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# **The Many Faces of Knowledge: Do Science and Traditional Ecological Knowledge Coexist in Federal Assessments?**

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## **Abstract**

Traditional Ecological Knowledge is officially recognized as a legitimate source of information when legislating on wildlife management at the federal level. This study assesses the extent to which this kind of information is mobilized by administrators when writing regulations. Analyzing the use of traditional knowledge in classifying endangered species shows that although Indigenous individuals and organizations are systematically consulted, traditional knowledge is rarely a factor in impact assessments. However, for scientific examinations conducted before these regulatory impact assessments, traditional ecological knowledge does appear to be considered a reliable source of information, even if it is not widely used.

## **Keyword**

traditional ecological knowledge, regulation, wildlife management, impact assessment, stakeholders' consultation

## **Acknowledgements**

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## Introduction

Top-down solutions to resource management problems are not always applicable in all contexts. This is particularly true when local institutions and management practices that have been in place for generations may be best suited to ensure the sustainability of natural resource use. In those circumstances, modern bureaucracies relying extensively on managerial techniques and in-house scientific expertise can develop and implement ineffective or even counterproductive policies. Political scientist Frank Fischer (2000) noted that experts and administrators do not have access to all the information necessary to formulate sound policies regarding resource management or environmental protection. Certain types of knowledge that can be essential to the success of government interventions are developed and transmitted at the local level, away from laboratories or public administration office buildings. Elected officials and public administrations have recognized the contribution that such local knowledge can make to the design of their public policies (Canada 2019). Through consultation, Canadian administrators have established mechanisms to gather and consider information and knowledge from people or organizations that are not qualified as experts, or at least not according to the technocratic definition of expertise.

Among the stakeholders and knowledge holders that Canadian officials are mandated to consult, Indigenous peoples are becoming increasingly prominent in administrative directives and legislation (Canada 2019). Formerly excluded from Canadian political life, they now participate in elections, both as candidates and as voters (Dabin, Daoust and Papillon 2019), practise some form of autonomy within the confederation, and are granted special constitutional rights (Larsen 2018). During the 1990s and 2000s, several court decisions helped define the legal framework surrounding the management of Indigenous resources and territories, traditional fishing rights and the need to consult with First Nations, Metis and Inuit communities (Olive 2016). Furthermore, international treaties such as the United Nations Declaration on the Rights of Indigenous Peoples (United Nations, 2007) and years of activism, negotiation and legal struggle have led to the recognition of their traditional expertise as a legitimate source of information by both the scientific community (Brook and McLachlan 2008) and political institutions (Usher 2000,

Eckert et al. 2020). Their inputs are now solicited on various levels of policymaking and many aspects of Canadian public life, such as climate change adaptation (Pearce et al. 2015, Nichols et al. 2004), nuclear waste management (Mayhew & Perritt 2021), forestry (Joa, Winkel and Primmer 2018), conservation (Bennett et al. 2012, Devin and Dorbenstein 2004) and agriculture (Settee 2018). However, it is in relation to resource management, and more particularly wildlife management, that the authorities most readily accept local Indigenous knowledge as valuable. As such, one of the very few guidance initiatives to formally frame the incorporation of Indigenous knowledge into the decision-making process was undertaken under the Species at Risk Act with the *Aboriginal Traditional Knowledge: Process and Protocols Guidelines*, adopted in 2017 (McGregor 2021).

In Canada, Indigenous participation in environmental governance has been institutionalized through impact and benefit agreements (Library of Parliament 2015), the work of the Impact Assessment Agency of Canada, and the day-to-day work of several ministries (Canada 2021a). As to their capacity to hear and understand Indigenous perspectives, the strengths and weaknesses of these institutions have been demonstrated, including the power imbalance in negotiations (Larsen 2018), the issue of free, prior and informed consent (Papillon and Rodon 2017), and, closer to the topic of this research, the relative difficulty of incorporating non-Western knowledge and expertise into the work of Canadian administrators. In this regard, McGregor (2009) provides a survey of Canadian institutions that officially recognize traditional knowledge as a valid source of information. As for the success of integrating this knowledge into administrative practices, Feit (2005), Olive and Rabe (2016), McGregor (2010), Hill, Schuster and Bennett (2019) and Usher (2000) present cases of partial success, while Nadasdy (2003), Sandlos and Keeling (2016), and Dubrule, Patriquin and Hood (2018) present cases of failure.

While results in policy-making are mixed, locally developed and context-specific knowledge now sits alongside scientific knowledge when developing regulations. Increasingly, efforts have been made to incorporate Indigenous viewpoints and observations into endangered species management and environmental impact assessments (Olive and Rabe 2016). With this paradigm shift, new sources of information are pooled with scientific expertise. However, this information

emanates from processes understood, characterized, and sometimes wrongfully essentialized as diametrically different from the causal inference methods typically used by Canadian authorities (Singleton et al. 2021). Thus, this knowledge, referred to as local ecological knowledge, Indigenous knowledges, Aboriginal traditional knowledge or traditional ecological knowledge (TEK)<sup>1</sup>, may be perceived by policymakers or experts as anecdotal or socio-cultural constructs (Varghese and Crawford 2021). In addition, the goals of traditional knowledge holders and non-Indigenous administrators may be expressed within different time frames. For example, Indigenous perspectives may be developed with inter-generational considerations in mind, while administrative tools, such as cost-benefit analyses or impact assessments, may have a significantly more limited perspective.

