

# Trends in Subsistence Research in Northern Canada: A Systematic Literature Review

David C. Natcher,<sup>1</sup> Ana Maria Bogdan<sup>2</sup> and Chris Southcott<sup>3</sup>

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**ABSTRACT.** In this paper we present the results from a systematic literature review of subsistence research that was conducted in northern Canada between 1950 and 2019. Our analysis identified trends in subsistence research, including the breadth of research topics, influential scholars and scholarship, and the emergence of research networks. Our results identified 245 publications authored by a multidisciplinary network of 365 scholars. Research conducted through ArcticNet and the International Polar Year is responsible for 75% ( $n = 183$  of 245) of all subsistence-related publications during this period. Subsistence publications cover a wide range of topics, including climate change, nutrition, and wildlife management, but Indigenous food culture and the roles of women in subsistence have received comparatively less scholarly attention. Given the profound changes occurring in northern Canada, whether a result of anthropogenic or non-anthropogenic disturbances, greater attention to the cultural and gendered dimensions of subsistence will be particularly valuable to northern scholarship and the public policies it can inform. This attention will be increasingly necessary in a time when critical thinking about the future of subsistence in northern Canada is of critical need.

**Key words:** subsistence; Canada; networks; publications; gender; culture; Indigenous

**RÉSUMÉ.** Nous présentons dans cet article les résultats d'un dépouillement systématique de la recherche sur la subsistance réalisée dans le Nord canadien de 1950 à 2019. Notre analyse a permis de repérer des tendances en matière de recherche sur la subsistance, y compris en ce qui a trait à l'ampleur des sujets de recherche, aux érudits et aux chercheurs influents, et à l'émergence de réseaux de recherche. Nos résultats ont permis de trouver 245 publications produites par des auteurs faisant partie d'un réseau multidisciplinaire comprenant 365 érudits. Les recherches que nous avons effectuées dans ArcticNet et dans les publications de l'Année polaire internationale ont permis de relever 75 % ( $n = 183$  sur 245) de toutes les publications portant sur la subsistance durant de cette période. Les publications sur la subsistance englobent une vaste gamme de sujets, dont le changement climatique, la nutrition et la gestion de la faune. Cependant, la culture alimentaire autochtone et le rôle des femmes en matière de subsistance ont retenu l'attention des chercheurs dans une mesure relativement moins grande. À la lumière des changements prononcés qui s'exercent dans le Nord canadien, que ceux-ci soient le résultat de perturbations anthropiques ou non, le fait de porter davantage attention aux dimensions de la culture et du genre en matière de subsistance sera très utile aux chercheurs nordiques et aux politiques publiques susceptibles d'être éclairées par ces dimensions. Cette attention s'avérera de plus en plus nécessaire au moment où la pensée critique sur la subsistance dans le Nord canadien devient de plus en plus cruciale.

**Mots clés :** subsistance; Canada; réseaux; publications; genre; culture; Autochtone

Traduit pour la revue *Arctic* par Nicole Giguère.

## INTRODUCTION

Subsistence in northern Canada, including the harvesting, processing, sharing, and consumption of wild foods, has received varied and uneven treatment in academic literature. With its origins rooted in the area studies of the early to mid-1900s (Moseley, 2009), many of which were influenced by the acculturative theories prominent at the time (Hughes, 1960, 1965), subsistence scholarship has since evolved through multidisciplinary attention. Since the

1950s, subsistence research has spanned the social, natural, and health sciences and has been directed to a range of topics, including economic and cultural change, nutrition, wildlife ecology, governmentality, climate change, and food security.

Given the multidisciplinary attention that has been directed to subsistence in northern Canada, the term subsistence has become a homonym, meaning different things to different people depending on the disciplinary orientation of those who apply it (Gartler, 2018). For

<sup>1</sup> Corresponding author: Department of Agricultural and Resource Economics, College of Agriculture and Bioresources, University of Saskatchewan, 51 Campus Drive, Saskatoon, Saskatchewan S7N 5A8, Canada; [david.natcher@usask.ca](mailto:david.natcher@usask.ca)

<sup>2</sup> Canadian Hub for Applied and Social Research, University of Saskatchewan, 9 Campus Drive, Saskatoon, Saskatchewan S7N 5A5, Canada

<sup>3</sup> Department of Sociology, Lakehead University, 955 Oliver Road, Thunder Bay, Ontario P7B 5E1, Canada

example, in cases where subsistence is viewed as a sector in the northern economy, focus has been directed to household labour, financial costs and returns, and the influence of market incentives (Lonner, 1980; Sharif, 1986). Research by anthropologists has often explored the norms, social relationships, worldviews, identities, and environmental knowledge that give subsistence meaning (Collings, 2011). Nutritionists on the other hand have directed their attention to food safety and the health implications stemming from dietary transitions (Kenny et al., 2018). Because the positionality of those employing the term influences its construct, the meaning of subsistence has varied, which in turn affects the ways in which research questions are formulated, results are interpreted, and outcomes are presented (Rowe, 2014).

In this paper, we present the results from a systematic literature review of subsistence in northern Canada. Our analysis identified trends in subsistence research between 1950 and 2019, including the breadth of research topics, influential scholars and scholarship, and the emergence of research networks. Because the value of systematic literature reviews is not an end in themselves (Mallett et al., 2012), we also identify areas of subsistence research that have received comparatively less attention. These research gaps include the cultural dimensions of Indigenous food systems and the role and contributions of women in subsistence. We hope that the results of this systematic review can inform the work of others who are engaged in subsistence research in northern Canada and beyond.

## METHODS

### *Systematic Literature Review*

The temporal period of this review was from 1950 to 2019. Geographically our study region included Yukon, Northwest Territories, Nunavut, Nunavik, and Labrador. Our temporal and spatial designations were based on recommendations made by participants of a workshop hosted by the Resources and Sustainable Development in the Arctic (ReSDA) Research Network. The workshop, held in Whitehorse, Yukon, in October 2012, brought together academics, government representatives, and Indigenous leaders to identify priority research areas for the ReSDA Research Network to explore. These priorities included answering new research questions and synthesizing existing bodies of scholarship to identify gaps that warrant further research attention. The study presented here falls into this latter category.

