aggregates called *leks.* A *lek* has been defined as a mating arena devoid of any resources (e.g., food, nesting sites) where moles establish territories to form an aggregate and females of the species visit for the sole purpose of mating

(Bradbury, 1977; 1985). Females have an opportunity to select a mate and males offer no parental care in the pre- and post-copulatory period (Bradbury, 1977; 1985). The biology of this type o1grouse species is quite unique. Thus, factual knowledge or lack of knowledge can easily be ascertained through a series of semi-directive questions during an interview process. All the answers of the participants were compared to what is known in the scientific literature for northern sharptails (and related subspecies when information was not available for the Ontarian species) to assess the validity of the answers.

Habitat

The range of the Sharp-tailed grouse is quite large, extending from western Quebec to Alaska and south to northern portions of the western and central regions of the United States of America (Hanson, 1953). There are six subspecies of Sharp-tailed grouse with the one of interest in northern Ontario being designated *Tympanuchus phasianellus phasianellus* (Peterle, 1954).

Sharp-tailed grouse generally inhabit open areas (Hamerstrom, 1939; Hamerstrom and Hamerstrom, 1951) with northern Sharptails living in regions of muskeg. Muskeg habitat has been described by Hanson (1953) as large areas covered by innumerable bodies of water and floating vegetation dotted with small blocks of stunted timber, usually tamarack, willow and black spruce. All participants correctly stated that Sharptails live in the muskeg of the region. Further, they all correctly answered that the birds roost (sleep) in snow burrows in the winter and spring (Snyder, 1935; Marshall and Jensen, 1937; Evans and Moens, 1975) and in shrubs in the fall and summer (Snyder, 1935).

Interesting answers were given to the question of whether these birds migrate in a similar fashion to geese and ducks. Five of the respondents said that there was no migration, however, two individuals suggested that although there was no "true" migration there was gradual movement In the north-south direction. The scientific community is in agreement that there is "no obvious north-south movement which can be interpreted as a marked climatic change of residence" (Snyder, 1935:14), but there is a migration, although it is "not migratory in the usual sense of the word" (Hanson, 1953:235). The fall movement that concentrates sharptails is probably the result of seeking heavier timber cover in advance of the winter" (Hanson, 1953:239). This type of seasonal movement is quite unique in birds.

Diet

Although Snyder (1935) has reported that emigrating Sharptails from northern Ontario mainly ate material from the paperbirch, Tsuji et al. (1995) found that during the winter and spring, sharptails mainly consumed material from tamarack and willow. The answers of the Elders were in agreement with Tsuji *et al.* (1995) in that the birds mainly ate tamarack and willow in the winter and spring.

During the summer and fall period, the diet typically consists of berries, grasses and Arthropods (e.g., insects, spiders and millipedes) as reported by Peterle (1954) and Mitchell and Riegert (1994). The Elders were in agreement with this assessment.

Morphology

Sharp-tailed grouse are cryptic in colouration (Johnsgard, 1983). Gross differences between male, female and yearlings are related to the adult male being larger in body size compared to yearlings and females (Christenson, 1970; Johnsgard, 1983; Tsuji, Koslovic, Sokolowski and Hansell, 1994). Adult males can also be distinguished because they possess well developed supra-orbital combs (yellow feathers above the eye area) and cervical apteria (purple areas of bare skin in the neck region) (Peterle, 1954; Gratson, 1989).

On a fine scale females can be distinguished by characteristics of the central tail feathers (females, transverse pattern; males, longitudinal pattern) and the pattern of crown feathers (females, alternating buff-coloured and dark cross-bars; males, dark with buff-coloured edging) (Snyder, 1935; Henderson *et al.,* 1967). Adults and yearlings can be classified according to differences in feather characteristics (Ammann, 1944; Caldwell, 1980).

All the Elders make use of gross differences in body mass to differentiate between males and females. Four Elders use both supra-orbital comb development and the presence of highly coloured esophageal pouches as further cues, while the other three use only one component (supra-orbital comb or cervical aptera).