However, this dichotomic view of formal science and traditional Indigenous knowledge is contested. There could be connections between some Indigenous perspectives and Western epistemologies, namely deep ecology. Such environmental philosophy, while still marginal, rejects the atomized and Cartesian view of the natural world and advocates for a more holistic approach to environmental problems. Another example is the concept of sustainable development, which, like the Haudenosaunee principle of Seven Generations, includes time-dependent concepts such as inter-generational equity. More importantly, science is based on mechanisms similar to many forms of TEK, as it relies heavily on inference, verification and empirical evidence (Menzies and Butler 2006, p. 9). Ecology and Indigenous knowledge also share the goals of understanding human impact on ecosystems and identifying sustainable practices (Ban et al. 2018). And yet TEK is conceptualized and understood as separate from formal science by Canadian authorities due to the perception that it is based on experience and relationships, while scientific knowledge is generally conceived as being founded on observations and experimentation.

While not necessarily opposed under the Canadian framework, the non-Indigenous and Indigenous ways of developing knowledge are framed as distinct. Although their

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<sup>1</sup> For consistency purposes, the term TEK is used in this text, although it does not reflect the actual and multiple nature of this type of knowledge.

complementarity is now recognized, and although the contribution of TEK is sought in environmental governance, its coexistence with administrative tools and science in the regulatory framework surrounding the protection of threatened species remains difficult for the reasons listed above. Incorporating TEK into impact assessments is presented as extremely difficult, if not impossible, meanwhile, it is now mandatory to consider them as sources of information in these same assessments. In light of this paradox, this study investigates the extent to which traditional ways of knowing are represented in regulatory consultations and whether or not information based on TEK is solicited in the administrative process related to the Canadian regulatory framework on wildlife management.

## **Indigenous knowledge uses in Canada**

The uses of TEK are fairly well documented in Canada, dating back to the late 1970s (Sallenave 1992). However, it was only in the 1990s that genuine efforts were made to incorporate these forms of knowledge into Western “ways of doing”, even going so far as to “write in” the use of TEK in some Canadian institutions (McGregor 2009). Regarding regulatory impact assessments, existing administrative guidelines stipulate that Indigenous peoples must be consulted and involved throughout the regulatory process. In addition, under certain acts such as the Canadian Environmental Protection Act, the Species at Risk Act, the Fisheries Act and the Impact Assessment Act, the regulatory framework goes beyond simple consultation to mandate officials to actively seek TEK (McGregor 2009, 2021, Canada 2021b).

While government directives theoretically allow for the significant use of Indigenous knowledge, academic research on the subject has shown rather negative results about its actual usage in Canada. Nadasdy (1999) reports that Indigenous knowledge generates its share of skepticism among participants in the regulatory process. Non-Indigenous scientists and administrators tend to minimize the relevance of Indigenous knowledge, sometimes going so far as to ignore it completely. Many holders of this knowledge have related experiences in which their knowledge has been used arbitrarily or integrated in a purely symbolic manner. Nadasdy attributes this distrust in part to a profound and mutual misunderstanding of how the natural environment and its interrelation with human beings can be conceived. In very general terms, science tends to

compartmentalize and divide knowledge (for example, by focusing research on a specific species), while the Indigenous perspective views the natural world more holistically. As Nadasdy writes, for Indigenous knowledge holders, “animals are not only numbers” (1999, 8), and their knowledge is not necessarily translatable into data compatible with scientific analytical grids. Ellis reaches a similar conclusion and observes that non-Indigenous experts and administrative authorities devalue the contextualized information associated with TEK. He argues that when TEK is not simply dismissed, its use is limited to factual and atomized contexts, such as “who, what, when, and where” (Ellis 2005: 72).

Other studies point in the same direction, including one by Paci et al. (2002), which, following a review of the literature on the integration of Indigenous knowledge into impact assessments conducted in Canada, concludes that attempts to incorporate such knowledge into bureaucratic procedures are rarely successful. This finding is supported by Keats & Evans (2020). They argue that, while factual data (e.g., observations on migration patterns) may be consistent with impact assessment, the “norms and values” that are integral to Indigenous conceptions of wildlife management may not be. Thus, incorporating Indigenous knowledge into non-Indigenous frameworks can only be partial at best.

White also raises the many problems associated with the use of TEK in the context of land claims and co-management initiatives. White suggests that the worldviews supporting TEK are fundamentally incompatible with the explicit and implicit values and procedures on which modern bureaucracies are based (White 2006, 402). White presents a few cases where TEK is rightfully considered part of co-management initiatives. Still, the many barriers (methodological, cultural, linguistic, philosophical – perceived or actual) that separate it from science inhibit dialogue between holders of the two conceptions of knowledge. This limits the degree to which TEK can be incorporated into decision-making.

In one of the few quantitative studies on the topic, Hill and her collaborators (2019) demonstrate that even the simple participation of Indigenous peoples within institutions aimed at preserving threatened species is limited. They argue that most recovery plans produced under the Species

at Risk Act (52%) make no mention of Indigenous peoples, despite government directives stating that their input and expertise should be included to the greatest extent possible.