The search protocol used in this review included published literature databases as well as web-based grey literature sources. Academic database searches were limited to peer-reviewed articles, book chapters, and books written in English or French. Decisions regarding which databases to include were made in consultation with a University of

Saskatchewan research librarian. The academic databases included: (1) Web of Science, (2) Sci Verse Scopus, (3) Google Scholar, (4) Academic Search Complete, (5) ASTIS Database (Arctic Institute of North America), (6) Arctic and Antarctic Regions Database, and (7) JSTOR. Grey literature was searched through web-based resources from several agencies: (1) the Canadian Environmental Assessment Agency, (2) Indigenous Food Systems Network Website, (3) First Nations Assembly, (4) Natural Resources Canada, (5) Indigenous and Northern Affairs Canada, and (6) the Congress of Aboriginal Peoples. For the grey literature, our search was limited to reports, policy briefs, and policy notes in PDF or Word format. Because academic databases have different search capabilities, specific terms or combinations of key words, search terms, and synonyms were used. An example of the search terms used in the Web of Science database is shown in Table 1.

### *Screening*

Our review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2009). The search results for the academic and grey literature publications were combined into a single Mendeley database containing 18,251 records. A total of 5511 duplicate records were then removed, leaving a total of 12,740 records. Our review then proceeded through three screening stages.

Stage one involved title screening, where records were screened out if they met any of the following conditions: (1) not in English or French, (2) not related to humans, (3) not a written record (references to videos, photos, etc.), or (4) not focused on northern Canada. Four researchers worked in pairs of two, independently reviewing each record title and marking potentially discardable records. Once the independent review was completed, the research team compared their collective results and finalized the list of excluded records. Out of the total 12,740 records, 10,434 records were removed during the first screening stage, leaving 2306 records remaining.

In stage two, a report was generated that included abstracts and basic bibliographic information to assess eligibility. Again in teams of two, researchers evaluated the list of records by reviewing the abstracts and keywords. At this stage in the screening process, records were discarded if they failed to meet the following conditions: (1) did not focus on Indigenous peoples or communities in northern Canada, (2) did not focus on subsistence, or (3) were not a full report or article (i.e., news, blog entries, court proceedings, etc.). In this second stage of screening, 1763 records were removed, leaving a total of 543 records. In a final stage, the remaining 543 records were again screened through a detailed reading review, after which 298 records were excluded, leaving 245 records in our final data set (Fig. 1).

TABLE 1. Example of key word and search terms used in academic database search.

Database	Search terms	Results
Web of Science	“subsistence economy” OR “subsistence-based economy” OR “mixed economy” OR “traditional economy” OR “wildlife harvest” OR “wild food harvest” OR “country food harvest” OR “food harvest” OR “food sharing” OR “food sharing network” OR “food processing” OR “food provisioning” OR “hunting” OR “fishing” OR “trapping” OR “livelihood” OR “food availability” OR “food safety” OR “food security” OR “food insecurity” OR “food sovereignty” OR “food culture” OR “guaranteed harvest level” OR “food trading” OR “food selling” OR “food purchase” OR “food sharing” OR “social economy” OR “informal economy” OR “local food” OR “country food” OR “wild food” AND “Indigenous” OR “First Nations” OR “Native” OR “Aboriginal” OR “Metis” OR “Inuit” OR “Inuk” OR “Dene” OR “Cree” OR “Gwichin” OR “Indians of North America” OR “Indigenous peoples” AND “Canada” OR “Northwest Territories” OR “Labrador” OR “Nunavik” OR “Quebec” OR “Nunavut” OR “Yukon” AND “women” OR “men” OR “gender” OR “gender role” OR “role of gender” OR “division of labour” OR “gender equality” OR “gender differences”	5822

### Bibliometric Analysis

With 245 records identified, a bibliometric analysis was conducted. Bibliometric analysis is a statistical method used to analyze books, articles, or other publications to measure the influence of individual scholars or research networks in a field of study (Borgman, 1990). Using a variety of bibliometric techniques (McCain, 1991), we identified communities of research bound by common research topics (e.g., nutrition, wildlife harvesting). The bibliometric analysis was effective for tracing the trends in subsistence scholarship that emerge over time.

Co-authorship network analysis was used to reveal distinct communities of research and to identify the most prominent researchers and influential research publications. In the co-authorship network, researchers are connected if they co-authored a publication. Similarly, a co-citation network analysis was used to identify influential papers in the subsistence literature, including publications that serve as bridges across different subfields of subsistence research. In the bibliographic coupling analysis, published articles are connected if a third paper cited them both. Bibliographic coupling assumes that two connected papers treat related subject matter in a similar way or pertain to a similar domain of research. Bibliographic coupling allowed us to identify linkages between published articles and the role they play in the extant literature, whether that is to bridge knowledge across the field or to advance a specific area of subsistence research.

## RESULTS

### Summary of Research Trends

Between 1950 and 2019, 245 publications were found that focused on subsistence in northern Canada. Seventy-four percent ( $n = 181$ ) of the records were peer-reviewed articles, 21% were books, book chapters, and graduate theses ( $n = 51$ ), and the remaining 5% were reports and conference proceedings ( $n = 13$ ). During the early stages of this period (1950–60), academic research on subsistence was conducted largely in the context of area studies. Area studies gained prominence in the years following World War II, when academic and public policy interests were

