

Who Knows? On the Importance of Identifying ‘Experts’ When Researching Local Ecological Knowledge (LEK)*

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Abstract

Documenting local ecological knowledge (LEK) has recently become a topic of considerable interest within the social research, development, and indigenous rights communities. For instance, LEK is thought to offer a substantial alternative to existing, largely 'top-down', natural resource management regimes. LEK informed resource management systems would acknowledge peoples' experiences and priorities, while also providing people with additional means of empowerment. Given these qualities, one might reasonably expect that rigorous design and methodological attributes will characterise LEK research, particularly respecting the procedures employed to identify and to select 'local knowledge experts'. Our review of the recent social research literature suggests that insufficient attention is given either to reporting the methods employed or to employing systematic approaches, especially with regard to the critical issue of

how local experts are identified. We detail a research design that systematically solicited *peer recommendations* of fisheries local knowledge experts in a study focused on two Northeast Nova Scotian embayments. Finally, we argue that in order to achieve the stated purposes and potentials of LEK research, researchers need to become more attentive to reporting on the methods employed and to employing systematic approaches than is currently the case.

Key Words: local ecological knowledge, research methods

Introduction

During the last two decades interest in what is variously termed "traditional", "indigenous" or "local" ecological knowledge has increased by leaps and bounds. Formerly the preserve of ethnobotanists and cultural ecologists the field is now dominated by those interested in the indigenous rights movement, in 'grassroots' approaches to development and in 'community-based' and 'co-management' approaches to resource management (Berkes 1999, Ellen *et al.* 1997, Grenier 1998, Inglis 1993, Johnson 1992, Sillitoe 1998, Usher 2000, Williams and Baines 1993). A growing number of researchers are also calling on government regulatory agencies to integrate local with 'scientific' knowledge in a number of resource areas, notably agriculture (Bellon 1995, DeWalt 1994, Sillitoe 2000) and fisheries (Johannes 1998, Neis *et al.* 1999a). The fact that these voices are now

being heard reflects, to a large extent, the widespread concern that exists respecting the social and economic sustainability of natural resource-based livelihoods throughout the world (Blaikie and Brookfield 1987, McGoodwin 1990, Meadows *et al.* 1992, World Commission on Environment and Development 1987).

This set of concerns has resulted in a search for ways and means to provide the peoples most directly dependent on natural resources with the capacity to assume more direct control over local resource management. This search has involved, on the one hand, a heightened interest in the political and institutional structures necessary for local resource management (Berkes 1989, Bromley 1994, Brush and Stabinsky 1996, McCay and Acheson 1987, Ostrom 1990) and on the other to methods of documenting and operationalising local ecological knowledge or LEK (Berkes 1999, Charles 2001, Dyer and McGoodwin 1994). In this paper we are primarily concerned with what appears to be one of the more problematic aspects of LEK documentation to date, namely the lack of attention to methodology, in particular the issue of how local knowledge ‘experts’ are identified and selected. The LEK research focus has proceeded on the basis of several presumptions. To begin with, livelihood dependencies embedded within specific localities are assumed to result in a very intimate relation between people, the environment, and natural resources. The closeness of the relations and dependencies is such that

people so engaged form from their experiences, needs and observations a very particular and detailed knowledge of local environmental conditions and ecological relations. The resulting knowledge system, often characterised as a way of knowing that is distinct from Western science, is presented commonly as embodying many attributes and qualities. These may range from the essential knowledge critical to harvesting naturally occurring resources successfully, through complex understandings associated with resource occurrence and distribution with reference to much broader environmental and ecological contexts and dynamics, to cultural beliefs and social institutional systems that characterise core aspects of human – environment/resource relations as ‘sacred’ (Berkes 1999). Whether entirely or partially evident, these attributes are presumed to take form in a unique and essential knowledge system respecting many of the things that matter for people who derive the basis of their living and being from within local environmental and ecological settings.

Another common presumption within LEK research is that the ‘knowledge system’ at issue is one that has been developed over generations of experiences and observations within very specific settings. Further, the richness associated with the knowledge system presumes accumulated experiences within and relations with ‘nature’ and naturally occurring resources. As a result, this knowledge is commonly associated with persons of advanced years and deep

experiences, i.e., elders within the local social community.

Further, much of the research presents and represents local knowledge as an epistemological system separate and unique from all others, particularly that of Western science. Acknowledgement of LEK systems is presumed as critical to fostering the development of respect for what people know and, as a result, do within local natural environmental and ecological settings. This condition, in turn, resides at the heart of developing alternative approaches to natural resource management that will include, if not be entirely based upon, LEK. Presumed here is the capacity of LEK to be translated practically and fundamentally into alternative approaches to relations with and management of naturally occurring resources. It is reasoned that these approaches would necessarily be much more sensitive to and inclusive of LEK, thereby embodying local practices, concerns, priorities, and sensibilities. They would also move to provide peoples and communities with a much greater capacity to self-direct and self-manage, thereby empowering them through provision of control over core factors in their lives and livelihoods.

These qualities underscore the reason why LEK has become a significant touchstone in recent years for development agencies and initiatives concerned with being 'human-centred' and, especially, respectful of indigeneousness. The indigenous rights movement has gained a strong voice within various UN forums

and agencies, especially those concerned with the issue of sustainable development. There are numerous references to “indigenous knowledge” in documents arising out of the Rio Summit and UN agencies such as UNESCO and FAO and affiliated organisations such as IUCN have been actively involved in promoting and facilitating the documentation of indigenous knowledge and its application in resource management, development planning and impact assessment contexts (Berkes 1999, Campbell and Salagrama 1999, Grenier 1998, Higgins 1998, Inglis 1993, Johannes 1989, Posey and Dutfield 1996). A large number of national agencies in countries throughout the world have been engaged in similar work (Berkes 1999, Sillitoe 2000). In Canada, as one example, federal government policy requires that traditional ecological knowledge be considered in impact assessment studies (Usher 2000).

While acknowledging that LEK potentially offers much with regard to developing alternative proposals for effective approaches in natural resource management that include and empower local people, certainly few would dispute the view that this potential is only realisable through a process that will, first, carefully and thoroughly document LEK systems. In this essay we consider a variety of conceptual and practical issues associated with documenting LEK. Drawing on our experiences from a study of LEK within two Northeastern Nova Scotian coastal fishing communities, we illustrate several fundamental issues and

challenges associated with researching LEK. In our view it is essential to design and conduct LEK research in a manner most likely to produce research results that will thoroughly represent the breadth, depth and comparability of LEK, while positioning the research outcomes to withstand rigorous public inspection. These two qualities are essential to a thorough understanding of LEK, to the prospect of successfully proposing LEK as a cornerstone in natural resource management, and to the possibility of substantially and sustainably empowering local peoples. In fact, we are convinced that anything less in LEK research will achieve little but discredit for social research and fatally compromise the ability of local people to achieve voice and agency.