Recent studies confirm that the issues raised in the literature of the late 1990s and 2000s evoked above remain unresolved. McGregor (2021) argues that the repeated efforts by Canadian authorities to make more room for TEK are still characterized by a profound misunderstanding of this knowledge and how it is developed and transmitted. In most cases, non-Indigenous stakeholders seek to "extract" specific pieces of TEK that they consider helpful, in order to incorporate them into their own analytical framework. This has the effect of disconnecting TEK from the wider contexts from which they draw their meaning. As the author puts it, "one cannot ever really 'acquire' or 'learn' Indigenous knowledge without having undergone similar experiences to those originally involved in acquiring/generating, holding, and transmitting such knowledge" (McGregor 2021: 3).

In the same vein, Eckert et al. (2020) find that the most recent iteration of the Canadian Impact Assessment Act is not built to mobilize TEK adequately. In a synthesis of the literature published between 1973 and 2018, they identify three significant barriers to TEK use in environmental assessment. The first barrier is historical, relating to the long-lasting consequences of colonization and the negative experiences lived by Indigenous communities with regard to the use and extraction of their local knowledge by non-Indigenous. The second barrier is legal, and is related to the history of treaty violations and the incompatibility between Canadian law and Indigenous practices. The last barrier is procedural and is connected to the design of environmental impact assessments and the potential for institutional malpractice. The authors find that while the new act indeed addresses some problematic issues, several problems persist. Among these, some are potentially surmountable, while others may be too large to be solved in the current context. In particular, the authors point out that the incorporation of TEK into governance practices is still being done through the lenses of Western values and assumptions. Consequently, the assessment processes remain mostly top-down, leaving Canadian authorities with the discretion of whether or not to delegate decision-making powers to Indigenous communities and organizations.



The picture painted by the literature indicates that non-Indigenous methodology is generally incompatible with Indigenous perspectives, and TEK is understood or framed as intrinsically at odds with non-Indigenous ways of knowing. Accordingly, science and Indigenous knowledge do not always speak the same language. The barriers surrounding the incorporation of TEK into the regulatory process are characterized by a lack of understanding by Indigenous knowledge holders of the concepts and procedures that structure bureaucratic action, but also a lack of understanding of critical components of TEK by non-Indigenous administrators and experts.

Table 5.1: Six Types of Indigenous Knowledge

Type	Short description
1) Factual observations, classifications, and system dynamics	Empirical information and observations such as animal behaviour, anatomy, or abundance; ecosystem and species interdependence and interrelationships.
2) Management systems	Information on sustainable use of resources and resource management strategies or technologies; methods of conservation.
3) Factual knowledge regarding past and current uses of the environment	Spatial and temporally defined knowledge of environmental use, typically transmitted through oral history.
4) Ethics and values	Environmental ethics and normative information on the correct attitude toward resource extraction.
5) Traditional ecological knowledge as a vector for cultural identity	Information on the cultural significance of nature and its relation to Indigenous identity (and its survival); spiritual, cultural, and social aspects of nature conservation and use.
6) Cosmology	Worldview and beliefs on how humans and nature are connected; culturally based assumptions on the role of humans and their place in the natural system.

Note: Table adapted from Houde (2007, p. 10), TEK nomenclature

Some of these critical components relate to the cultural or spiritual nature of TEK. Houde (2007) identifies six general types of Indigenous knowledge. These six types are detailed in Table 5.1. The nomenclature used implies that many types of Indigenous knowledge can hardly be

associated with "factual" data or empirical observations, as a non-Indigenous scientist might conceptualize it. In particular, the above literature hints that knowledge related to ethics and values, identity and culture, or cosmology and spirituality would be the most difficult for non-Indigenous administrators and scientists to understand and thus the most difficult to fit into their analytical frameworks.

Taking this literature and Houde's nomenclature into account, the following two hypotheses are put forward:

**H1:** Relatively little traditional ecological knowledge is solicited throughout the various stages of the regulatory process.

**H2:** The traditional ecological knowledge mobilized by administrative or scientific authorities is essentially factual in nature.

## **Data & Method**

### **The anatomy of rulemaking under the Species at Risk Act**

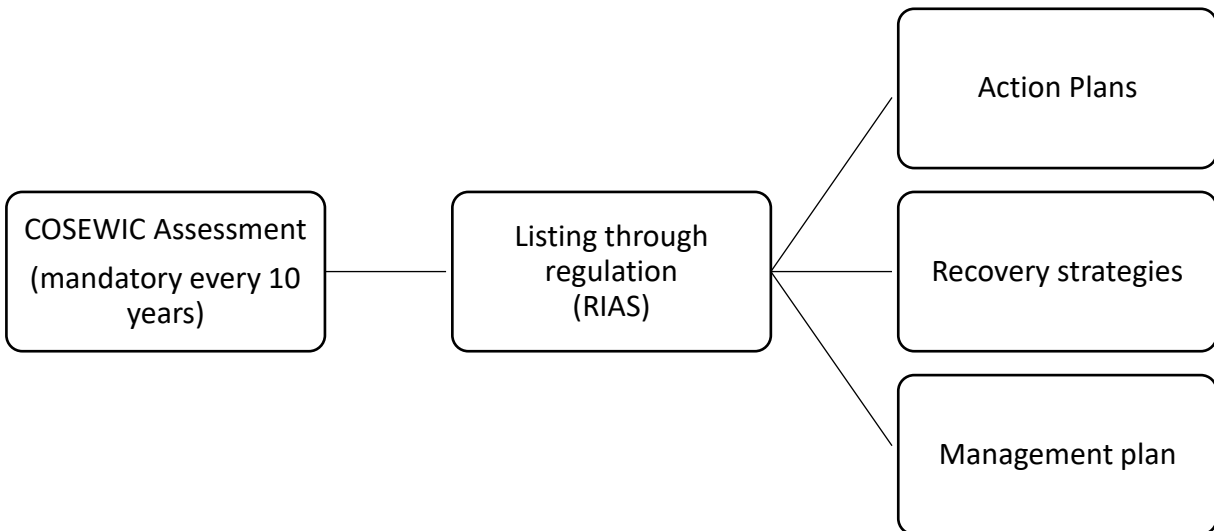
The protection of endangered species in Canada is governed by the Species at Risk Act (SARA) and is typically implemented through regulation. This means that federal administrators conduct the bulk of policymaking on the topic. An impact assessment must be produced by national administrative guidelines (Canada 2021a) and good regulatory practices established by international standards (OECD 2020) whenever administrators amend, withdraw, or write a new regulation. Federal officials prepare these regulatory impact assessments, supervised by the Treasury Board and validated by government departments before being publicly posted in the Canada Gazette. As part of this process, policymakers must conduct detailed cost-benefit analyses and consult with stakeholders potentially affected by the regulatory changes they are implementing. This process attests to the federal government's aim to develop the most concise

