Dalhousie Journal of Interdisciplinary Management
Volume 17 | 2023
ojs.library.dal.ca/djim

Bringing Evidence Back from the Dead: A History of Interference in Science in Canada

MANJULIKA E. ROBERTSON

SCHOOL FOR RESOURCE AND ENVIRONMENTAL STUDIES

ABSTRACT

Since the earliest accounts of the 'muzzling' of Canadian federal government scientists in 2012 and the declaration of a 'war on science' in 2013, the detrimental impacts of Stephen Harper's leadership as Canadian Prime Minister has been investigated and reported in the media and gray literature in Canada and abroad. Significant evidence spoke to the consequences of this government-led 'war on science' for the environment, for public sector scientists, and for the Canadian public's trust in government decision-making. The current Prime Minister and leader of the Liberal Party of Canada, Justin Trudeau has been twice elected by Canadians, in part, based on a promise to restore scientific integrity, prevent political interference, and implement environmental protections informed by the best available scientific research and evidence. Since 2015, the Prime Minister has taken steps toward the betterment of conditions for environmental scientists in the public sector and for the environment. However, the effectiveness of these have been called into question. The following research paper succinctly documents the historical 'war on science' and its consequences as well as the steps taken by the current government to resurrect use of scientific research and evidence to inform law, policy, and decision-making. Recent evidence that reports on the perspectives of environmental researchers following the implementation of federal policy, were also uncertain of what effect these policies will have on Canadians and the environment in the long-term. It is vital that Canadians continue to hold their government and leaders accountable for their actions and demand that scientific integrity be upheld.

Keywords: environmental science; scientific integrity; Canadian Governance; public policy

INTRODUCTION

Research has shown that public policy is more effective when informed by a collaborative, democratic process that uses sufficient evidence, public opinion, critical thinking, and evaluation (Anbleyth-Evans & Lacy, 2019; Hahn, 2019; Heink et al., 2015; Kukkonen & Ylä-Anttila, 2020; Lester &

Foxwell-Norton, 2020; Soomai, 2017; Westwood et al., 2019). In order to equip decision-makers with sufficient evidence to develop effective policy, knowledge transfer is required (Heink et al., 2015; Nguyen et al., 2017; Young et al., 2016). In addition, the integrity of the completed scientific work is vital to assure that the knowledge produced is the best-available information in its rigor, trustworthiness, and empirical basis (Douglas, 2012). According to the Liberal Canadian government elected in 2015, there are two key principles of scientific integrity for science conducted in the federal public sector. They are to: (1) maintain independence by protecting research from political interference and (2) communicate results transparently (Science Integrity Project, 2015; ISEDC, 2018). It is generally agreed that scientific evidence is valuable to decision-making and promotes a democratic approach to governance by raising awareness, issuing warnings, defining problems, assessing policy options before and/or after implementation, and monitoring implemented policies (Douglas, 2012; McNie, 2007; Westwood et al., 2019). However, scientific integrity has not always been a priority for Canada's political leaders and governments.

Before the election of a majority Liberal government in 2015, Canada was governed by a Conservative majority led by Prime Minster Stephen Harper from 2011–2015. During that time, Canada witnessed what environmental scientists called "the death of evidence" and a "war on science" (Chung, 2014; Makuch, 2013). This "war on science" was characterized as an insufficiency of funds and opportunities for public sector scientists to research public health and the environment, and restrictions on public sector scientists' ability to freely communicate their research results internally to decision-makers or externally to the public without the burden of political or managerial interference (Learn, 2017; Turner, 2013; Wells, 2013; Westwood et al., 2019). This era had negative consequences for researchers, democratic processes, and the environment (Kheiriddin, 2012; Leblanc, 2012; May, 2012; Turner, 2013; Learn, 2017).

THE "DEATH OF EVIDENCE"

Prime Minister Stephen Harper held his seat in office from 2006 to 2015, but it was not until his third term beginning in 2011 that a majority Conservative government held power in the House of Commons and earned ultimate decision-making power over budget allocation (Learn, 2017; Leblanc, 2012). In 2012, the Conservative government began years of political interference with public sector research, particularly on issues such as climate change, oil and gas extraction, parks and protected areas, species at risk, and energy (Ghosh, 2012; Turner, 2013).