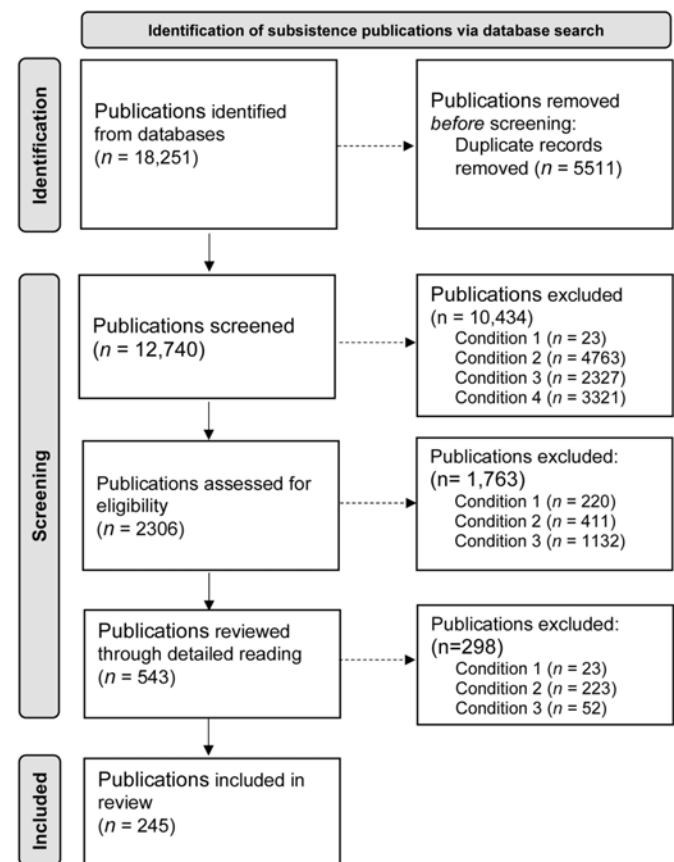


FIG. 1. Stages of systematic literature review (adapted from Page et al., 2021).

directed to the intersections between global and local change processes (Moseley, 2009). Notable in Canada was the research of Murphy and Steward (1956) who examined the cultural and economic consequences for Indigenous peoples as they transitioned to greater dependency on the commercial economy. They concluded that when wild products that have traditionally been obtained to fulfill personal subsistence needs enter a trading economy, an irreversible change in Indigenous culture will ensue. The area studies approach was influential in subsequent research in northern Canada that adopted similar acculturative theories of social change (Hughes, 1965). In many cases, the research of the 1950s and 1960s concluded that the subsistence lifestyles of Indigenous peoples had all but been supplanted by the cash economy, and the loss of subsistence

skills made their economic transition that much more necessary. In the 1970s, similar conclusions were reached by Lotz (1970:92–93), who surmised that economic change had led to a propensity among Yukon Indigenous peoples to pursue wage earning over the more taxing physical demands required in subsistence. Parallel predictions were made for Inuit where a perceived breakdown of traditional subsistence institutions was cast as inevitable change in the wake of modernization. For example, Diamond Jenness (1978:144), in *The Economic Situation of the Eskimo*, concluded that the “economic prosperity ... of an Eskimo community today is roughly proportional to the amount of wage employment it obtains, and not, as formerly, to the wildlife resources that exist in its neighborhood.” This era of subsistence research was motivated by the notion that subsistence was in decline, and the fleeting subsistence systems of Indigenous peoples needed to be documented prior to their full assimilation into Euro-Canadian society (Natcher, 2019).

Whereas area studies were conducted to advance social theory, a number of other applied subsistence studies were also conducted during this period. These included the close-range studies of food procurement in regions, communities, or for specific wildlife species. Now commonly referred to as wildlife harvesting studies, these studies identified the number of animals, fish, and plant resources harvested by Indigenous peoples. These harvest totals were then used to calculate the total food weight available for consumption by Indigenous households. These studies were further popularized as a method for estimating the potential impacts of extractive resource development projects, either to mitigate potential effects or to calculate compensation for their losses (Gamble, 1978).

In other cases, harvest studies were conducted as part of comprehensive land claims agreements. In 1975, the Northern Quebec Inuit Association initiated a seven-year study entitled *Research to Establish Present Levels of Native Harvesting* (JBNQNHRC, 1988). The study set out to determine harvest levels by species and community in order to establish guaranteed harvesting levels for Inuit households. Since the completion of the Nunavik study, other land claims agreements have required similar assessments, including the most recent Labrador Inuit Land Claims Agreement (LILCA, 2003).

In the 1980s, academic interest in subsistence was being directed to the mixed economies of Indigenous households (i.e., harvesting and wage earning). This scholarship was motivated by the recognition that subsistence harvesting was not being abandoned or displaced by capitalistic modes of production as was predicted but rather functioned alongside wage earning—i.e., mixed economy (Goldring, 1986; Smith and Wright, 1989). Rather than subverting subsistence production, these studies found that the wage economy provided the necessary economic basis for wildlife harvesting to continue (Hobart, 1981).

Other scholars during this time were focusing on human ecology and the foraging strategies of northern

Indigenous peoples. Winterhalder (1980) and Winterhalder and Smith (1981) examined the decision-making process of Indigenous hunters and trappers in their exploitation of heterogeneous habitats, settlement patterns, and residential group size. From this research, a theory of optimal foraging was advanced that continues to influence the field of environmental anthropology today. Eric Smith (1985) was especially interested in applying ecological models to test Inuit foraging and food exchange hypotheses. Other prominent scholars during this time include Alton Mackey and Moore Orr (1988) who evaluated country food use and the impacts of imported foods on Inuit diets in Labrador.

In the 1990s, a number of influential publications appeared on the political ecology of subsistence. Most notably, George Wenzel’s (1991) *Animal Rights, Human Rights: Ecology, Economy and Ideology* in the Canadian Arctic examined the impacts of the anti-sealing movement on the mixed economy of Inuit hunters of Clyde River, Nunavut. In this influential volume, Wenzel traces the effects of the anti-sealing campaigns on Inuit culture and economy. Also during this period, the health sciences were making important contributions to understanding the nutritional benefits of subsistence foods and the health implications stemming from the dietary transitions that were underway in northern Indigenous communities. For example, Harriet Kuhnlein (1995) examined the changes occurring in Inuit subsistence and the effects on human health and nutrition. Kuhnlein concluded that because of external pressures, including industrialization and the emergence of the market economy, traditional food systems derived from local, natural environments were in generational decline; a dietary transition that has consequences for the physical and mental health of Inuit. Her studies proved influential in positioning health sciences at the forefront of subsistence-related research in northern Canada for the decades that followed.