and efficient body of regulations possible, aligning regulatory changes with the most relevant sources of information and the soundest science.

The regulations produced under the SARA are a particular case, since regulators, in addition to conducting standard administrative analyses, rely on the recommendations of an independent agency. This agency, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), is an expert panel mandated to evaluate the status of threatened species every ten years. COSEWIC officers are tasked with reviewing the literature on the status of each plant or animal species brought to their attention. They must consult with experts, Indigenous knowledge holders and scientists, and, on occasion, they conduct their own field research to determine the status of threatened species. After gathering all this information, COSEWIC defines the degree of protection needed to preserve the species under consideration and recommends their listing to the appropriate government department (typically Environment and Climate Change Canada, Fisheries and Oceans Canada, or Parks Canada). Finally, if warranted by COSEWIC's non-binding recommendations, federal officials formally initiate the regulatory process to add the species to the endangered species list. Action plans, recovery strategies and management plans may be developed to ensure the recovery of threatened species (Figure 5.1).

Management plans are designed for species of special concern, while recovery strategies are developed for species at greater risk or those facing extinction (Mooers et al. 2010). On the other hand, action plans can be put into place for any species on the list and outline what needs to be done to meet the species' population and distribution objectives. This approach is distinct from other regulatory fields, as Indigenous knowledge is institutionalized in COSEWIC processes not only through administrative guidelines but also through a subcommittee dedicated to collecting and evaluating information specifically relating to TEK (COSEWIC 2021).

Figure 5.1: The species at risk classification process



### Case choice and analysis

The regulations undertaken under the SARA are a particularly interesting case considering the research questions of this study, since the use of COSEWIC by regulators allows for a process that identifies the sources of information leading to the regulatory action. COSEWIC provides a window for academics to see and analyze the sources of information used by the bureaucratic apparatus, as these are explicitly identified and systematically referenced in their report, which is made public. The sources of information are more easily identifiable in these reports than in standard regulatory impact assessments, which are only available in summary form and do not systematically cite their references. Moreover, since this panel of experts is independent, and since its recommendations are non-binding, it is, in principle, sheltered from the political realities that may otherwise guide the use of science and expertise in formulating public policy (Cairney 2016, Lemor et al. 2022). As previously stated, natural resource management and species protection are areas of activity where the validity of Indigenous knowledge is most readily recognized, or at least, where it is most solicited (Houde 2007). Canada is one of the countries where TEK is most frequently incorporated in its institutions (Sidorova 2020). As such, quantifying

the use of TEK in the work of SARA administrators is one of the clearest tests that can be defined to assess the extent to which non-Indigenous institutions mobilize TEK.

This research uses regulatory impact analysis statements (RIAS) from regulations produced under the SARA and adopted between January 2015 and April 2021. The sample includes 62 different RIAS associated with 79 regulatory changes (some of the regulatory changes share the same impact assessment and, accordingly, the same consultation process). This sample provides a comprehensive picture of recent regulatory activity under the SARA. As displayed in Table 5.2, the RIAS have an average length of 7968 words. In parallel, 30 COSEWIC reports are randomly selected from the 247 published during the same period (2015-2021). The RIAS measure the extent to which TEK is solicited by federal administrators and the extent to which Indigenous peoples are consulted during regulatory impact analyses. In parallel, COSEWIC reports can evaluate the extent to which TEK is used to define the status of a threatened species, and can identify which “type” of TEK is mobilized.