Under the majority Conservative government, research in these domains was defunded and prevented through burdensome restrictions on scientists' ability to conduct and communicate their research (Fitzpatrick, 2012; Gatehouse, 2013; Ghosh, 2012; Learn, 2017; Makuch, 2013; May, 2012; Turner, 2013; Wells, 2013). Political interference and control over messaging designed to fit the government's political and economic agenda weakened scientific integrity in Canada and led to negative impacts for the scientists who experienced overly controlled communications, reported in the public media as "muzzling" (Gatehouse, 2013; Ghosh, 2012; Makuch, 2013; Wattie, 2013).

Political interference

In 2012, the Jobs, Growth and Long-term Prosperity Act (S.C., 2012, c. 19) changed over 70 federal laws designed to protect and preserve the environment against further degradation due to climate change (Learn, 2017; May, 2012). The Act, popularly known as Bill C-38, repealed Canada's commitment to the Kyoto Protocol and replaced the Canadian Environmental Assessment Act (S.C., 1992, c. 37) and Canadian Environmental Protection Act (S.C., 1999, c. 33) with new versions (May, 2012). It also weakened agricultural protections, water programs, and other environmental regulations through amendments to the Navigable Waters Act (R.S.C., 1985, c. N-22), Fisheries Act (R.S.C., 1985, c. F-14), Parks Canada Agency Act (Parks Canada Agency Act, 1998), and more (May, 2012). The government made no announcements and issued no press releases around the passing of omnibus Bill C-38 that

made major changes to many unrelated Acts at the same time, making it difficult to evaluate and debate in the House of Commons (May, 2012; Turner, 2013). Beginning with the 2012 budget, funding priorities were allocated away from scientific and environmental research, particularly those on the forefront of monitoring anthropogenic climate change (Turner, 2013). When funding for the Polar Environment Atmospheric Research Laboratory was reallocated, researchers and the public began voicing serious concern (Turner, 2013; Learn, 2017). The eventual defunding of the Experimental Lakes Area facilities led to severe public backlash that prevented the shutdown of the facility entirely, however, its annual budget was still cut by two million dollars (Turner, 2013; Wells, 2013).

Controlling communications

According to an account published in Smithsonian Magazine (2017), Canadian scientists in the public sector who were still sufficiently resourced and funded in order to be able to conduct research were operating under unbearably tight restrictions when it came to communicating their findings. It was well established that failure to adhere to the government's rules would cost them their jobs (Learn, 2017). Max Bothwell, from Environment Canada (now Environment and Climate Change Canada), explained that when a journalist reached out the following would take place; (1) scientists were expected to contact a media control center so that the center could ensure the messaging of the conversation was in alignment with the government's political agenda, (2) the media center contacts the journalist to request their questions, (3) the media center provides the scientists with the approved answers and sometimes omit parts of the answers [drafted by scientists] in their response to the journalist (Learn, 2017). In one instance, Bothwell recounted "110 pages of emails between 16 different government communications staffers" (Learn, 2017), and in others, recounted the media center simply stalling until the journalist's deadlines were passed (Learn, 2017). When the head of the Canadian Shark Research Laboratory, Steven Campana, responded to a media inquiry in 2014 without explicit permission from the

media center, he received a disciplinary letter and "threat of severe punishment upon a second infraction" (Learn, 2017).

Campana reported that his usual 30–40 interviews a year dropped to no more than three (Learn, 2017). In order to share a novel finding about ageing crustaceans, he was required to put in a request to share the story with the media, but permissions never came, so the research was not shared publicly until it was picked up by American news outlets two years later (Learn, 2017). Bothwell had a similar story about a CBC radio interview that was approved only as long as media staffers were able to be present and listening during the phone interview (Learn, 2017). Dr. Ian Stirling recounted being escorted around an Arctic conference in Montreal in 2012 by government chaperones who were responsible for "shield[ing] and filter[ing] possible media questions, listen[ing to] them speak to other scientists and track[ing] which research posters they read" (Learn, 2017). During Harper's majority term, no direct communication or unauthorized communication between public sector scientists and the public or news media was allowed.