#### *A Turning Point in Subsistence Research*

While important contributions were made in subsistence scholarship between 1950 and 2000, it was not until 2004 that subsistence research gained considerable prominence in northern Canada. The proliferation of subsistence publications can be attributed to two factors. The first major influence on subsistence research was the establishment of the ArcticNet Centre of Excellence. ArcticNet represents Canada’s largest commitment to date on climate change science (Natcher et al., 2020). Between 2004 and 2018, ArcticNet received over CAD363 million in government funding, which was used to support research in the areas of marine and terrestrial systems, Inuit health, education and adaptation, and northern policy development and knowledge transformation. This research resulted in over 4530 scientific publications, including 56 that examined Inuit subsistence. It was during this time that James Ford and Tristan Pearce (2012) published *Climate Change Vulnerability and Adaptation Research Focusing on Inuit*



*Subsistence in Canada: Directions for Future Research*. In this paper, the authors identified the need for more targeted interdisciplinary research capable of documenting the climate-related vulnerabilities affecting Inuit subsistence. This paper proved influential in other ArcticNet research that examined climate-related impacts on Inuit subsistence, including food security (Hoover et al., 2016), community adaptation (Fillion et al., 2014), and traditional knowledge for monitoring food safety (King and Furgal, 2014).

The second major influence on subsistence scholarship was Canada's participation in the International Polar Year (IPY) (2007–09). Stemming from CAD156 million in federal research funding, 1750 researchers from government agencies, universities, and northern communities were supported in 228 research projects. The Canadian IPY Publications Database now includes over 4000 records, including 127 focused on northern subsistence. In their review of 15 IPY projects, Parlee and Furgal (2012) found consensus that the high rate of food insecurity experienced in northern communities was being hastened by the effects of climate change, particularly melting sea ice, erratic weather events, and changes in the stability of northern landscapes. They further determined that industrial resource development was compounding rather than alleviating the stresses experienced by many northern communities in their subsistence systems (Parlee and Furgal, 2012). In a special issue of *Polar Research* (Ford and Furgal, 2009), George Wenzel (2009) arrived at similar conclusions. In his paper, Wenzel described the adaptive strategies used traditionally by Inuit to respond to climate variability, including adjustments made in mobility, social organization, and prey selection. Wenzel also explained that the challenges brought about by climate change today are being compounded by restrictive government policies that have further constrained the adaptive capacities of Inuit hunters in new ways.

Through these two federally supported research programs, subsistence research had for the first time received considerable and sustained funding support. Although subsistence studies account for only 4% of all publications produced by ArcticNet and IPY, they nonetheless represent 75% ( $n = 183$ ) of the 245 subsistence records published for northern Canada since 1950.

### Communities of Research

Over the past 70 years, an extensive network of scholars has emerged in the study of subsistence. This network, involving 365 researchers, reflects the multidisciplinary dimensions of subsistence and the varying ways in which subsistence has been framed in the literature. For example, a community of scholars has emerged in the area of climate change and subsistence. In their work, this group of researchers, mainly human geographers, have published on the adaptive strategies used by Inuit communities to adjust their food procurement systems in response to environmental change. In this case, James Ford plays a

prominent role, as does Barry Smit, Tristan Pearce, and 38 other researchers.

Another important area of subsistence research was found in the areas of food safety, nutrition, and environmental and human health. This group includes toxicologists, environmental scientists, and nutritionists. Here the research of Hing Man (Laurie) Chan is noteworthy for investigating the effects on human health of chemical contaminants found in subsistence foods. Other major contributors with central roles in this network of scholars include Harriet Kuhnlein and Christopher Furgal. In these two subnetworks, Ford and Chan occupy positions of high centrality. Ford has published 21 papers with 40 other co-authors on subsistence-related topics (e.g., vulnerability, adaptation, climate), and Chan maintains a similar position with 15 publications on health and food safety involving 41 co-authors.

In terms of betweenness centrality—i.e., influence in connecting subsistence researchers across the entirety of the network—Catherine Huet's research on subsistence has effectively bridged areas of food security, vulnerability, climate change, and human and environmental health. In this way, Huet, as well as Grace Egeland, perform important brokering roles between researchers and areas of subsistence scholarship.

The sociogram in Figure 2 reflects the overall subsistence research network in northern Canada. The clustering of nodes represents subnetworks that have formed subject areas (i.e., subsistence and human health). In this figure, the size of each node reflects the centrality or influence of individual scholars within their respective network, whereas the lines between nodes indicate co-authorship of publications.

The co-citation network contained 57% ( $n = 139$ ) of all publications in our dataset ( $n = 245$ ). These co-citation scores indicate a reoccurrence of influential publications in subsistence research, as reflected in their high betweenness centrality scores. These publications are important for bridging multiple disciplines or subareas of subsistence research that facilitate the transference of ideas across disciplines. The top five most cited publications, as indicated by the co-citation network, are presented in Table 2. Given the narrow topic of the articles included in the co-citation analysis, it is not surprising to observe a highly dense network.

## DISCUSSION

Until the 1980s, subsistence was a major focus of Canadian anthropology. This interest was undoubtedly influenced by the foundational work of Franz Boas ([1888] 1964:52–54) who himself had an interest in correlating features of the physical environment and Inuit subsistence strategies. However, by the end of the 1980s, anthropological attention to subsistence in northern Canada had experienced a dramatic decline. Balikci (1989) estimated that by the late 1980s, as few as five university-based anthropologists were conducting