Table 5.2: Descriptive statistic (rounded to the unit)

<b>RIAS</b>	<b>Average word count</b>	<b>Word count standard deviation</b>	<b>Min</b>	<b>Max</b>	<b>Number</b>
	7968	7177	589	34093	62
<b>COSEWIC report</b>	<b>Average number of information sources referenced</b>	<b>Standard deviation of total informational source referenced</b>	<b>Min</b>	<b>Max</b>	<b>Number</b>
	86	112	5	433	30

To test the main hypotheses of this research, the RIAS in the sample are coded to identify the different consultation initiatives undertaken during the impact analysis. Hence, any mention of consultation or attempted consultation with an Indigenous organization or individual is identified. The same is true for any mention of the use of TEK. As for the COSEWIC assessments and status reports, their bibliographies are manually coded to differentiate between non-Indigenous or Indigenous sources of information. This type of bibliographic analysis of official documents is notably used by Costa, Desmarais and Hird (2016) to document the usage of science

in U.S. regulatory impact assessments. Items in the bibliographies are classified as Indigenous knowledge based on three complementary factors. First, an item is classified as TEK if its authors are affiliated with an Indigenous institution or a co-production initiative. Second, an item is classified as TEK according to the research topic, methodology, and connection with any type of TEK as defined by Houde (2007). Third, a keyword search within the text of the COSEWIC reports identifies if any bibliographic elements are explicitly referenced as being “Indigenous”, “Aboriginal”, “traditional” or originating from “elders”, “trappers” or “hunters”. Subsequently, the nature of the information referenced by these sources is systematically validated in the reports to ensure that they actually relate to TEK. Where ambiguity remains, the cited documents are themselves consulted.

## **Results & discussion**

### **Regulatory impact assessments: lots of consultation, very little use of TEK**

This study found that in the 62 RIAS conducted under the SARA since 2015, TEK is rarely used to justify regulatory action. This is not surprising, as the administrative guidelines for regulation at the time (including the one produced under the SARA) do not explicitly mention TEK as a source of information to consider. While not bound to seek it out specifically, administrators are still exposed to it through their interactions with Indigenous peoples, who are among the stakeholders they are mandated to consult. Indeed, in a few cases, information linked to TEK is reported in the consultation section of the RIAS, notably about the fluctuation of specific animal populations,<sup>2</sup> the effect of hydroelectric infrastructures on biodiversity,<sup>3</sup> or the cultural significance of a species for specific communities.<sup>4</sup>

While TEK is mostly absent from those documents, it is apparent that Indigenous people and organizations are still consulted. Within the RIAS under review, over 240 different consultation initiatives are listed. Those initiatives could be calls for comments aimed at entire communities or specific people, phone calls, public postings, forums, and individual or group interviews. In

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<sup>2</sup> Canada Gazette, Part II: SOR/2018-112, SOR/2020-219, SOR/2019-289

<sup>3</sup> Canada Gazette, Part II: SOR/2019-289

<sup>4</sup> Canada Gazette, Part II: SOR/2018-112, SOR/2019-289, SOR/2019-52

most cases, a RIAS reports only whether or not the communities and individuals consulted support the proposed classification. In other instances, administrators said that the organizations and individuals consulted requested further clarification or information about the regulatory change before commenting. In 56 cases, the organizations or individuals approached as part of the consultation process did not provide comments or did not respond to the administrators' invitations.

The virtual absence of TEK from RIAS under the SARA may be explained by the fact that much of the information-gathering is done either before or after the regulatory impact assessment is written, for example, during the COSEWIC assessment process or when defining action plans and recovery strategies (Figure 5.1). If this is the case, it leaves little space for Indigenous knowledge within the regulatory impact assessments themselves. The overseers of these assessments orient their work instead around standard administrative analysis tools such as formal public consultations and cost-benefit analyses. Thus, consultation with Indigenous peoples and organizations in regulatory impact assessments is primarily to identify their preferences, answer technical questions, or validate support for the proposed regulatory change. There were four exceptions where TEK was explicitly mentioned in a RIAS<sup>2,4</sup> and 56 cases where no Indigenous stakeholders were involved in the consultation.

### **COSEWIC species classification: some TEK in a sea of formal science**

Unlike in RIAS, information sources are explicitly referenced in COSEWIC reports. In every document analyzed except for one (which was subsequently rejected from the sample since it was not a complete report), the people and experts consulted are listed, and the various sources of information are systematically referenced. Most of the sources cited are scientific studies or expert reports, but personal communications, town hall meetings and interviews with individuals are also listed.