THE "WAR ON SCIENCE"

Beginning in 2012, scientists began to come forward with their concerns to the media and the public to expose how the Conservative government had restricted science and "muzzled" scientists (Fitzpatrick, 2012; Ghosh, 2012; Gatehouse, 2013; Makuch, 2013). Protests, marches, walks, and rallies were hosted across the country, but primarily in Ottawa, where in 2013 over 2000 scientists rallied on Parliament Hill to call attention to the "war on science" (Makuch, 2013). Science activists gained international media attention and the sympathy of a United States group based in Cambridge, Massachusetts, the Union of Concerned Scientists, who advocates for environmental science to support sustainability (Chung, 2014). The group drafted an open letter, signed by more than 800 scientists in

Canada and abroad calling on the Conservative government to remove "burdensome restrictions on scientific communication and collaboration faced by Canadian government scientists." (Chung, 2014). In response to public outcry, several institutions began to investigate claims of muzzling (Kondro, 2013; PIPSC, 2015) and later confirmed intentional restriction of federal public sector scientists' communications by the sitting government (Legault, 2018). The Professional Institute of the Public Service of Canada (PIPSC) surveyed scientists employed by the federal government in 2013 and found that 90% of respondents felt that they could not speak publicly about their work. Another 71% of survey respondents reported political interference, and half reported being aware of cases where Canadians' health or safety and/or the environment was comprised because of political interference with their scientific work (PIPSC, 2015).

In Stephen Harper's final year as Prime Minister, despite public outrage and adamant opposition from researchers and scientists in Canada and abroad, the government closed seven out of eleven world-renowned Department of Fisheries and Oceans (DFO) marine libraries (Learn, 2017; Sowunmi, 2015; Wells, 2013, 2014). The libraries stored decades of scientific evidence and research related to the environment, aquatic ecosystems, water safety, marine species, and more (Learn, 2017; Sowunmi, 2015; Wells, 2014). The majority of archived materials were discarded and destroyed without being digitized (Sowunmi, 2015).

Impacts of the "war on science"

Impact on researchers

In 2013, PIPSC reported that 5,332 federally employed scientists had "already either been fired from their jobs of transferred to other duties" (Nelson, 2013). For those who were able to keep their jobs, the working conditions were demoralizing and frustrating for the scientists who could not effectively conduct their scientific research due to the restrictions and interference (Learn, 2017).

Although the Harper administration's "war on science" affected scientists in the medical and health sciences (Miller et al., 2017), the most severe consequences were experiences by scientists working in the environmental studies and sciences in the federal public sector.

Impact on the democracy and the environment

A protester from the "death of evidence" mock funeral on Parliament Hill closed their speech with the words "No science, no evidence, no truth, no democracy" (Fitzpatrick, 2012), arguing that the Prime Minister's choice to exclude sufficient relevant, credible, and legitimate evidence from the decision-making process was effectively propaganda (Fitzpatrick, 2012). There is consensus among political-science experts that in order for governments to engage in democratic decision-making processes that address the interests and priorities of tax-paying citizens who entrust government, sufficient evidence to weigh in on that process and public engagement is crucial (Douglas, 2012; Hahn, 2019; Lester & Foxwell-Norton, 2020; McNie, 2007). When the Conservative government defunded, cut back, and in some cases destroyed evidence-producing agencies, labs, and libraries across Canada, it also lessened availability of the information required to inform the public.

Common consent not only internal to the government but externally among stakeholders and the public is crucial (Kerckhove et al., 2015), especially in evaluating which pieces of evidence are relevant, credible, legitimate, and the most useful to apply (Heink et al., 2015; McNie, 2007). Without the influence of public opinion, democratic decision-making on issues of policy is not possible (Douglas, 2012; Lester & Foxwell-Norton, 2020), but in order to equip the public with sufficient information to form an opinion, they must be allowed transparent access to the evidence that is communicated directly from scientists in layperson's terms (Lester and Foxwell-Norton, 2020). During the "war on science," Canadians' opportunity to engage with the evidence, think critically about the information, and evaluate it in order to democratically form public opinion for the government to act on was sidelined, resulting in

a significant decline in the public's trust of the federal government and its ability to uphold democratic processes (Beers, 2015; Kheiriddin, 2012; Turner, 2013).