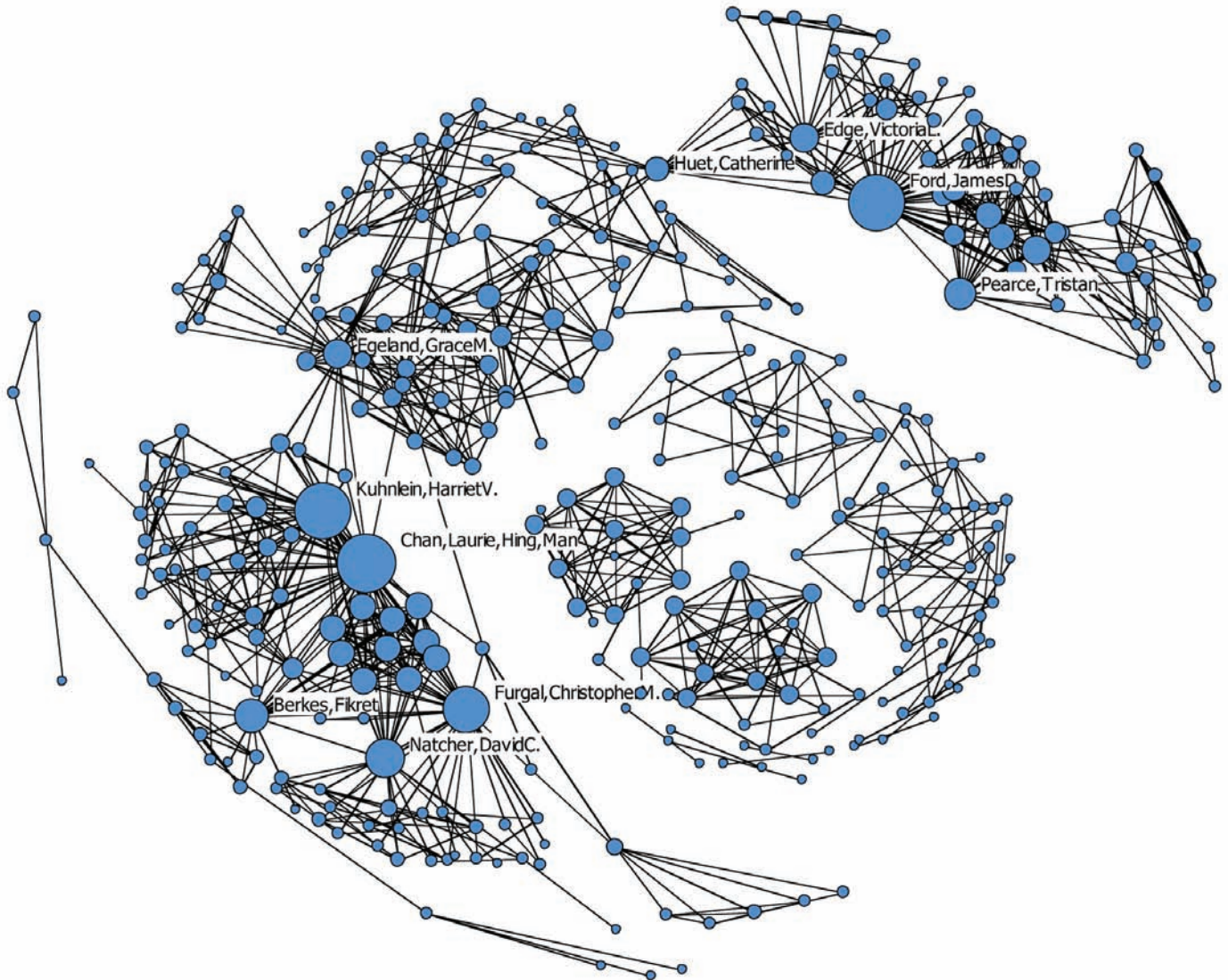


FIG. 2. Subsistence network in northern Canada.

research on subsistence in northern Canada, including Eric Smith, John O'Neil, Richard Condon, George Wenzel, and Milton Freeman. Whereas these scholars were making important contributions to the subsistence literature, other anthropologists had directed their attention to other subfields of applied anthropology (Hedican, 2008), for example, Indigenous political development (Asch, 1988). This trend was not inconsistent with broader changes occurring in the field of anthropology, where economic anthropology, along with kinship, were being replaced as core subfields of the discipline (Gregory, 2009). It was at this time that many anthropology departments discontinued the teaching of economic anthropology in their course curriculum all together.

Another important factor that limited anthropological attention to the cultural dimensions of northern subsistence was a general lack of research funding. In fact, Balicki (1989) attributes the erasure of the anthropological presence in northern Canada to the curtailment of government

research funding for anthropological research, which between 1974 and 1984 received less than 1% (CAD115,000) of all northern research funds (CAD167 million). The reduction in government funding limited the opportunities for prolonged fieldwork in northern communities, which had long been a hallmark of the Canadian anthropological tradition (Harrison and Darnell, 2006). This void has since created a paradox in that the changes occurring in Canadian anthropology have been inverse to the changes underway in the northern Indigenous communities, where the industrialization of northern environments and other global influences are having a profound effect on Indigenous cultures and their subsistence-based food systems.

While there are important exceptions (e.g., Collings, 2009, 2014; Ready and Power, 2018), the study of subsistence has too often been devoid of cultural meaning. For many Indigenous peoples in northern Canada, subsistence is synonymous with culture, identity, and self-determination. Considered to be a way of life or "our

TABLE 2. Top five most cited subsistence publications as indicated by the co-citation network.

Peer-review journal article	Degree centrality	Betweenness centrality
Ford, 2009	0.71	6.28
Chan et al., 2006	0.71	5.10
Lambden et al., 2006	0.69	5.50
Furgal and Seguin, 2006	0.65	6.28
Duhaime et al., 2002	0.66	4.79

way of being,” subsistence for many Indigenous peoples entails cultural identity and traditional values (Thornton, 1998). Yet in much of the literature, subsistence is treated as individual or collective legal rights, an economic need, or nutritional supplementation—in essence, the material aspect of subsistence only. The disconnect between culture and subsistence is not inconsequential (Sahlins, 1972). By failing to account for the cultural dimensions of subsistence, Indigenous ontologies risk becoming illusionary through the abrogation of the cultural interpretations of what subsistence entails. This indiscriminate treatment can then lead policy-makers to assume subsistence is substitutable for other forms of production, for instance through wage-earning employment in extractive resource industries, or in cases where subsistence production declines, can be compensated through increased food imports—strategies that can place subsistence at even greater risk. What is therefore required is research that accounts for the cultural dimensions or the “life-enriching process” in which subsistence occurs (Elder Nelson Frank in Thornton, 1998).