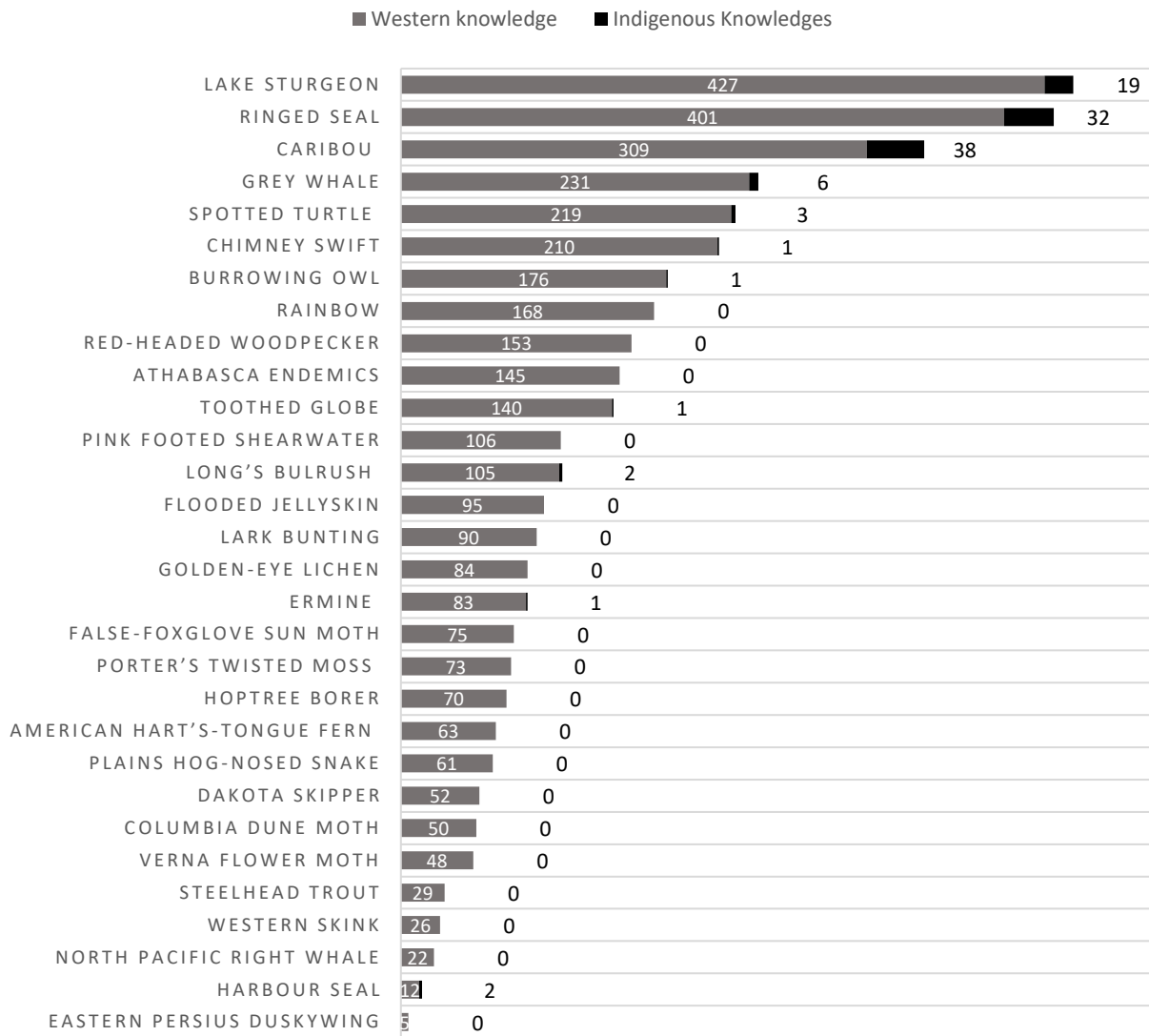
Quantitatively, formal science takes up significantly more space in the COSEWIC reports than Indigenous knowledge (Figure 5.2). Only 11 out of the 30 reports contain any sources of information that can be linked to TEK. In total, 106 sources of information out of the 3834 identified mention or report on Indigenous knowledge. Of these 106 sources, the vast majority

(93.5%) are secondary sources. They are essentially non-Indigenous studies about or incorporating Indigenous knowledge, reports from governmental institutions, or reports from co-management organizations. Among these secondary sources are interviews with Indigenous knowledge holders, but they have been conducted in other contexts or prior to the COSEWIC assessment (some sources even date back several decades). Overall, little research is done directly by COSEWIC. In only 6.5% of cases where Indigenous knowledge is mobilized is it sourced from direct communication with knowledge holders or synthesis reports from their own Aboriginal Traditional Knowledge Advisory Committee. This is in itself not insignificant, as this way of aggregating information (i.e. through secondary sources) contrasts with TEK holders' own understanding of knowledge, as many of them "gain true knowledge about the land and animals through direct personal experience" (Nadasdy 2003: 111) and not through indirect observations or external sources.

With regard to the type of Indigenous knowledge used, information that relates to factual data or observations is much more often included in COSEWIC reports than any other type of TEK. In total, 183 separate uses of the 106 TEK-identified sources of information can be counted in the COSEWIC texts (some sources are referenced more than once). As shown in Figure 5.3, the three categories of Indigenous knowledge (Table 5.1) most often mobilized are those relating to factual data, i.e., 1) *Factual observations, classifications, and system dynamics* [Observations], 2) *Management systems* [Managements], and 3) *Factual knowledge regarding past and current uses of the environment* [Uses]. These categories represent nearly 96% of the information sourced from Indigenous knowledge in the sample analyzed.



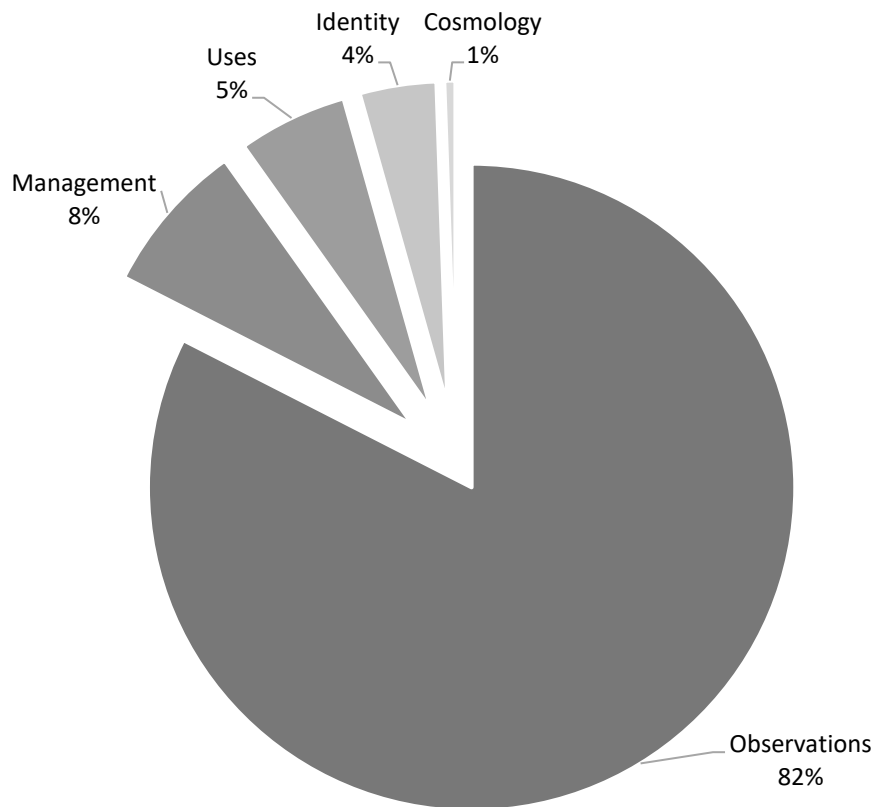
Figure 5.2: Information sources distribution