Certainly an essential issue in LEK research concerns the means by which local knowledge experts are identified. This goal must be a critical initial focus of LEK research design since not all persons within local settings are of similar stature in terms of the substance and character of their knowledge. A second, equally critical, issue must concern specifying the parameters and nature of the experiences and understandings under investigation. Several key questions come to mind. What are the attributes constituting local ecological knowledge and what attributes is the research intended to document? For instance, how widely must statements, experiences and descriptions be shared within a community in order to be considered attributes of the local knowledge 'system'? While the knowledge

that is unique to a single individual may be as sound empirically as knowledge that is widely shared, it cannot be considered representative of the knowledge system as a whole and is not likely to inform social behaviour as it relates to resource use. Such knowledge, sound as it may be in its own right, may well be discounted as mere ‘anecdotal’ evidence if presented in a resource management setting where final decisions are made by external regulatory agencies.

This is not to argue that LEK should be represented in management settings as an entirely uniform ‘system’. Clearly, knowledge and the vested interests that inform it will vary from individual to individual in any setting. It is also true that important components of ‘local’ knowledge systems are not always unique to the ‘local’ setting but have arisen as a consequence of ongoing regional and global exchanges of ideas and people. But certainly few would insist that LEK is best approached as expressive of and embedded within only individual experiences, observations, practices and understandings. Understood in this manner, LEK would be no more than an expression of individual experiences and perceptions that begin and end within the individual’s lifecycle, expressing little, if anything, about the richness and depth of human community and its relations with and understandings of the local environment and ecology. Such a view would necessarily deny LEK’s historical and cultural core.

Of course, LEK generally *is* posited to be a socially- and culturally-rooted

‘knowledge system’. As such, one of its greatest strengths is that it is dynamically mutable in so far as it has the capacity to incorporate each new generations’ experiences, understandings, and needs, thereby remaining current and vital. Certainly political economic and historical processes may erode or even destroy the currency and extent to which LEK systems continue to ‘live’ within cultures, peoples, communities, and localities. Debased as primitive knowledge and often pushed into the most peripheral areas of social life, the residuals and remains of many LEK systems are found only in the memories and worldviews of communities’ elders and wise persons.

This essay continues with a selective overview of recent research literature on local ecological knowledge. Here we focus on highlighting the reported attributes of research design and methodologies with a view to discerning the extent to which LEK is documented through reliable and representative work with ‘local ecological knowledge expertise’. Following this we describe the research design and methodologies being employed in a study of LEK among Northeastern Nova Scotian small boat fish harvesters. This presentation emphasises the reasoning underscoring the design and methods described. Following this is a review of the results with regard to the identification of local knowledge experts. Our essay concludes with a discussion of the implications of our findings for the design and conduct of LEK research. Here we also consider the importance of research

design and methodology with respect to describing and presenting local knowledge in a manner that will withstand public scrutiny and, thus, potentially contribute to empowering local knowledge within natural resource management systems.

An Overview of Research Design and Methodology in Recent LEK Literature

Paul Sillitoe (1998:223) has argued that the current focus on local knowledge systems signals nothing less than "the next revolution in anthropological method". Emphasizing the widespread support that now exists for "grassroots participatory" approaches to development, Sillitoe proposes that anthropologists, in particular, are well positioned to contribute to this research agenda. A careful review of the most recent literature indicates, however, that social researchers are focusing far less on "method" than on the many epistemological, ethical and property rights issues associated with the study of local knowledge systems. Even when reporting the results of specific case studies, many researchers fail to provide detailed descriptions of their methodologies. This is particularly true when it comes to the issue of how researchers identify the local knowledge "experts" with whom they work. This absence of discussion impedes the development of methodologies sophisticated and rigorous enough to withstand the level of scrutiny to which they

will be subjected within applied resource management and development settings. Table 1 summarizes the extent to which recent journal articles concerning local ecological knowledge include descriptions of how local knowledge experts are selected. These articles were identified through library database searches using the terms “local (ecological) knowledge”, traditional (ecological) knowledge”, “indigenous (ecological) knowledge” and “ecological knowledge”. The resulting bibliography was then screened in order to determine which publications were focused on specific case study materials rather than on more general theoretical and conceptual issues. Only case study publications were retained in the final sample with the exception of one article which was included because of its explicit focus on TEK methodology (Usher 2000). This approach ^[1] was taken in order to ensure that only publications with a wide readership were included, and that all publications reviewed were ones in which a reader would legitimately expect to find detailed methodological description. The time frame was limited to the past five years, that is 1997-2001, in order to focus on recent publications and thus ensure that the analysis is relevant to the current situation.

A general lack of attention to methodology was revealed, first of all, by the finding that only 22 out of the 65 articles generated in the original database search had a case study or a methodological focus. The ten most cited of these 22 publications are represented in Table 1. They represent a broad cross-section of

geographic settings and resource types including fisheries in Canada (Neis *et al.* 1999a), Sweden (Olsson and Folke 2001) and West Africa (Poizat and Baran 1997), forests in India (Robbins 2000), mangrove forests in Mexico (Kovacs 1999), mountain ecosystems in India and Canada (Duffield *et al.* 1998), wind erosion and agriculture in the Sahel (Biielders *et al.* 2001), arctic tundra caribou (Ferguson and Messier 1997), beluga whales in Alaska (Huntington 1998), and mining impact assessment in northern Canada (Usher 2000).

[Table 1 about here]

Nine of the ten publications listed in Table 1 do provide at least a minimal description of the methodologies they employed during their fieldwork (see column 1). A ‘minimal’ description was considered to include the following four components: 1) an account of why the research was being carried out and whether it was directed towards issues of resource management, development planning or other purposes; 2) an account of the time period during which research was carried out; 3) a description of the research instrument(s) used to gather information (i.e. semi-structured interviews, questionnaires, telephone surveys, participant observation); and, 4) an account of the number of individuals included in the study in comparison to the total population of the communities and/or

resource-user groups involved.

Only four of the ten case studies represented in Table 1 provide a detailed account of their methodologies (Ferguson and Messier 1997, Huntington 1998, Neis *et al.* 1999a, Olsson and Folke 2001) and only three provide a description of how local knowledge experts were selected. Olsson and Folke (2001) based their selection on the responses of a large sample of resource-users. Neis *et al.* (1999a) employed a snowball technique together with referrals from local resource-user associations while Ferguson and Messier (1997) based their selection on referrals from local associations or from one or more community *peers*, that is other locally resident resource-users.