Another area of subsistence research that has received relatively little attention has been gender, specifically the role of women in subsistence. Of the 245 citations identified, 7% ( $n = 17$ ) focused explicitly on the role of women in subsistence. The records that were found, however, do provide rich perspectives on the changing role of women in subsistence (Inksetter, 2012) and particularly the critical contribution of women in the mixed economy (e.g., Quintal-Marineau, 2016). These studies show that Inuit women are often the main monetary providers for their household and, concomitantly, are experiencing an increase in their provisioning responsibilities, which have had paradoxical effects on household food production (Quintal-Marineau and Wenzel, 2019). Notwithstanding these and other important contributions (e.g., Dalseg et al., 2018), gender considerations in subsistence research have been underemphasized. Altamirano-Jiménez (2008:130f), whose research is conducted in Nunavut, attributes this oversight to the belief that subsistence is an activity carried out by men, who may or may not receive support from their wives, mothers, or female siblings. Such characterizations have been made by Inoue (2001:93) who concluded “that many Gwich’in males, especially those who are in their thirties or older, often help each other to prepare for hunting trips. ... For Gwich’in females it is important to be careful not to disturb fathers, husbands, brothers and sons, especially not to touch any of their hunting

equipment.” Such characterizations have been challenged on the grounds that women’s contributions to subsistence often go unrecognized because they are less visible to male researchers who are influenced by their own cultural biases. For example, Isaac (1995:3) suggests that women’s participation in subsistence is largely transformative in that women “turn carcasses to edible meat, clothing, and other products,” which are activities typically overlooked by male researchers. However, unlike the underrepresentation of women in other fields of northern research (Natcher et al., 2020), considerable parity exists among male and female subsistence researchers. In this case, men ( $n = 186$ ) and women ( $n = 179$ ) account for 51% and 49% of subsistence researchers. Despite this parity, a general myopia persists in the literature, which most often characterizes subsistence as a male domain. Thus, by failing to account for the complex contributions of women in subsistence, the conduct of androcentric-informed research is perpetuated (Brumbach and Jarvenpa, 1997), with femininity remaining largely unrecognized in the literature (Gartler, 2018).

## CONCLUSION

Our objective in this study was to deliver a clear and comprehensive overview of subsistence research in northern Canada since 1950. In doing so, we have traced the trends in subsistence research and have identified the thematic areas of focus, key researcher involved, and the influence of funding organizations. We have also identified research gaps in the field that can be used to inform subsistence research in the future.

Our findings show that over the past 70 years, subsistence in northern Canada has received considerable multidisciplinary attention. We identified 245 publications authored by a network of 365 scholars. Evolving from the area studies of the 1950s, subsistence has since been examined through a multidisciplinary lens, including health and nutrition, human ecology, mixed-economies, and climate change among others. Notwithstanding this multidisciplinary interest, it was not until 2004 that publications on northern subsistence began to truly propagate. This emergence was facilitated in large part by federal research funding made available through ArcticNet and the International Polar Year. These two research programs are responsible for 75% ( $n = 183$  of 245) of all subsistence-related publications for northern Canada. These publications reflect the scholarly interest of these research programs, namely, the effects of climate change on northern environments and societies. Influenced in this way, these studies focused on documenting climate-related vulnerabilities to Indigenous food systems. The nutritional aspects of subsistence have also been well documented, including the implications of dietary transitions on the physical and mental health of northern Indigenous peoples.

Receiving less scholarly attention have been the cultural and gendered dimensions of subsistence. The place of



culture and women in subsistence remain poorly understood and reflect changes occurring within disciplinary training, priorities in research funding, and entrenched biases that continue to influence the conduct of northern subsistence research. By acknowledging these challenges and making concerted steps to reverse them, a more informed research program can be implemented that has the potential to strengthen the conduct and output of subsistence research by making visible those dimensions that to date have been less observable.

## ACKNOWLEDGEMENTS

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## REFERENCES

- Altamirano-Jiménez, I. 2008. Nunavut: Whose homeland, whose voices? *Canadian Woman Studies* 26(3-4):128–134.  
<https://cws.journals.yorku.ca/index.php/cws/article/view/22121>
- Alton Mackey, M.G., and Moore Orr, R.D. 1988. The seasonal nutrient density of country food harvested in Makkovik, Labrador. *Arctic* 41(2):105–108.  
<https://doi.org/10.14430/arctic1701>
- Asch, M. 1988. Kinship and the drum dance in a northern Dene community. Edmonton: Boreal Institute for Northern Studies.
- Balikci, A. 1989. Ethnography and theory in the Canadian Arctic. *Études/Inuit/Studies* 13(2):103–111.  
<http://www.jstor.org/stable/42869668>
- Boas, F. (1888) 1964. *The Central Eskimo*. Lincoln: University of Nebraska Press.
- Borgman, C.L., ed. 1990. *Scholarly communication and bibliometrics*. Newbury Park, California: Sage Publications.
- Brumbach, H.J., and Jarvenpa, R. 1997. Ethnoarchaeology of subsistence space and gender: A subarctic Dene case. *American Antiquity* 62(3):414–436.  
<https://doi.org/10.2307/282163>
- Chan, H.M., Fediuk, K., Hamilton, S., Rostas, L., Caughey, A., Kuhnlein, H., Egeland, G., and Loring, E. 2006. Food security in Nunavut, Canada: Barriers and recommendations. *International Journal of Circumpolar Health* 65(5):416–431.  
<https://doi.org/10.3402/ijch.v65i5.18132>
- Collings, P. 2009. Birth order, age, and hunting success in the Canadian Arctic. *Human Nature* 20(4):354–374.  
<https://doi.org/10.1007/s12110-009-9071-7>
- . 2011. Economic strategies, community, and food networks in Ulukhaktok, Northwest Territories, Canada. *Arctic* 64(2):207–219.  
<https://doi.org/10.14430/arctic4100>
- . 2014. *Becoming inummarik: Men's lives in an Inuit community*. Montreal: McGill-Queen's University Press.
- Dalseg, S.K., Kuokkanen, R., Mills, S., and Simmons, D. 2018. Gendered environmental assessments in the Canadian North: Marginalization of Indigenous women and traditional economies. *The Northern Review* 47:135–166.  
<https://doi.org/10.22584/nr47.2018.007>
- Duhaime, G., Chabot, M., and Gaudreault, M. 2002. Food consumption patterns and socioeconomic factors among the Inuit of Nunavik. *Ecology of Food and Nutrition* 41(2):91–118.  
<https://doi.org/10.1080/03670240214491>
- Fillion, M., Laird, B., Douglas, V., Van Pelt, L., Archie, D., and Chan, H.M. 2014. Development of a strategic plan for food security and safety in the Inuvialuit Settlement Region, Canada. *International Journal of Circumpolar Health* 73(1): 25091.  
<https://doi.org/10.3402/ijch.v73.25091>
- Ford, J.D. 2009. Vulnerability of Inuit food systems to food insecurity as a consequence of climate change: A case study from Igloodik, Nunavut. *Regional Environmental Change* 9(2):83–100.  
<https://doi.org/10.1007/s10113-008-0060-x>
- Ford, J.D., and Furgal, C. 2009. Foreword to the special issue: Climate change impacts, adaptation and vulnerability in the Arctic. *Polar Research* 28(1):1–9.  
<https://doi.org/10.3402/polar.v28i1.6107>
- Ford, J.D., and Pearce, T. 2012. Climate change vulnerability and adaptation research focusing on the Inuit subsistence sector in Canada: Directions for future research. *The Canadian Geographer* 56(2):275–287.  
<https://doi.com/10.1111/j.1541-0064.2012.00418.x>
- Furgal, C., and Seguin, J. 2006. Climate change, health, and vulnerability in Canadian northern Aboriginal communities. *Environmental Health Perspectives* 114(12):1964–1970.  
<https://doi.org/10.1289/ehp.8433>