No mention of Houde’s fourth type of Indigenous knowledge, *Ethics and Values*, could be identified in the sample of COSEWIC reports. In a few cases, notably concerning caribou hunting best practices (COSEWIC 2016), the difference between Type 3 and Type 4 knowledge may be ambiguous. Nevertheless, in these cases, it is clear from the text that the emphasis is more on the consequences of bad practices on the maintenance of animal populations than on their welfare or the nature of the relationship between the hunter and the caribou. The type of knowledge referring to the importance of the natural world in the culture and identity of

Indigenous peoples (Houde’s fifth type) is also present in COSEWIC reports. The relevance of this knowledge is recognized by COSEWIC officers, as their reports feature a section discussing the “special significance” of endangered species. However, it is usually undeveloped or left blank. The use of this type of information remains marginal, with only seven references identified in the report bibliographies. Finally, Houde’s sixth type of traditional knowledge, *Cosmology*, is mentioned only once. The information attached to it is used in an essentially descriptive manner, as demonstrated by the passage where it is found: “*The Mi’kmaq word for Chimney Swift is Kaktukopunjej. This name refers to Chimney Swift as being a ‘Thunder Bird’ and it means that thunder will soon arrive when an individual sees this bird*” (COSEWIC 2018). Surprisingly, no other reference to Indigenous knowledge is made in the report where this excerpt appears.

Figure 5.3: Types of Indigenous knowledge used



## Corroborating the hypotheses

In both RIAS and COSEWIC reports, references to or use of Indigenous knowledge are few and far between. Therefore, it is relatively easy to confirm **H1** and to see that the prognosis of the literature, even that dating from the late 1990s or mid-2000s when the Canadian commitment to TEK was less salient, still holds. Nevertheless, it cannot be excluded that this marginal use of Indigenous knowledge could be due to a lack of accessibility or resources (informational or material). Indeed, on several occasions in the COSEWIC reports, it is mentioned that Indigenous knowledge for a specific species is non-existent or limited, as shown in this passage:

“Little Aboriginal traditional knowledge [ATK] is available regarding Burrowing Owls in Canada. While there are nearly one hundred different Aboriginal Nations and organizations whose territories or areas of interest overlap with historical Burrowing Owl habitat, ATK was identified for fifteen of them. Of this available ATK, much of it was limited in scope and consisted of recent surveys for individuals and habitat/nesting sites on Reserve lands. Hence, some information was available on population and distribution data, but this was largely limited to presence/absence information. Some information was available on cultural significance of Burrowing Owls, though this was restricted to the general role of owls as opposed to identification of any food, social, or ceremonial importance” (COSEWIC 2017).

Thus, the present study cannot state whether Indigenous knowledge was ignored, went under the radar of COSEWIC officers, or did not exist. We cannot exclude the possibility that COSEWIC agents simply lack the capacity to gather TEK or that TEK is limited in some instances. The loss of traditional knowledge in recent history is a documented phenomenon (Nadasdy 2003, Smith 2021) that could, to some extent, negatively affect its incorporation into federal assessments.

Also, while the literature highlights the difficulty of incorporating TEK into decision-making, the administrative guidelines might have suggested more significant use of TEK in the day-to-day work of administrators, if only in terms of volume. TEK is institutionalized in the operations of COSEWIC through its Aboriginal Traditional Knowledge Advisory Committee, and wildlife management is one of the areas of public policy where TEK is most easily considered. Thus, disproving the literature’s hypothesis by analyzing the administrative work recently undertaken under the SARA should have been one of the easiest tests for the Canadian public administration

to pass. Indeed, one can hardly expect that TEK would be used more extensively in other spheres of public policy, which are typically less open to TEK than wildlife management, or in which TEK only recently became more salient (i.e., climate change adaptation).