In the Olsson study, which set out to document the knowledge of crayfish harvesters in Sweden's Lake Racken area, the researchers began by identifying a "focus group" of 73 households with fishing rights assigned to their properties. These are the only individuals in the area with the right to harvest crayfish. The 73 license holders were then asked to participate in a survey. During the survey they were asked to identify those harvesters they considered "especially knowledgeable about crayfish and their management" (Olsson and Folke 2001:90). The authors also reviewed the records of the local fishing association in order to identify those who consistently held leadership positions within the association and therefore played a strong role in crayfish management. This

process resulted in the identification of ten key informants who subsequently participated in in-depth interviews.

Although Olsson and Folke took a systematic approach to selecting their local knowledge experts, their published account does not describe the sample group in terms of how many peer recommendations were considered sufficient to qualify them as "experts". Further, they do not specify the relative weight given to peer recommendations as compared with leadership roles in the association. Nor is any discussion provided with respect to the extent to which those identified as "knowledgeable" were also association leaders. The absence of such discussion is not evidence that the authors failed to consider these issues carefully during their study; but, readers engaged in comparable research projects would benefit from more complete accounts than those provided. The approach taken by Olsson and Folke is, nevertheless, far more systematic and comprehensive than those generally reported in the literature.

Neis *et al.* (1999a) report using a snowball sampling technique to select local "experts" in a study conducted among fishers living along the northeast coast of Newfoundland. For the most part the researchers concentrated their efforts on skippers with long fishing careers who were considered to be "especially observant" and who kept detailed records. In one area Neis *et al.* (1999b)^[2] also selected interview subjects from among those recommended by the local

fishermen's union, with the final sample selection being significantly affected by "individuals' availability and willingness to participate in the research" (1999b:227). The authors readily acknowledge the shortcomings of this approach, noting that the small sample size and the "limits of snowball sampling" made it impossible to generalize to the region as a whole (Neis *et al.* 1999a:1951). Neis *et al.* (1999b) address a number of fundamental methodological issues arising out of their own research, including that of sample selection. They also comment on a number of the approaches taken by other researchers. But, they do not address substantively the issue of *who* should be asked to identify local experts, or how much weight should be attached to referrals by a local association as compared with those provided by peers. Relying on Felt (1994), however, they note that "coherent patterns" tend to emerge in the data when the research process includes a sufficiently large number of interview subjects. In this approach the issue of sample size is addressed on the basis of conducting the research so as to achieve a demonstrated 'saturation point' in the collection of local knowledge on any given topic.

Ferguson and Messier (1997)^[3] carried out a study to document Inuit knowledge about Arctic tundra caribou on Baffin Island. A "flexible interview protocol" was developed and pre-tested and used as the key research instrument (Ferguson and Messier 1997:3). Interview participants were selected on the basis of

recommendations from local Hunting and Trapping Associations (HTAs) and local Inuit "advisors". Local experts in the Ferguson study were either elders or active older hunters, partly because elders are generally expected to possess more extensive experience as hunters than younger men, but also because the study was attempting to document long term historical trends in caribou populations and distributions. Unfortunately, as in the case of the Neis and Olsson articles, no details are provided as to the qualifications of those within the local associations who made referrals, or the personal or social characteristics of other "advisors". The authors' discussion instead emphasizes that the research project evolved over a period of many years and involved regular consultation with local HTAs and other community representatives. The implication then, while not explicitly stated, is that a broad consensus existed within local communities as to whom the local knowledge experts were.

Ferguson and Messier (1997:3) state that care was taken in their sample selection to include individuals knowledgeable about all portions of the geographic area relevant to the caribou herds under consideration. They further state that "enough overlap was obtained to evaluate concurrence among informants' observations". They also compared the information gathered from interview participants to published records about caribou populations and movements and report finding a "high degree of concurrence" (Ferguson and Messier 1997:8). They acknowledge,

however, that “logistical constraints inevitably limit the number of settlements and informants that can be included in any study”, and that their data does not represent a “complete picture” of Inuit knowledge about caribou in the region under study.

Ferguson’s and Messier’s approach to sample selection is typical of the approaches taken by a large number of Arctic researchers (Huntington 1998, 1999, Usher 2000, Wenzel 1999, Mymrin and Huntington 1999, Nakashima 1999), an outcome of the fact that TEK research has been underway for a considerable period of time in that region. Arctic researchers, in fact, have been at the forefront of those attempting to develop more rigorous methodologies in this area of study, a finding emphasized by the fact that three of the ten case studies appearing in Table 1 were published in the journal *Arctic*. The research designs employed by those cited above generally involve long term processes of consultation with participating communities and careful attention to ethical and legal issues such as intellectual property rights and the need for obtaining informed consent from all participants (Stevenson 1996, Usher 2000, Wenzel 1999).

Arctic researchers are not exempt from the criticism offered here, however, that too little discussion and debate is occurring in recently published literature about the means by which interview participants are selected. Does the broadly

consultative process many researchers report following truly lead to a consensus among hunters or resource users as to who qualifies as a local expert? What social and political factors within local communities affect their recommendations concerning local expertise and potentially compromise the value of documented knowledge? Are enough people being interviewed to ensure that documentation is as complete and accurate as it needs to be if used for resource management or development planning? These questions must be answered substantially for LEK to move beyond its current theoretical emphasis and become a truly effective tool within resource management settings.

The absence of methodological description is even more striking when reviewing the contents of the most frequently cited monographs that deal exclusively or predominantly with the issue of local ecological knowledge. Of the six case studies described in *Lore* (Johnson 1992) only two authors, Flemming (1992) and Baines (1992) meet the criteria described above as "minimal" methodological description and only Johnson and Ruttan (1992) and Baines (1992) describe how interview subjects were selected in the case studies they describe. Johnson and Ruttan, in a study of TEK documentation among the Dene of the Northwest Territories, report that interview subjects were chosen on the basis of advice from a "steering committee" of six elders. However, no information is provided as to how the elders came to occupy their positions on the committee, how the steering

committee made their decisions, or how many individuals were actually interviewed during the research project. Baines (1992), in a study of the Marovo Lagoon area in the Solomon Islands, states simply that local experts were identified on the basis of referrals from "elders" or other "knowledgeable" individuals in the local communities.

In *Traditional Ecological Knowledge: Concepts and Cases*, edited by Julian Inglis (1993), three of thirteen chapters specifically document the gathering of ecological knowledge on a case study basis (Eythorsson 1993, Hrenchuk 1993, Nakashima 1993) but only Hrenchuk's article meets the criteria of providing either "minimal" methodological description or an account of how the interview sample was selected. Other recent and frequently cited monographs on the topic, or chapters in monographs, also fail to substantively address the issue raised here and some do not even make passing reference to the topic (Berkes 1999, DeWalt 1999, Ellen *et al.* 2000, Felt 1994, Grenier 1998, Mailhot 1993, Sillitoe 2000, Warren 1999, Williams and Baines 1993).