- Gamble, D.J. 1978. The Berger inquiry: An impact assessment process. *Science* 199(4332):946–952.  
<https://doi.org/10.1126/science.199.4332.946>
- Gartler, S. 2018. One word, many worlds: The multivocality of “subsistence.” *Alaska Journal of Anthropology* 16(2):49–63.  
[https://www.alaskaanthropology.org/wp-content/uploads/2021/02/Gartler\\_forweb.pdf](https://www.alaskaanthropology.org/wp-content/uploads/2021/02/Gartler_forweb.pdf)
- Goldring, P. 1986. Inuit economic responses to Euro-American contacts: Southeast Baffin Island, 1824–1940. *Historical Papers* 21(1):146–172.  
<https://doi.org/10.7202/030951ar>
- Gombay, N. 2010. *Making a living: place, food, and economy in an Inuit community*. Saskatoon: Purich Publishing.
- Gregory, C. 2009. Whatever happened to economic anthropology? *The Australian Journal of Anthropology* 20(3):285–300.  
<https://doi.org/10.1111/j.1757-6547.2009.00037.x>
- Harrison, J.D., and Darnell, R., eds. 2006. *Historicizing Canadian anthropology*. Vancouver: University of British Columbia Press.
- Hedican, E.J. 2008. *Applied anthropology in Canada: Understanding Aboriginal issues*. Toronto: University of Toronto Press.
- Hobart, C.W. 1981. Impacts of industrial employment on hunting and trapping among the Canadian Inuit. In Freeman, M.M.R., ed. *Proceedings: First International Symposium on Renewable Resources and the Economy of the North*. Association of Canadian Universities for Northern Studies and Canada-Man and the Biosphere Programme: Ottawa.
- Hoover, C., Ostertag, S., Hornby, C., Parker, C., Hansen-Craik, K., Loseto, L., and Pearce, T. 2016. The continued importance of hunting for future Inuit food security. *Solutions* 7(4):40–51.  
<https://www.thesolutionsjournal.com/article/continued-importance-hunting-future-inuit-food-security/>
- Hughes, C.C. 1960. *An Eskimo village in the modern world*. Ithaca: Cornell University Press.
- . 1965. Under four flags: Recent culture change among the Eskimos [and comments and reply]. *Current Anthropology* 6(1):3–69.  
<https://doi.org/10.1086/200556>
- Inksetter, J.B. 2012. *Women and work: Analyzing the mixed economy in Qikiqtarjuaq, Nunavut*. MEnvS thesis, Lakehead University, Thunder Bay, Ontario.  
<http://knowledgecommons.lakeheadu.ca/handle/2453/278>
- Inoue, T. 2001. Hunting as a symbol of cultural tradition: The cultural meaning of subsistence activities in Gwich'in Athabaskan society of northern Alaska. *Senri Ethnological Studies* 56:89–104.  
<https://doi.org/10.15021/00002806>
- Isaac, B.L. 1995. Introduction: Hunting and gathering: Gender as an economic factor. In: Isaac, B.L., ed. *Research in Economic Anthropology Vol. 16*. Greenwich, CT: JAI Press Inc. 1–12.
- JBNQNHRC (James Bay and Northern Quebec Native Harvest Research Committee). 1988. *Final report: Research to establish present levels of harvesting for the Inuit of northern Quebec, 1976–1980*. Quebec City: JBNQNHRC.
- Jenness, D. 1978. The economic situation of the Eskimo. In: Valentine, V.F., and Vallee, F.G., eds. *Eskimo of the Canadian Arctic*. Toronto: Macmillan. 127–148.
- Kenny, T.-A., Wesche, S.D., Fillion, M., MacLean, J., and Chan, H.M. 2018. Supporting Inuit food security: A synthesis of initiatives in the Inuvialuit Settlement Region, Northwest Territories. *Canadian Food Studies/La Revue canadienne des études sur l'alimentation* 5(2):73–110.  
<https://doi.org/10.15353/cfs-rcea.v5i2.213>
- King, U., and Furgal, C. 2014. Is hunting still healthy? Understanding the interrelationships between Indigenous participation in land-based practices and human-environmental health. *International Journal of Environmental Research and Public Health* 11(6): 5751–5782.  
<https://doi.org/10.3390/ijerph110605751>
- Kuhnlein, H.V. 1995. Benefits and risks of traditional food for Indigenous peoples: Focus on dietary intakes of Arctic men. *Canadian Journal of Physiology and Pharmacology* 73(6):765–771.  
<https://doi.org/10.1139/y95-102>
- Lambden, J., Receveur, O., Marshall, J., and Kuhnlein, H. 2006. Traditional and market food access in Arctic Canada is affected by economic factors. *International Journal of Circumpolar Health* 65(4):331–340.  
<https://doi.org/10.3402/ijch.v65i4.18117>
- LILCA (Labrador Inuit Land Claims Agreement). 2005. *Labrador Inuit Land Claims Agreement Act (S.C. 2005, c. 27)*. Ottawa: Queen's Printer.  
[https://www.rcaanc-cirnac.gc.ca/DAM/DAM-INTER-HQ/STAGING/texte-text/al\\_ldc\\_ccl\\_fagr\\_labi\\_labi\\_1307037470583\\_eng.pdf](https://www.rcaanc-cirnac.gc.ca/DAM/DAM-INTER-HQ/STAGING/texte-text/al_ldc_ccl_fagr_labi_labi_1307037470583_eng.pdf)
- Lonner, T.D. 1980. *Subsistence as an economic system in Alaska: Theoretical and policy implications*. Technical Paper 67. Anchorage: Alaska Department of Fish and Game, Division of Subsistence.
- Lotz, J. 1970. *Northern realities: The future of northern development in Canada*. Toronto: New Press.
- Mallett, R., Hagen-Zanker, J., Slater, R., and Duvendack, M. 2012. The benefits and challenges of using systematic reviews in international development research. *Journal of Development Effectiveness* 4(3):445–455.  
<https://doi.org/10.1080/19439342.2012.711342>