As for **H2**, this study corroborates the idea that factual data are much more in demand in the documents processed than other types of information. Consequently, the conception of TEK by Canadian officials seems somewhat unidimensional. This may be explained by the fact that other types of knowledge are difficult to reconcile with bureaucratic procedures and impact analyses. Alternatively, it may be because the compartmentalization of knowledge and the search for objective data compromise administrators' ability to grasp the value of other types of Indigenous knowledge (Nadasdy 1999, Ellis 2005). This search for generalizable and decontextualized information may lead COSEWIC officers to report contrasting local observations from Indigenous knowledge holders. Scientists look for information that allows them to establish general trends; thus, the local factual observations of knowledge holders might be seen to be too specific to be of use to them. One example of this is the following quote taken from a COSEWIC report: *"hunter observations have been variable and contradictory, with some saying Ringed Seal numbers have decreased over time and others suggesting they have increased over time [...]. Overall, there are reports of declines in some areas, but information is not available across the entire species range. It is also unknown whether local changes represent declines or distribution shifts with sea ice changes"* (COSEWIC 2019). Consequently, even in cases where TEK is available and accessible, non-Indigenous scientists and administrators may not understand their meaning or see their relevancy, especially if they are not factual. This can be particularly problematic when, consciously or unconsciously, scientists and administrators only seek to "extract" the specific bits of knowledge that fulfil their own informational needs (McGregor 2021).

## **Conclusion**

As part of this research, regulatory impact assessments and scientific reports produced under the SARA are analyzed to quantify and identify the different uses of Indigenous knowledge. By examining the information used by federal administrators and scientists to justify the classification of animal or plant species, this study demonstrates that the use of TEK is an

observable but rare phenomenon. In addition, it is argued that within regulatory impact assessments, Indigenous people are primarily consulted to validate their support for a regulatory change or to provide them with information. As such, their input is not solicited in their capacity as TEK holders. The bulk of the TEK used in COSEWIC reviews and studies relates to factual data or observations. Therefore, it is safe to say that the small amount of Indigenous knowledge that is mobilized by non-Indigenous institutions in Canada remains essentially unidimensional, at least when it comes to recent regulatory work. However, the existence of TEK in official documentation reflects the government's commitment to consulting with Indigenous peoples and valuing their knowledge, although the level of incorporation of this knowledge into the decision-making process is still quite limited. This is consistent with observations at the supranational level (Manrique et al. 2018, Sidorova 2020) and under other national contexts (Butler et al. 2012, Jolly and Thompson-Fawcett 2021).

Future research could mobilize machine learning and automated textual analysis techniques to extend the analysis conducted here to other corpora. This study is indeed one of the few, along with Hill, Schuster and Bennet (2019), to analyze a multitude of cases to measure Indigenous people's participation in non-electoral forums. Examining the extent of TEK use in other types of assessments, or even in academia, is easier than ever. And yet, the kind of methodology involved in this paper and computer-assisted textual analysis cannot directly answer why TEK is not as prominent in wildlife management as administrative directives would suggest. This very question is crucial to our understanding of TEK incorporation into scientific assessment; consequently, the hypotheses raised in the previous section deserve to be addressed or readdressed. The exercise of mapping the use of TEK remains relevant to the study of public administration and its reliance on diverse types of information. This exercise sheds light on the potential of local knowledge to address some of today's most pressing policy issues, such as deforestation, the overuse of natural resources and climate change adaptation.

Nevertheless, TEK is typically developed and transmitted within specific contexts. It is not "run-of-the-mill" local knowledge. More often than not, TEK is held by populations and individuals still suffering from the consequences of colonization. This adds a level of complexity to the

incorporation of TEK into non-Indigenous analytical grids. Risks of misuse and instrumentalization persist when experts and administrators are mandated to include TEK in their work. Developing ways to properly use this knowledge as a source of information in the context of policymaking remains a challenge for both the authorities and the Indigenous populations involved. As stated by McGregor, “Indigenous knowledge and IKS [Indigenous Knowledge Systems] are themselves inseparable from the people who live that knowledge and those systems on a daily basis and who have done so for thousands of years” (McGregor 2021: 6).

Fortunately, recent examples demonstrate that it is possible to develop practical and feasible applications of TEK (Peacock et al. 2020) that can go beyond wildlife management (Khalafzai et al. 2019). While the barriers to integrating TEK into bureaucratic processes are well known, solutions to ease the cohabitation of TEK with non-Indigenous knowledge exist. Some of these have been developed with a view to address disaffection among Indigenous communities with the Western assessment framework. Notable examples come from “Two-eyed-seeing”, a Mi’kmaw framework of collaborative research (Kutz and Tomaseli 2019, Reid et al. 2021), knowledge co-production methodologies (Zurba et al. 2021), and Kauapa Māori research (Smith 2021), to name just a few. All of these approaches share a few essential elements: they recognize the power dynamics and injustices inherited from colonialism and they place Indigenous individuals and their communities at the forefront of knowledge production. Equally important, these approaches avoid decontextualizing TEK and recognize that this type of knowledge keeps its meaning only under certain conditions. These conditions can sometimes be frustrating for scientists and administrators seeking generalizable knowledge. In addition to the findings of this research, these observations indicate that the way the federal government has sought to incorporate TEK so far, through guidelines, established institutions and formal protocols, might not be appropriate. At the very least, this approach does not work as intended. The enterprise is not in vain, however, as recognizing the importance of Indigenous knowledge is seen as an integral part of the process of mending the relationship between Indigenous peoples and non-Indigenous institutions (TRC 2015). It has been made abundantly clear that using multiple types of knowledge can improve environmental governance (Henri et al. 2020), and that TEK, in particular, can complement scientific assessments (Berkes 2018). Henceforth, if they want to

effectively incorporate TEK into their decision-making and improve their assessments, Canadian wildlife management authorities must rely more heavily on Indigenous knowledge holders and engage directly with their ways of knowing.

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