Despite the overall poverty of methodological description in recent literature, several of the articles reviewed in Table 1, and a few of the monographs cited above, do make substantive positive contributions in the area of LEK methodology. In much of the *Arctic* literature, for instance, the cultural embeddedness of local knowledge systems is emphasized as is the need for

researchers to develop methods appropriate to the knowledge system they are documenting. Several authors describe their interview protocols in great detail and also describe the process, sometimes extending over many years, through which their protocol was developed. For the most part these protocols have been developed through a process of collaboration with local associations and the community as a whole, and in most cases they involve the training of community members in research methods. The Arctic literature also reflects the political and institutional realities of the settings they describe, ones in which the rights of indigenous populations in regard to local resources has been the subject of prolonged legal and political battles. In these settings the most immediate purpose of local knowledge research is often to gather data for use in land claims negotiations, impact assessment studies or in court.

The Olsson and Folke article, by contrast, recounts a situation in which crayfish are managed as a common pool resource by local institutions whose management authority is legally recognized and who have a cooperative relationship with regional and national management agencies. The methodology employed in this case allows the authors to describe the way in which local ecological knowledge informs the activities of a local fish management association, thus emphasizing the fact that effective resource management requires effective management institutions as well appropriate ecological knowledge.

The methodologies pursued by Neis *et al.* (1999a) and Poizat and Baran (1997), while applied in very different settings (coastal Newfoundland fisheries in the former and Guinea, West Africa artisanal riverine fisheries in the latter), both facilitate the integration of local knowledge with the types of scientific data typically used by external state management agencies. By gathering local fishers' knowledge about seasonal trends in the abundance and distribution patterns of fish species, and comparing that information to data gathered through fish sampling techniques, Poizat and Baran are able to develop a strategy whereby local ecological knowledge could be used to inform sampling techniques and thereby facilitate a more effective management regime. Neis *et al.*, by documenting and quantifying changes in efficiency and CPUE for Newfoundland lumpfish and cod fisheries over several decades, were able to develop a method by which aggregated local knowledge, rooted in detailed knowledge of specific fishing locations, can be integrated with the large-scale perspective of state management agencies.

It nevertheless remains true, whatever the contributions of the research approaches described here, that the quality and impact of data assembled during LEK research depends to a large extent on who is identified as “knowledgeable” and whether information is gathered systematically from a large enough group of knowledgeable individuals. It is also the case that the resource management

applications of LEK described in the above literature remain, for now, hypothetical. While a strong theoretical case is made for the use of systematically documented local knowledge in resource management settings, none of the recent literature reviewed here actually describes such uses. For examples of applied uses of local ecological knowledge one must either search the ‘gray’ literature produced by government agencies, or rest content with case studies that describe resource management by indigenous groups or local communities, but which don’t involve any systematic documentation of local knowledge. The challenge, now, is to move beyond the seeming preoccupation with theoretical issues, to a substantive engagement with the applied issues that have engendered the ecological knowledge ‘revolution’ noted by Sillitoe (1998). At a minimum this challenge requires that researchers engaged in LEK research describe their methodologies in a detailed manner, allowing other researchers to learn from their mistakes and build on their strengths.

Finding ‘Who Knows’: Research Design and Methodology in Northeastern Nova Scotian Fishing Communities

Research Context and Research Design Needs

Social Research for Sustainable Fisheries (SFSF) ^[4] is a research alliance that operates as a collaboration among university-seated social scientists, two

northeastern Nova Scotian fish harvester organisations and the Paq'tnkek Fish and Wildlife Society based in the Mi'kmaq First Nation's Afton community.

Currently we are engaged in a multi-phase study of local ecological knowledge, this knowledge having been identified as a priority by the three local organisations which view LEK as an avenue through which fish harvester understandings may be more effectively represented within fisheries management forums. Many marine harvesters contend that government-based fisheries assessment science and sampling practices are inadequate in documenting the variations, conditions and trends within micro-environmental contexts that impact directly on fisheries dependent livelihoods. Consequently, fisheries management and regulation are considered, at best, to be insensitive to local conditions, thereby negatively impacting on the capacity of many to realise sustainable and satisfactory livelihoods. For the university-seated social researchers the collaboration presents an opportunity to design and engage in a structured and systematic approach to documenting LEK, while at the same time contributing to the development of social research know-how and capacity within community-based fisheries settings.

From the outset, the partnership agreed that the LEK research must be designed and conducted in a manner that would produce results capable of withstanding rigorous public inspection. This quality is considered critical to providing fishers

and their representatives with research results that offer the greatest likelihood of impacting upon fisheries management and regulations, i.e., of being meaningful and beneficial. The specific interest of the university social researchers in developing a research project of this sort is essentially self-evident. Notably, the community organisations acknowledge and accept the ‘risks’ inherent in partnering in a research process wherein the results may not confirm preferences and presumptions, let alone produce desired outcomes. That is, they recognise that only defensibly designed and conducted research will potentially provide useful, meaningful, and beneficial results.

The first key question addressed was: what might be the most effective way to identify the persons considered to be ‘local knowledge experts’? A review of the literature with a view to isolating effective measures to use in identifying these persons proved to be of limited success. Few clearly describe the means through which they identified local knowledge experts and key informants. Of course this does raise an important methodological issue. On what basis do LEK researchers identify expertise? Surely researchers are not assuming that all persons are equally knowledgeable. Consequently, the first step in conducting LEK research must involve some means to identify the most knowledgeable persons.

A related issue concerns the specification of the knowledge domain or domains under inquiry. That is, those deriving their livelihoods in primary or natural

resource settings will have a wide variety, indeed a lifetime, of experiences and observations. What among these will be of particular importance and interest? Choices have to be made respecting selection and specification of the resources and livelihood-related activities on which the research will focus. In our study, specific fisheries were identified as the foci. These were selected on the basis of their economic importance, both in present day (lobster, herring) and in the recent past (cod, hake, haddock, herring).