- McCain, K.W. 1991. Communication, competition, and secrecy: The production and dissemination of research-related information in genetics. *Science, Technology, & Human Values* 16(4):491–516.  
<https://doi.org/10.1177/016224399101600404>
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G., and the PRISMA Group. 2009. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA Statement. *PLoS Medicine* 6(7): e1000097.  
<https://doi.org/10.1371/journal.pmed.1000097>
- Moseley, W.G. 2009. Area studies in a global context. *The Chronicle of Higher Education*, 29 November.  
<https://www.chronicle.com/article/area-studies-in-a-global-context/>
- Murphy, R.F., and Steward, J.H. 1956. Tappers and trappers: Parallel process in acculturation. *Economic Development and Cultural Change* 4(4):335–355.  
<https://doi.org/10.1086/449720>
- Natcher, D.C. 2019. Normalizing Aboriginal subsistence economies in northern Canada. In: Southcott, C., Abele, F., Natcher, D., and Parlee, B., eds. *Resources and sustainable development in the Arctic*. New York: Routledge. 219–233.
- Natcher, D.C., Bogdan, A.M., Lieverse, A., and Spiers, K. 2020. Gender and Arctic climate change science in Canada. *Palgrave Communications* 6: 32.  
<https://doi.org/10.1057/s41599-020-0407-6>
- Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., et al. 2021. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ* 372:n71.  
<https://doi.org/10.1136/bmj.n71>
- Parlee, B., and Furgal, C. 2012. Well-being and environmental change in the Arctic: A synthesis of selected research from Canada's International Polar Year program. *Climatic Change* 115:13–34.  
<https://doi.org/10.1007/s10584-012-0588-0>
- Quintal-Marineau, M. 2016. Near the floe edge: Inuit women's role in the mixed economy. PhD thesis, Department of Geography, McGill University, Montréal.
- Quintal-Marineau, M., and Wenzel, G.W. 2019. Men hunt, women share: Gender and contemporary Inuit subsistence relations. In: Lavi, N., and Friesem, D.E., eds. *Towards a broader view of hunter-gatherer sharing*. Cambridge: McDonald Institute for Archaeological Research. 211–220.
- Ready, E., and Power, E.A. 2018. Why wage earners hunt: Food sharing, social structure, and influence in an Arctic mixed economy. *Current Anthropology* 59(1):74–97.  
<https://doi.org/10.1086/696018>
- Rowe, W. 2014. Positionality. In: Coghlan, D., and Brydon-Miller, M., eds. *The SAGE encyclopedia of action research*. SAGE Publications Ltd. 628.  
<https://www.doi.org/10.4135/9781446294406.n277>
- Sahlins, M. 1972. *Stone age economics*. London and New York: Routledge.
- Sharif, M. 1986. The concept and measurement of subsistence: A survey of the literature. *World Development* 14(5):555–577.  
[https://doi.org/10.1016/0305-750X\(86\)90124-5](https://doi.org/10.1016/0305-750X(86)90124-5)
- Smith, E.A. 1985. Inuit foraging groups: Some simple models incorporating conflicts of interest, relatedness, and central-place sharing. *Ethology and Sociobiology* 6(1):27–47.  
[https://doi.org/10.1016/0162-3095\(85\)90039-1](https://doi.org/10.1016/0162-3095(85)90039-1)
- Smith, T.G., and Wright, H. 1989. Economic status and role of hunters in a modern Inuit village. *Polar Record* 25(153):93–98.  
<https://doi.org/10.1017/S003224740001038x>
- Thornton, T.F. 1998. Alaska Native subsistence: A matter of cultural survival. *Cultural Survival Quarterly* 22(3):29–34.  
<https://www.culturalsurvival.org/publications/cultural-survival-quarterly/alaska-native-subsistence-matter-cultural-survival>
- Wenzel, G.W. 1991. *Animal rights, human rights: Ecology, economy and ideology in the Canadian Arctic*. Toronto: University of Toronto Press.
- . 2009. Canadian Inuit subsistence and ecological instability—if the climate changes, must the Inuit? *Polar Research* 28(1):89–99.  
<https://doi.org/10.1111/j.1751-8369.2009.00098.x>
- Winterhalder, B.P. 1980. Canadian fur bearer cycles and Cree-Ojibwa hunting and trapping practices. *The American Naturalist* 115(6):870–879.  
<https://doi.org/10.1086/283605>
- Winterhalder, B.P., and Smith, E.A., eds. 1981. *Hunter-gatherer foraging strategies: Ethnographic and archeological analyses*. Chicago: University of Chicago Press.