The government's failure to implement adequate environmental protections through law and policy may have also led to further environmental degradation in the meantime (Anbleyth-Evans & Lacy, 2019; Sutherland et al., 2004; Wells, 2014). Public sector scientists in Canada have claimed that under the Conservative government, the environment suffered the consequences of inadequacies in effective and protective research and evidence-informed policy (Fitzpatrick, 2012; Gatehouse, 2013; Learn, 2017).

ENDING THE "WAR ON SCIENCE"

As Canada approached the 2015 federal election, Prime Minister Stephen Harper had fallen so far out of favour with Canadians that some voters were agreeing to vote for parties whom they do not usually support, engage in vote swapping, and participate in public campaign groups calling for votes for 'Anyone but Harper' and 'Anything but Conservative' (City News, 2015; Gordon, 2015). Over 50 candidates for Member of Parliament, including representatives from all major political parties, signed on to a 'science pledge' to, if elected, restore funding to federal science-based initiatives and enshrine the right of public sector scientists to speak to the media (Evidence for Democracy, 2015). In the nation's 154-year history, 2015 marked the first time that a federal electoral debate specifically about science was held (Gibbs & Westwood, 2015; Linnitt, 2015). The Liberal Party campaigned on a promise to "ensure that government science is fully available to the public, that scientists are able to speak freely about their work, and that scientific analyses are considered when the government makes decisions" (Liberal Party of Canada, 2019). Public sector scientists' ability to communicate was considered a key election issue (Halpern, 2015).

Upon successful election, Liberal party leader and Prime Minister, Justin Trudeau delivered immediately on some campaign promises related to scientific integrity. Trudeau swiftly freed scientists to

communicate directly with the media and increased funding to federal science in Canada (May, 2016; Statistics Canada, 2017a, 2017b). Within the first few months of 42nd Parliament, Trudeau also created a new cabinet position for a Minister of Science, appointed a Chief Science Advisor, and renamed the Environment Minister's position to Minister of Environment and Climate Change (Jones, 2015). In 2017, PIPSC repeated their 2013 survey about the “muzzling” of federal scientists. They found that 50% of scientists surveyed still felt obstructed from communicating their work, in comparison to the 90% reported four years prior (PIPSC, 2018). The number of those who reported they felt that political interference had compromised the use of scientific evidence in government decision-making dropped from 71% to 40% (PIPSC, 2018).

The second PIPSC survey demonstrated progress in terms of freedoms for public sector scientists, but the remaining percentage of respondents feeling obstructed from communicating and who felt that evidence was compromised by political interference remained cause for concern. In 2018, The Office of the Information Commissioner of Canada concluded a four-year review into federal scientists' ability to communicate (Legault, 2018). The study noted improvements since the Liberal government took power but found uneven policy application between departments and agencies and ongoing issues of independence of scientific offices (Legault, 2018).

A model for scientific integrity policies for federal science-based departments and agencies led by the Office of the Chief Science Advisor was developed in 2018 and implemented in 2019 (ISEDC, 2018, 2019) The policies were organized around two key principles of scientific integrity that (1) guarantee Canadian public sector scientists' right to communicate with the public about their areas of expertise, and (2) prevent political interference in the conduct or dissemination of research (ISEDC, 2018, 2019).

Addressing the consequences

In terms of consequences faced by environmental scientists, there is no easily accessible information to determine whether or not the Trudeau administration reinstated previous employment opportunities for environmental scientists and researchers in the public sector. Since the lifting of burdensome restrictions, evidenced by media reports (May, 2016), and implementation of policies to protect federal public scientists' freedoms (ISEDC, 2018, 2019), it is reasonable to assume that they would not have ongoing reason to be frustrated or feel unproductive and demoralized at work. However, no known research has been conducted to support this assumption or understand how effective the Trudeau government has been at addressing personal consequences to mental health and job satisfaction experienced by environmental scientists in the public sector or in any other sector or domain.