A critical feature of domain-focused LEK research concerns developing a design that enables time-sensitive and time-rich data gathering and referencing. Time-referencing is essential to capturing meaningful descriptions of experiences as well as of variations and changes. It is even more important to situate and relate the experiences and observations of local knowledge experts. Local knowledge is presumed here to constitute a 'body' and a 'system' of understandings and know-how that arise through time from a variety of individual and shared experiences and observations, mediated by culture, with regard to environmental factors, behavioural attributes, and ecological dynamics. Locating individual experiences and observations within at least a relative timeframe is critical to associating them, steps that are essential to building the understanding of LEK as a developed and shared 'system' of knowledge. In other words, for it to be a 'system', LEK must be shown to reside in the heads and to arise from the

experiences and observations of more than one person, including those of any one 'expert'. If left unsatisfied, this condition would reduce LEK to no more than the assemblage of an individual's or group of individuals' experiences and observations. While interesting and possibly ethnographically compelling, such would surely not constitute the basis for developing or representing LEK effectively either as a unique knowledge system or as an alternative to existing natural resource management practices.

In order to address this issue we decided to design our research in a manner that would permit us to satisfy the recommendation that a minimum of three independent observations be gathered respecting each particular ecological, environmental, or resource behavioural knowledge claim. Satisfying this standard would provide assurance that each claim is in fact an aspect of the LEK 'system' in so far as the understandings, observations, and experiences related are demonstrably shared within the local setting. Satisfying this standard, however, places even more importance on the means through which local knowledge expertise is identified and characterised. Since not all those identified as experts will agree to participate in the project we concluded that our design would require the identification of a 'pool' of at least five, but hopefully more, LEK experts within each community area. It is expected that this strategy will lead to the participation of a minimum of three LEK experts in each setting. The face-to-face

interviewing process was intended from the outset to be domain-centred with the goal of achieving demonstrable information saturation on a set of specified core questions.

The research is focused around two embayments. St. George's Bay is located on the Gulf of St. Lawrence side of northeastern Nova Scotia and Chedebucto Bay is located on the Atlantic side. Two independent studies have already been completed, one for each embayment. ^[5] The research teams in both instances concluded that they would identify LEK experts through systematically gathering *peer recommendations*. That is, it was decided to simply ask fish harvesters, through a structured survey technique, who they considered to be most knowledgeable about the local fisheries and fishing grounds. We anticipated that this approach would identify those considered by their peers to be most knowledgeable within each locality. Certainly peer referencing is a well-positioned technique with regard to identifying local knowledge experts. After all, what social groups other than livelihood peers would be better able to identify local experts? Additionally, it was recognised that the peer recommendation approach would also provide several names that could be rank-ordered with respect to the number of mentions received, thereby providing a road map for interview sequencing. That is, face-to-face interviewing would begin with the person receiving most mentions. ^[6] Interviewing would proceed down the list of

identified experts until demonstrable information saturation on core questions is achieved, with at least three independent observations recorded for each local ecological or environmental knowledge claim. It was also anticipated that this technique would provide a sufficient number of names to allow us to satisfy the design and methodological need for at least five persons identified within each locality.

[Insert Map here]

Both research sites are characterised by numerous small boat coastal fishing harbours and communities that have been settled for a considerable period of time. The Chedebucto Bay site has been settled by European peoples since the mid-seventeenth century. Pursuit of the fisheries has underwritten from that time to the present-day the area's settlement history, community development, and core livelihoods. In contrast, the large-scale settlement of the St. George's Bay site occurred over a century later with the beginning of the Highlands and Islands Scots compelled relocations. By the mid-nineteenth century over six decades of largely Catholic Scots immigration had given rise to all of the area's coastal communities. From those days to the present the fisheries have occupied a cornerstone place in the peoples' mix of primary livelihoods which also include

farming and woods work. The coastal zone, family-centred and community-based fisheries have been pursued in both St. George's and Chedebucto Bay for as few as six and as many as twelve generations. The vast majority of this generation's fish harvesters are simply the latest in a time rich line of fishing peoples and families. Small boat, coastal zone fishing is, indeed, a livelihood 'tradition' in both of the research settings. This definitive social quality is illustrated by the fact that over three in every four of those interviewed in Phase 1 of this study noted that, at a minimum, their fathers and fathers' fathers either fish or fished for their living. Many described family involvements in the fisheries that are lineally and collaterally multi-faceted. These social attributes underscore the fact that people settled in specific localities within each of the sites have a deep and rich historical relation with the coastal environment and ecosystem. Of course, meeting livelihood needs resides in the heart of this relation, as it does for all other peoples dependent upon natural resources. As with others, it is reasonably safe to assume that these people have come to know, through time and as a consequence of need and experience, the local environmental and ecological factors that are most pertinent to successful fishing.

In addition to the fact that both sites feature long-settled communities with a socially rich family-centred fishing tradition, a couple of current attributes featured prominently in the research design. Firstly, marine harvesters in both

areas are economically dependent on the returns from a high value coastal zone lobster fishery. Secondly, participation in the lobster fishery is strictly regulated through a federal government limited entry licensing fisheries management system. Given these attributes, those fishing lobster were selected as the primary focus in the initial phase of the research, expecting that most will also be involved in the sites' other major fisheries. ^[7] A comprehensive list of current lobster license holders was obtained, identifying 304 license holders in the St. George's Bay region and 211 in the Chedebucto Bay area.

After considering all factors, a telephone survey approach was selected as the most time and resource efficient means to proceed through Phase 1 of the anticipated research process. A random sample of 174 license holders, stratified by harbour, was selected for the St. George's Bay region (Pictou, Antigonish, and Inverness County). ^[8] Of these, 127 (73% of the total) completed interviews.

Since there are only 211 license holders in the Chedebucto Bay area (Richmond and Guysborough County), we decided to include all of these persons in the initial survey. Of these, 159 (75.4% of the total) completed interviews. These response rates provide considerable confidence that the resulting information is representative. ^[9] The interview solicited information on a variety of family background and fisheries-related matters before requesting up to three names of

persons, other than the participant, considered to be particularly knowledgeable about the local fisheries and fishing grounds. ^[10] In addition, the interviewee was asked whether the person recommended is currently fishing or retired. Further, on the basis of a set list of attributes, the participant was asked to specify how they had come to know each of the persons named. ^[11]

In our view, the technique described here could be easily included in most standard field research that begins with household census, interviews with local notables such as community leaders and representatives, and informal conversations with initial key informants and other early contact persons. The point is to design the research so that the researcher has the means to identify LEK expertise on the basis of systematically gathered peer recommendations. Thereafter, the researcher will be able to initiate interviews on the basis of a rank-ordered list constructed from the numbers of peer mentions any individual receives, beginning with the most mentioned.

The Results

Local knowledge experts were identified by asking those interviewed – ‘Other than yourself, who would you say knows the most about the local fishing ground?’ Following the response to this question, the interviewees were asked – ‘Are there any other persons currently fishing or retired from fishing who you

think are very knowledgeable about the fishing ground?’ As many as five names were solicited. [\[12\]](#) Table 2 presents a summary of the results.