Although all the Elders were familiar with the internal organs of the bird, four participants responded they did not know when and how the reproductive system of the sharptail changed during the year. The three individuals that responded in the affirmative, stated that during the spring (April-May). the reproductive organs of both the males and females become visible, growing in size. In birds, both male and female reproductive organs are internal, so that answering this question requires a detailed knowledge of the internal anatomy of the grouse as well as familiarity with their mating

time sequencing. An examination of the scientific literature establishes the validity of the answers when it is noted that testis size increases from late March to a maximum size in late April (Evans, 1961; Nitchuk and Evans, 1978; Tsuji et al., 1992). A similar trend has been observed in the field for the female reproductive tract (Tsuji, unpublished data).

Breeding Season

As stated earlier, during the brooding season, male sharptails aggregate in territories to form what have been called leks. On the leks, males engage in courtship display rituals that have been termed "dancing". Information pertaining to sharptail dancing behaviour is very specific and is thus a good indicator of the validity of traditional ecological knowledge.

Males begin to dance in late March and typically continue to do so until early June (Marshall and Jansen, 1937; Kermott, 1982). Dancing also occurs during the autumn on an infrequent basis (Hamerstrom and Hamerstrom, 1951; Kermott, 1982). Five of the Elders noted that the dancing period started in March and ended in May. The other two Elders stated that the dancing period extended from March to June. Only one Elder confirmed that sharptails also danced in the autumn.

On a daily basis, it is known that the birds begin to dance just prior to sunrise and end approximately three to four hours later (Lumsden, 1965; Kermott, 1982). Later in the breeding season, dancing at the lek is known to also occur in the evening approaching sunset, but on a less regular basis (Marshall and Jensen, 1937; Schiller, 1973; Kermott, 1982). Elders were in agreement that sharptails begin to dance just prior to sunrise and dance for a few hours in the morning. Only two people stated that the birds also danced in the evenings.

An interesting phenomena associated with the dancing of the Sharptailed grouse is that they dance in the same location within and between years (Evans, 1969; Kermott, 1982; Gratson, 1989). Even if the birds are disturbed while they are dancing, they will return the same day to dance again (Rippin and Boag, 1974). If the weather is too harsh, that is too cold, snowing or windy, the birds do not typically dance (Lumsden, 1965). Only unusual circumstances such as flooding or snowstorms will result in a change in lek location (Tsuji, 1992).

All Elders agreed that birds dance at the same lek within years. Furthermore, five Elders stated that birds will come back the same day to dance if they are disturbed, with one Elder saying that the birds would not return until the next day. This last answer can be explained by examining the answer of another Elder who stated that the birds would return in the

same day only if disturbed early in the dance period. If disturbed later in the dance period, the birds would not return until the next day (I have verified this observation in the field). All Elders agreed that the lek is in the same general location year after year. They also stated that the birds dance only on nice warm days, not when it is too cold, windy or snowing. Four Elders stated that the lek will move if the area becomes too wet to dance. The other three Elders stated that leks typically do not move because they are situated on knolls in open areas and are therefore unaffected by flooding. Symington (undated) agreed that leks are situated in open areas usually on knolls.

It should be emphasized that only males dance at leks (Tsuji, Koslovic and Sokolowski, 1992; Tsuji, Koslovic, Sokolowski and Hansell, 1994) and the number of males in attendance averages 8-12 birds with a range of 3 to 30 birds (Johnsgard, 1983). However, Symington (undated) has reported leks of up to 100 birds. Six Elders responded that only males danced while one answered that he did not know which sex danced. The ranges of birds usually found at a lek were given as: 10-15; 10-20; 10-30; 15-20; and 20-30. One Elder said that the smallest lek he has encountered consisted of two birds and the largest 50 birds. Another, Elder stated that when he was young, he saw leks that contained up to 100 birds. These observations are in general agreement with the scientific literature.

The mating dance of the Sharp-tailed grouse is quite complex, consisting of many components including tail-rattling, foot stamping, esophageal pouch inflation, supra-orbital comb extension and so on (Lumsden, 1965; Hjorth, 1970). Allowing for the fact that all the Elders correctly described specific aspects of the dance, only two individuals gave a detailed account of the dance. Three Elders knew that the dance had something to do with reproduction, while the other three answered that they did not know. One answered that maybe it had something to do with mating.