CONCLUSION

Years after the end of the "war on science" in Canada, it is apparent that attempts have been made to re-establish and protect scientific integrity. By immediately dedicating resources and personnel to address the status of scientific integrity in Canada (Jones, 2015; May, 2016) Prime Minister Justin Trudeau was able to keep his promises made in his first term election to lift the burdensome restrictions on science imposed by the previous government (Privy Council Office, 2019). The 2017 PIPSC report and study on communications by the Office of the Information Commissioner of Canada indicate a positive upward trend in improvements being made to the state of scientific integrity in the public sector (Legault, 2018; PIPSC, 2018). However, a more recent study by Robertson, et al., (in revision) reports "that conditions for Canadian researchers have improved since the end of the "war on science," but there are competing opinions on the impact of the scientific integrity policies" implemented by the Liberal government in 2019.

The media, gray literature, and peer-reviewed research published in Canada and elsewhere offers evidence of a recent history of interference in science, restrictions on researchers' ability to conduct and to communicate scientific work, and how interference impacts the ability of researchers to engage in effective knowledge exchange to inform the public and decision-makers. It is clear that the consequences of interference in science can be severe for researchers, as well as democratic processes and the environment (Robertson et al., in revision). In order to continue to improve scientific integrity it is essential to first understand its barriers, including the phenomenon of interference in science. To protect against the risk of similar consequences experienced during Canada's "war on science" in past years, interference in science and its impacts should be investigated on a continuous basis, with special attention paid to the researchers affected.

REFERENCES

Anbleyth-Evans, J., & Lacy, S. N. (2019). Feedback between fisher local ecological knowledge and scientific epistemologies in England: Building bridges for biodiversity conservation. Maritime Studies, 18(2), 189–203. https://doi.org/10.1007/s40152-019-00136-3

Beers, D. (2015, August 10). Harper, serial abuser of power: The evidence compiled. The Tyee. https://thetyee.ca/Opinion/2015/08/10/Harper-Abuses-of-Power-Final/

Canadian Environmental Assessment Act, (1992). https://laws-lois.justice.gc.ca/eng/acts/c-15.2/

Canadian Environmental Protection Act, (1999). https://laws-lois.justice.gc.ca/eng/acts/c-15.31/

Canadian Navigable Waters Act, (1985). https://laws-lois.justice.gc.ca/eng/acts/n-22/

Chung, E. (2014, October 20). Foreign scientists call on Stephen Harper to restore science funding, freedom. CBC News. https://www.cbc.ca/news/technology/foreign-scientists-call-on-stephen-harper-to-restore-science-funding-freedom-1.2806571

City News. (2015, September 14). “Anyone But Harper” team turns to vote-swapping to oust Conservatives. City News. https://toronto.citynews.ca/2015/09/14/anyone-but-harper-team-turns-to-vote-swapping-to-oust-conservatives/

Douglas, H. (2012). Weighing Complex Evidence in a Democratic Society. Kennedy Institute of Ethics Journal, 22(2), 139–162. https://doi.org/10.1353/ken.2012.0009

Evidence for Democracy. (2015). Federal candidates who have taken the Science Pledge. https://evidencefordemocracy.ca/en/content/federal-candidates-standing-science-and-smart-decision-making

Fisheries Act, (1985). https://laws-lois.justice.gc.ca/eng/acts/f-14/

Fitzpatrick, M. (2012, July). Death of scientific evidence mourned on Parliament Hill. CBC News. https://www.cbc.ca/news/politics/death-of-scientific-evidence-mourned-on-parliament-hill-1.1218019

Gatehouse, J. (2013, May 3). When science goes silent. Macleans. https://www.macleans.ca/news/canada/when-science-goes-silent/

Ghosh, P. (2012, February 17). Canadian government is “muzzling its scientists.” BBC News. https://www.bbc.com/news/science-environment-16861468

Gibbs, K., & Westwood, A. (2015, August 13). We need a national debate on science. The Star. https://www.thestar.com/opinion/commentary/2015/08/12/we-need-a-national-debate-on-science.html

Gordon, J. (2015, September 24). Canada PM faces “Anyone But Harper” strategic voting in election. Reuters. https://www.reuters.com/article/uk-canada-election-strategic-idUKKCN0RO2II20150924

Hahn, R. (2019). Building upon foundations for evidence-based policy. Science, 364(6440), 534–535. https://doi.org/10.1126/science.aaw9446