[Table 2 about here]

In the Chedebucto Bay study 136 individuals received at least one and as many as 17 recommendations as a local knowledge expert. Of those named, 41 were retired (30.1%) while 95 were active fishermen (69.9% of all named). Named active fishermen accounted for as many as 45% of all current lobster license holders (95 of 211), assuming that those identified as currently fishing held a lobster license. In the St. George’s Bay study 138 individuals also received at least one and as many as 17 recommendations as a local knowledge expert, of whom 21 were retired (15.2%) and 117 were active fishermen (84.8% of all named). In this instance the named active fishermen accounted for as many as 38.5% of all current lobster license holders (117 of 304).

These results demonstrate that the persons interviewed did draw distinctions among local fishermen respecting knowledge of local fishing grounds. For instance, over fifty percent of all active fishermen in both the St. George’s Bay and the Chedebucto Bay sites do not receive as much as one mention. Yet, the fact that no less than one in three (St. George’s Bay) and almost one in every two

(Chedebucto Bay) currently active fishermen and lobster license holders receive at least one mention as a local knowledge expert suggests a complex and important social process and set of social relations/structures effect interviewee determinations of the attributes designating local knowledge expertise. The factors influencing local knowledge expertise perceptions and specifications need to be understood, if simply to assure that LEK research actually engages local experts. The results do lend support to the presumption that LEK is most likely a local 'system' of knowledge, shared in many key respects among most, if not all, of those who have fished and who are currently fishing.

A list was constructed that rank ordered all those mentioned in terms of the number of mentions received. This list identifies those fishermen, currently fishing or retired, who are considered within their peer reference groups to be the most knowledgeable about the local fishing grounds. In the St. George's Bay site, comprised of nine community areas, 53 persons received a minimum of at least two first mentions or three total mentions. In the Chedebucto Bay site, comprised of seven community areas, 27 persons received a minimum of at least two first mentions or three total mentions. The criterion of two first mentions or three total mentions was determined as a reasonable break point for the purposes of identifying at least five persons specified by several respondents as local knowledge experts in each peer referenced community area. These persons have

been selected for inclusion in the second phase of the study during which in-depth face-to-face interviews are being conducted for the purpose of documenting local ecological knowledge. As noted earlier, our design has identified a minimum of five potential interviewees as critical to satisfying the methodological goal of achieving at least three independent observations for each local knowledge claim. In general, when compared with the results for those currently fishing, surprisingly few retired fishermen receive three or more mentions as local knowledge experts. In fact, the retired, as a percentage of those named three or more times, are notably under-represented. They compose 11.3% of those recommended three or more times in the St. George's Bay site, and 22.2% of those recommended in the Chedebucto Bay site. Further, in only three instances, two in St. George's Bay and one in Chedebucto Bay sites, do retired fishermen receive the most mentions. This result is surprising given that small boat, coastal zone fishing is a natural resource harvesting activity in which knowledge accumulated through experience 'on the water' might be assumed as critical to success in satisfying livelihood goals and central in peer referenced status and reputational social dynamics. In such livelihoods and settings, one would think it reasonable to anticipate that knowledge and wisdom will be associated by the local community with those who have accumulated the most experience, i.e. senior and retired fishers. Such is not the case in these settings.

Notably, within most of the harbour/community sites, one or two persons usually receive a clearly distinguishing number of mentions, especially first mentions, as local knowledge experts. That is, in each community area a select few are identified as highly reputed as local knowledge experts. While specific individuals receive a notable number of mentions, many other persons are also mentioned as local knowledge experts. Also, among those receiving two or fewer mentions are many persons who receive first mentions. In the St. George's Bay site, 30.3% (23 of 76 persons) of those mentioned one or two times are mentioned first while in the Chedebucto Bay site fully 40% of those mentioned one or two times (20 of 50 persons) received first mentions. Also, with the exception of the previous female owner of a local fish plant who is mentioned once, all those mentioned as local knowledge experts are male. Of course, this pattern may reflect little more than the fact that fisheries LEK in each setting constitutes a local 'system' that is broadly shared. Indeed, several of those interviewed who refused to name local experts claimed that everyone knows "...about the same".

Finally, a surprising number of those noted frequently as local knowledge experts receive mentions from persons fishing and living in community areas other than their own. But, with few exceptions these areas are usually adjacent. The exceptions are either persons known as fishing organisation leaders or persons who seem to have resided in different locations. In short, this pattern indicates that

use of the phrase 'local fishing grounds' in the survey question was understood as intended and did solicit responses that reference LEK expertise within each specific peer referenced community area.

Discussion and Conclusions

Our early results in Northeastern Nova Scotia demonstrate the value and necessity of employing a systematic methodological approach when identifying local ecological knowledge experts. Anything less than this raises important questions about the quality and accuracy of the information gathered and the legitimacy of claims respecting the local knowledge 'system'. Certainly, any design or methodology that leaves the researcher unable to establish and to demonstrate unequivocally the basis on which local experts were selected will compromise various aspects of the research, including, of course, its utility as a tool for resource management.

Peer-referenced, systematic identification of local experts assures that those considered most knowledgeable within either the local community, social group, or livelihood fraternity will be revealed and potentially included in work dedicated to documenting the LEK system. This procedure also assures that persons considered less knowledgeable or unremarkable will not be mistaken as local experts and given inordinate emphasis in subsequent LEK documentation

processes. In settings where there are many possible candidates it is even more crucial to employ a technique that enables the researcher to distil and to work with those considered most expert, while at the same time positioning the researcher with the means to demonstrate the basis on which these persons were chosen and invited to participate in the research. [\[13\]](#)

The results reported here also underline some of the challenges associated with identifying local ecological knowledge experts. One of the most important challenges is identifying those considered 'most' knowledgeable from among the many acknowledged as knowing. Here the procedure of asking for two or more names enables the construction of a rank-ordered list of all persons receiving peer-references, with the list reflecting consideration for both the number and the placement order of the peer references. [\[14\]](#) These results also suggest that it would be inappropriate to assume that those considered most knowledgeable about local ecology will be found mainly among the elderly. In our outcomes the elderly retired constitute a notable minority of those identified by peers as knowledgeable and are also under-represented among those named as 'most' knowledgeable.

Our analysis of the recent empirical literature shows that many researchers are not reporting critical details of their research designs and methodologies. As a result, it is difficult to appreciate the extent to which the material reported actually

embodies the local knowledge system it claims to represent. When researchers conduct interviews on the basis of referrals from just a few personal contacts, or on the basis of 'availability' during a short time period, those limitations in the research process should be made transparent to the reader. And, when research is more thorough and systematic there is an even greater need for detailed methodological description, since it will place other researchers in a position to strengthen and refine their own research methods.