Parasites

All Elders answered that they have not found ectoparasites and endoparasites associated with the Sharp-tailed grouse. Tsuji *et al.* (unpublished data) have found in the specimens they have examined that the only indication of endoparasites present in the sharptails were in the form of nematode eggs (that could only be detected microscopically). Further, Tsuji *et al.* (unpublished data) have shown that the distribution of ectoparasites (lice) on male Sharp-tailed grouse is overdispersed, that is, most males have a few ectoparasites and most ectoparasites are on a few males. Lice have also been reported on sharptails in several other studies (Emerson,

1951; Peterle, 1954). Moreover, Snyder (1935) also found few lice on Sharp-tailed grouse with an absence of parasitic worms being evident.

Nesting

Female Sharp-tailed grouse establish nests on the ground near the base of trees or shrubs (Peterle, 1954; Christenson, 1970; Schiller, 1973). Females lay on average 12 lightly spotted eggs (Schiller, 1973; Johnsgard, 1983). The female alone incubates and looks after the precocious young (Johnsgard, 1983). Only one Elder did not know that sharptails are ground nesters. Four Elders answered correctly that 10-12 speckled eggs are typically found in the nest, while three answered that they did not know the answer. Three Elders stated correctly that the female alone cares for the eggs and young, two answered that they did not know, and two answered incorrectly that females and male take turns.

Hunting Practices

One participant answered that he usually did not hunt sharptails because he always had lots to eat (e.g., moose) during the spring time and that the geese were coming. He hunted sharptails only when he needed food. The other six Elders stated that they typically hunted (3 people) and snared (3 people) sharptails during the spring dancing period and only shot enough to eat. The reason they gave for not killing all the birds on the lek relates to their views on conservation and sustainability. If no birds were left, there would be no birds at that lek the next season. It has been found that older males are important during the autumn recruitment of yearlings to the lek (Johnsgard, 1983). All six Elders were in agreement that once the geese and ducks arrive, they no longer hunt sharptails.

Discussion

Johannes (1993) suggests that to successfully determine the validity/reliability of traditional ecological knowledge, a series of questions must be asked to which the interviewer already knows the answer. Also, questions must be asked where the participant should not know the answer, and should answer 'I don't know' (Johannes, 1993). In this study, it is clearly shown that Cree traditional knowledge (with respect to the case study of the Sharp-tailed grouse) is factual (when taken as a whole) when compared to the scientific literature. Although there were some incorrect answers, these abberations may be viewed more as interpretative mistakes rather than fault in observation (Johannes, 1993). Traditional ecological knowl-

edge was shown to be more quantitative in structure than previously believed although the qualitative nature of it was apparent, Further, some assurance that the data collected was reliable is evident from the 'I don't know' answers for several of the questions. Moreover, the one Eiderwhose knowledge of the Sharp-tailed grouse was extensive although he rarely hunted them, illustrates Berkes (1993:4) assertion thai Indigenous "people do possess scientific curiosity, and that traditional knowledge does not merely encompass matters of immediate practical interest'.

It should be emphasized that although traditional ecological knowledge is important in its own right, it cannot replace western science. However, traditional ecological knowledge can be used as a starting point (or can be added to existing data bases), to help facilitate the direction and approach western science takesto a resource management problem. As Nakashima (1993:103) astutely points out:

> For many Arctic species, severe deficiencies in scientific knowledge...are not the exception but the rule. Wildlife managers nonetheless make decisions and take actions based upon deficient scientific data, declaring for the time being it is the only information available. In so doing, they choose to ignore the traditional ecological knowledge of Native peoples.

This type of attitude will have to change before co-management can be viewed as a viable alternative to traditional government-based strategies. Lastly, it should be stressed that "for many species of Arctic wildlife, traditional ecological knowledge far outstrips current scientific knowledge" (Nakashima, 1993:108).

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