Halpern, M. (2015, October 21). How science helped to swing the Canadian election. The Guardian. https://www.theguardian.com/science/political-science/2015/oct/21/how-science-helped-to-swing-the-canadian-election

Heink, U., Marquard, E., Heubach, K., Jax, K., Kugel, C., Neßhöver, C., Neumann, R. K., Paulsch, A., Tilch, S., Timaeus, J., & Vandewalle, M. (2015). Conceptualizing credibility, relevance and legitimacy for evaluating the effectiveness of science-policy interfaces: Challenges and opportunities. Science and Public Policy, 42(5), 676–689. https://doi.org/10.1093/scipol/scu082

Innovation Science and Economic Development Canada. (2018). Model policy on scientific integrity. https://www.ic.gc.ca/eic/site/052.nsf/eng/00010.html

Innovation Science and Economic Development Canada. (2019). Canada's science vision. https://www.ic.gc.ca/eic/site/131.nsf/eng/h_00000.html

Jobs, Growth and Long-term Prosperity Act, (2012). https://laws-lois.justice.gc.ca/eng/acts/J-0.8/page-1.html

Jones, N. (2015). Canada creates science-minister post. Nature, 527(7577), 146. https://doi.org/10.1038/nature.2015.18739

Kerckhove, D. T., Rennie, M. D., & Cormier, R. (2015). Censoring government scientists and the role of consensus in science advice. EMBO Reports, 16(3), 263–266. https://doi.org/10.15252/embr.201439680

Kheiriddin, T. (2012, November 13). The public's distrust of Stephen Harper poses dilemma for Conservatives. IPolitics. https://ipolitics.ca/2012/11/13/the-publics-distrust-of-stephen-harper-poses-dilemma-for-conservatives/

Kondro, W. (2013, April 2). Canadian scientists explain exactly how their government silenced science. Science. https://www.sciencemag.org/news/2013/04/canadian-official-investigate-allegations-government-scientists-are-being-muzzled

Kukkonen, A., & Ylä-Anttila, T. (2020). The science-policy interface as a discourse network: Finland's climate change policy 2002-2015. Politics and Governance, 8(2), 200–214. https://doi.org/10.17645/pag.v8i2.2603

Learn, J. R. (2017). Canadian scientists explain exactly how their government silenced science. Smithsonian Magazine, 2–3. https://www.smithsonianmag.com/science-nature/canadian-scientists-open-about-how-their-government-silenced-science-180961942/

Leblanc, D. (2012, November 12). Harper among least trusted leaders, poll shows. The Globe and Mail. https://www.theglobeandmail.com/news/politics/harper-among-least-trusted-leaders-poll-shows/article5187774/

Legault, S. (2018). Complaint outcome to Calvin Sandborne of the Environmental Law Centre.

Lester, L., & Foxwell-Norton, K. (2020). Citizens and science: media, communication and conservation. In Conservation research, policy and practice (pp. 265–276). Cambridge University Press. https://doi.org/10.1017/9781108638210.016

Liberal Party of Canada. (2019). Forward, a real plan for the middle class (Liberal platform election 2019). https://2019.liberal.ca/wp-content/uploads/sites/292/2019/09/Forward-A-real-plan-for-the-middle-class.pdf

Linnitt, C. (2015, September 25). “War on Science” top of mind for candidates and public at science and technology debate. The Narwhal.

Makuch, B. (2013, September 16). Stop muzzling scientists, protesters tell Tories. The Star. https://www.thestar.com/news/canada/2013/09/16/stop_muzzling_scientists_protesters_tell_tories.html

May, E. (2012, May 10). Bill C-38: the Environmental Destruction Act. The Tyee. https://thetyee.ca/Opinion/2012/05/10/Bill-C38/

May, K. (2016, December 11). Federal scientists win right to be unmuzzled in tentative PIPSC contract. Ottawa Citizen. https://ottawacitizen.com/news/politics/federal-scientists-unmuzzled-in-tentative-pipsc-contract

McNie, E. C. (2007). Reconciling the supply of scientific information with user demands: an analysis of the problem and review of the literature. Environmental Science & Policy, 10(1), 17–38. https://doi.org/10.1016/j.envsci.2006.10.004