One of the more important principles that has been reported among the case studies reviewed in this paper is that of assigning the highest reliability to information that has been verified by *several* local experts and that uncorroborated information is discounted or left out of summary reports (see especially Ferguson and Messier 1997). While we agree that this should be an essential component of all LEK research methodologies, we emphasise that, in and of itself, this approach does not guarantee the completeness or quality of documented information. Others have pursued or proposed a strategy of expanding the research process to new interview subjects until a 'saturation' point is reached at which little or no new information is being reported (Felt 1994, Neis *et al.* 1999b). While we agree that the concept of reaching a 'saturation' point is sound, and should also be an integral part of LEK methodology, researchers generally have neither the time nor the funds needed to continue the interview

process indefinitely. The methodology outlined here for Northeastern Nova Scotia has been designed to facilitate a time- and resource-efficient method of achieving 'saturation'.

It is surely reasonable to ask and to expect LEK social researchers to include detailed descriptions of research design when publishing research outcomes. At a minimum it seems reasonable to expect that authors describe the means by which local expertise is identified and the procedures employed to assure confidence about the quality and content of information gathered. Such contributions would also enable the development of a generally accepted design and methodological approach, or set of approaches, to LEK research, and thereby enhance the opportunity for comparative studies.

This issue is of immediate and crucial importance in light of the fact that LEK research, in many instances, is driven by the goal of enhancing the capacity of local communities to represent more effectively their knowledge, needs and rights within the political processes and institutions through which natural resources are managed. It is essential that LEK research be designed and conducted in a manner that will enable it and the research results to welcome the most rigorous of public inspections and critical treatments. These qualities would provide considerable potential for mobilising social research as a means to empowering the voices of local communities and resource harvesters respecting the extent to which LEK is

incorporated within natural resource management regimes, thereby providing people *in situ* with much greater determination over core factors impacting on the basis of their livelihoods and lives.

It is time then for social scientists to move beyond their current preoccupation with theoretical issues and general endorsements of the value of local ecological knowledge, and begin a substantive engagement with the research processes necessary to systematically document local knowledge. Notably absent from the literature published to date are accounts of how local ecological knowledge has been employed in 'real', as opposed to hypothetical, resource management settings. A very few authors report the occurrence of such uses but not their outcomes (Stevenson 1996, Usher 2000). For the time being, it remains to be seen whether the "revolution" Sillitoe (1998) speaks of will occur in the lives of those whose 'local' knowledge is considered important.

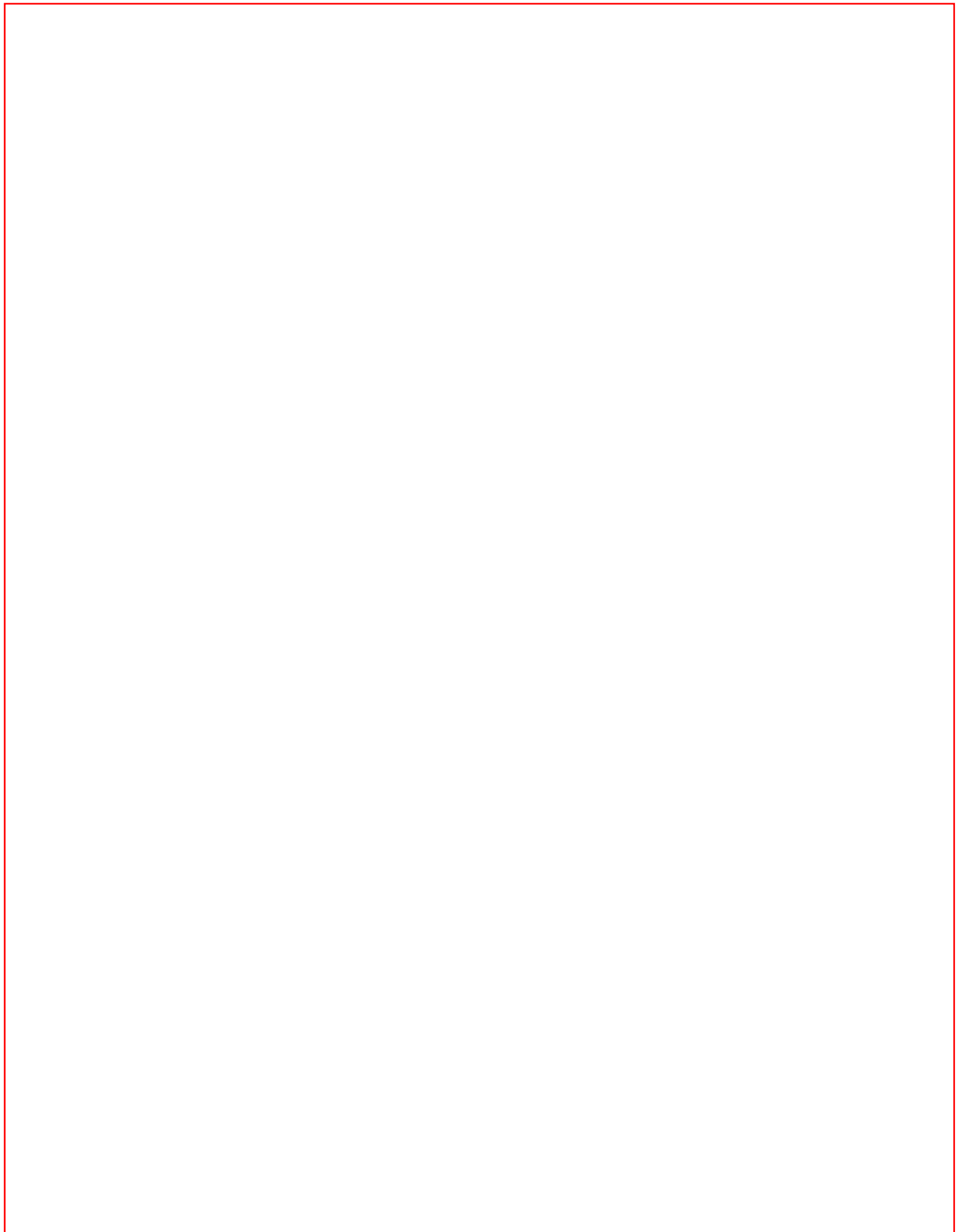


Table 1:Recent Journal Articles

Journal Article	describes overall methodology	describes method of selecting interview subjects	Selection of local knowledge experts		
			by local association	by one or more peers	systematic survey of resource-users
Olson & Folke 2001	yes	yes			x
Bielders 2001	yes	no			
Robbins 2000	yes	no			
Usher 2000	yes	no			
Kovacs 1999	no	no			
Neis <i>et al.</i> 1999	yes	yes	x	x	
Duffield <i>et al.</i> 1998	yes	no			
Huntington 1998	yes	no			
Poizat and Baran 1997	yes	no			

Ferguson and Messier 1997	yes	yes	x	x	
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Table 2: A Summary of Peer Recommended LEK ‘Expertise’ Results

Categories	Research Sites	
	St. George’s Bay	Chedebucto Bay
Total # of License Holders	304	211
Total # Sampled	174	211
Total # of Completed Interviews	127	159
Response Rate	73.0	75.4
Total # Cited as Local Knowledge Experts	138	136
% Retired	15.2	30.1
% Active	84.8	69.9
% Active of All Current Lobster License Holders Cited as LEK Experts	38.5	45.0

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Notes

[1] Searches were conducted in the “Social Science Citation Index”, “Arts and Humanities Citation Index” and “Science Citation Index (Expanded)” for 1998 to the present using the ISI “Web of Science” search engine (<http://woscanada.isihost.com/CIW.cgi>). Searches for 1997 were made in the “Social Sciences Index”, the “Humanities Index” and the “General Science Index”

databases available online at the St. Francis Xavier University library. These searches resulted in a list of 453 citations which were then screened in order to remove articles that were focused primarily or exclusively on ‘scientific’ ecological knowledge, or on local, indigenous or traditional knowledge that did not address issues of resource management, environmental assessment or development issues. The 65 publications that remained were then screened to determine which of them employed a case study approach when documenting the characteristics of local ecological knowledge. Un-cited articles were eliminated from the list in keeping with our intention to review only the most widely read recent literature on LEK rather than provide a comprehensive survey. Table 1 was compiled by selecting the two most cited publications for each year from among the 22 case studies identified, and by limiting the list to one article per author.

[2] Information about this case study is provided by Neis *et al.* in two publications, one a journal article (1999a) and the other (1999b) appearing as one chapter in a book edited by Newell and Ommer (1999). This summary of their methodology relies on both publications.

[3] The case study reviewed here is also described in a subsequent publication by Ferguson *et al.* (1998). The 1997 article is reviewed here since it provides the

most complete description of the researchers' methodology.

[4] This partnership, titled 'Social Research for Sustainable Fisheries (SRSF)', is comprised of social researchers at St. Francis Xavier University, the Paqtnkek Fish and Wildlife Commission, the Gulf Nova Scotia Bonafide Fishermen's Association, and the Guysborough County Inshore Fishermen's Association. The research alliance is funded by a three year grant obtained from the Social Sciences and Humanities Research Council of Canada, Community-University research Alliance (CURA) programme. SRSF's main purpose is to build social research capacity within the partnership through collaborative efforts focused on the design, conduct and interpretation of social research. While the research discussed here concerns work that is underway with SRSF's non-Mi'kmaq partners, the Mi'kmaq-SRSF collaboration is focusing its research on LEK and traditional use of American Eel within the lakes, rivers and estuaries that drain into St. George's Bay.

[5] The St. George's Bay study was completed in 1998. The Principal Investigator for the project was Dr. Daniel MacInnes, Professor, Sociology and Anthropology, St. Francis Xavier University, with A. Davis as Co-Investigator. This research was supported by a grant from the Centre for Regional Studies, St. Francis Xavier

University. The Chedebucto Bay research was completed by Social Research for Sustainable Fisheries, spring-summer 2001. The survey instrument and preliminary report for the St. George's Bay study are available at:

www.stfx.ca/people/gbayesp Similar documents for the Chedebucto Bay study may be viewed at: www.stfx.ca/people/adavis/srsf Similarities in research and question design for the two projects have enabled much of the data to be merged into one file.

[6] Neis et. al. (1999b) suggest beginning interviews with less knowledgeable persons as a means to allow interviewers to accumulate understandings that would be essential to making the most, as a result of their being better equipped to ask informed questions, of work with the most knowledgeable. An approach such as this would be especially useful when interviewers have little by way of background preparation and understanding.

[7] Indeed, the vast majority of those holding limited entry lobster licenses also currently hold licenses which permit them to participate in groundfish, other shellfish, and pelagic species fisheries. This is evident from information that we do not describe in detail here; but, that was gathered through the interviews as

well as from Fisheries and Oceans Canada.

[8] An introductory letter explaining the research objectives was mailed to all potential participants. Every effort was made to contact and to conduct the telephone interview within two weeks of sending the introductory letter. Once in contact, the interviewer was required to read a statement describing the goals of the research, as well as for purpose of assuring confidentiality and anonymity respecting the information provided through the course of individual interviews. Additionally, participants were assured that they would be receiving a report of the research results. These have been developed and sent. They can be viewed through the aforementioned websites.

[9] While these are substantial response rates for telephone surveys, it must be noted that the response rates would likely have been higher had the surveys been conducted during the winter months when most small boat license holders are not fishing or otherwise engaged in livelihood-related activities. If circumstances allow, it is always ideal to design and engage research in primary resource settings at a time of year, week and day most conducive to engaging maximum participation.

[10] Notable differences between the research sites are evident in key attributes of the participants' social background characteristics. For example, fish harvesters in the Chedebucto Bay area are, on average, two years younger than those working around St. George's Bay. Yet, the latter reported, on average, over two years more of completed formal education than did the former. Further, while the majority in both sites reported considerable family history and engagement with the fisheries, Chedebucto Bay fishers described more numerous and richer lineal connections than did the marine harvesters living and working around St. George's Bay. These patterns suggest that meaningful social differences exist between these geographically adjacent research sites of a magnitude that would question the advisability of generalising results from one site to the other site.

[11] These attributes are being examined by us in another essay that we are currently preparing.

[12] The question wordings for the St. George's Bay study were slightly different. Here the participants were asked: "Other than yourself, I will ask for the names of three persons who you think to be well informed about the local fishing ground." Following the provision of the first name, the participant was asked: "Are there

any other persons currently fishing or retired from fishing who think are well informed about the fishing ground?” Additionally, while as many as five names were solicited in both studies, only rarely were more than three provided. The discussion here focuses on the first three names provided.

[13] It should also be apparent that a systematic approach employed in the initial phase of LEK research provides researchers with an ‘economic benefit’ in terms of the immediacy of returns realised for the resources and time expended for the primary purpose of identifying ‘expertise’.

[14] The placement order of the names provided by each person interviewed constitutes a rank-ordered list in so far as the first person mentioned can be interpreted as the first name which comes to mind when asked the question, and is therefore the person evaluated as most knowledgeable by the respondent and so on through the list of names provided.