Miller, P., Martino, F., Gross, S., Curtis, A., Mayshak, R., Droste, N., & Kypri, K. (2017). Funder interference in addiction research: An international survey of authors. Addictive Behaviors, 72(March), 100–105. https://doi.org/10.1016/j.addbeh.2017.03.026

Nelson, J. (2013). The Harper government's war on science many scientific programs terminated, many scientists fired. Candian Center for Policy Alternatives. https://www.policyalternatives.ca/publications/monitor/harper-governments-war-science

Nguyen, V. M., Young, N., & Cooke, S. J. (2017). A roadmap for knowledge exchange and mobilization research in conservation and natural resource management. Conservation Biology, 31(4), 789–798. https://doi.org/10.1111/cobi.12857

Parks Canada Agency Act, (1998). https://laws-lois.justice.gc.ca/eng/acts/P-0.4/

PIPSC. (2015). The big chill: Silencing public interest science a survey. https://pipsc.ca/sites/default/files/comms/PDF_Reports/bigchill.en_.pdf

PIPSC. (2017). Defrosting public science.

Privy Council Office. (2019). Mandate Letter Tracker: Delivering results for Canadians. Government of Canada. https://www.canada.ca/en/privy-council/campaigns/mandate-tracker-results-canadians-all.html

Robertson, M. E., Chu, S. M., Cloutier, A., Mongeon, P., Driscoll, D. A., Heer, T., & Westwood, A. R. (n.d.). Interference in science: Scientists' perspectives on their ability to communicate and conduct environmental research in Canada. FACETS.

Science Integrity Project. (2015). Statement of principles for sound decision making in canada. http://scienceintegrity.ca/

Soomai, S. S. (2017). The science-policy interface in fisheries management: Insights about the influence of organizational structure and culture on information pathways. Marine Policy, 81, 53–63. https://doi.org/10.1016/j.marpol.2017.03.016

Sowunmi, J. (2015, January 15). The Harper government has trashed and destroyed environmental books and documents. Vice. https://www.vice.com/en/article/4w578d/the-harper-government-has-trashed-and-burned-environmental-books-and-documents

Statistics Canada. (2017a). Federal government spending on science and technology, 2015/2016 (final), 2016/2017 (preliminary) and 2017/2018 (intentions) Released.

Statistics Canada. (2017b). Table 358-0166 - Federal personnel engaged in science and technological activities, by major departments and agencies, annual (2010-2018). CANSIM (Database). https://goo.gl/2tHsrc

Sutherland, W. J., Pullin, A. S., Dolman, P. M., & Knight, T. M. (2004). The need for evidence-based conservation. Trends in Ecology and Evolution, 19(6), 305–308. https://doi.org/10.1016/j.tree.2004.03.018

Turner, C. (2013). The War on Science. Greystone Books.

Wattie, C. (2013). A group of protesters represent former Prime Minister Stephen Harper muzzling a Member of Parliament, a librarian and a scientist in April 2013. https://www.rcinet.ca/en/2018/07/30/scientific-integrity-canada-freedom/

Wells, P. G. (2013). Canadian aquatic science and environmental legislation under threat. Marine Pollution Bulletin, 69(1–2), 1–2. https://doi.org/10.1016/j.marpolbul.2013.01.035

Wells, P. G. (2014). Managing ocean information in the digital era - Events in Canada open questions about the role of marine science libraries. Marine Pollution Bulletin, 83(1), 1–4. https://doi.org/10.1016/j.marpolbul.2014.04.012

Westwood, A. R., Olszynski, M., Fox, C. H., Ford, A. T., Jacob, A. L., Moore, J. W., & Palen, W. J. (2019). The role of science in contemporary Canadian environmental decision-making: The example of environmental assessment. UBC Law Review, 52(1), 243–284. https://www.researchgate.net/publication/330956174_The_role_of_science_in_contemporary_Canadian_environmental_decision_making_The_example_of_environmental_assessment

Young, N., Nguyen, V. M., Corriveau, M., Cooke, S. J., & Hinch, S. G. (2016). Knowledge users' perspectives and advice on how to improve knowledge exchange and mobilization in the case of a co-managed fishery. Environmental Science & Policy, 66, 170–178. https://doi.org/10.1016/j.envsci.2016.09.002