

What Do Users Want From a State of the Environment Report?
A Study of Awareness and Use of the *State of the Scotian Shelf Report*

by

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This thesis is dedicated to Bertrum MacDonald for his advice and support, to Elinor Crosby for her encouragement, and to you for taking the time to read it.

Table of Contents

List of Tables.....	vii
List of Figures.....	viii
Abstract.....	ix
List of Abbreviations and Symbols Used.....	x
Acknowledgments.....	xi
Chapter 1: Introduction.....	1
Chapter 2: Literature Review.....	8
2.1 State of the Environment Reporting: Origins, Characteristics, and Selected Examples of the Form.....	8
2.2 Studying the Impact of State of the Environment Reports.....	12
2.3 Salience, Legitimacy, and Credibility: Metrics for Evaluating the Usefulness of SOE Reports.....	20
2.4 Stakeholder Engagement and Co-production of Knowledge.....	25
2.5 Eastern Scotian Shelf Integrated Management Initiative and the State of the Scotian Shelf Report.....	30
Chapter 3: Methodology.....	36
3.1 Introduction.....	36
3.2 Preliminary Data Collection.....	37
3.2.1 Citation Searching.....	37
3.2.2 Google Analytics for COINAtlantic Website.....	38
3.3 Primary Data Collection.....	39
3.3.1 Citation Search.....	39
3.3.2 Google Analytics for COINAtlantic Website.....	39

3.3.3 Surveys.....	41
3.3.4 Semi-Structured Interviews.....	42
3.3.5 Ethics Approval.....	43
Chapter 4: Results.....	45
4.1 Preliminary Data Collection.....	45
4.1.1 Citation Search.....	45
4.1.2 Google Analytics for COINAtlantic Website.....	45
4.1.3 Analysis of Preliminary Data.....	46
4.2 Primary Data Collection.....	48
4.2.1 Web Traffic Analysis for COINAtlantic Site (Google Analytics).....	48
4.2.2 Citation Searching and Analysis.....	56
4.2.3 Online Surveys.....	60
4.2.4 Interviews with ESSIM SAC Members.....	84
Chapter 5: Discussion.....	114
5.1 Google Analytics Data.....	114
5.1.1 Evidence of Awareness and Access for SoSS Report Landing Page at COINAtlantic.....	114
5.1.2 Evidence of the Effectiveness of Promotional Efforts for the SoSS Report.....	115
5.2 Citation Searching.....	116
5.3 Online Surveys.....	117
5.3.1 Coastal Update Newsletter.....	117
5.3.2 Awareness of the SoSS Report.....	119
5.3.3 Promotion of the SoSS Report	119

5.3.4	Format of the SoSS Report.....	121
5.3.5	Use of the SoSS Report	121
5.3.6	Stakeholder Engagement in the Development of the SoSS Report.....	122
5.4	Interviews with Former ESSIM SAC Members.....	123
5.4.1	The Role of the ESSIM Stakeholder Advisory Committee.....	123
5.4.2	Development of the State of the Scotian Shelf Report.....	126
5.4.3	Format, Distribution, and Promotion of the SoSS Report	127
5.4.4	Use of the SoSS Report.....	130
5.4.5	Updating the SoSS Report.....	132
5.5	Limitations of the Methods.....	132
5.5.1	Limitations of Google Analytics Data.....	132
5.5.2	Limitations of Citation Data.....	133
5.5.3	Limitations of Online Survey Data.....	134
5.5.4	Limitations of Interview Data.....	135
Chapter 6:	Conclusions and Recommendations.....	137
6.1	Conclusions.....	137
6.2	Recommendations.....	144
6.2.1	Incorporate Evaluation Planning into Project Design for Future SOEs.....	144
6.2.2	Expand and Sustain Promotional Efforts for SOEs to Increase Awareness and Use.....	147
6.2.3	Expand Stakeholder Engagement Efforts in Production of SOEs	148
6.2.4	Future Research.....	149
6.3	What is the Value of a State of the Environment Report?.....	150
References	152

Appendix A: Social Sciences & Humanities Research Ethics Board Letter of Approval.....	159
Appendix B: Online Survey for Subscribers to the Atlantic Coastal Zone Information Steering Committee's Coastal Update Newsletter	160
Appendix C: Online Survey for Former Members of the Eastern Scotian Shelf Integrated Management Initiative's Stakeholder Advisory Committee	168
Appendix D: Interview Protocol for Semi-Structured Interviews with Former Members of ESSIM Stakeholder Advisory Committee.....	172
Appendix E: Invitation to Former Members of ESSIM Stakeholder Advisory Committee to Participate in Semi-structured Interviews.....	174
Appendix F: Consent Forms for Participation in Semi-structured Interviews.....	175
Appendix G: Text of Consent to Participate in Surveys.....	179

List of Tables

Table 2.1: Drafting Process for State of the Scotian Shelf Report Theme Papers (Personal Communication w/H. Breeze).....	34
Table 4.1: Preliminary Google Analytics Data for SoSS Report Landing Page.....	46
Table 4.2: Basic Analytics for Landing Pages A and B—Period A (May 31, 2011- April 8, 2014).....	51
Table 4.3: Top Five Referrals to SoSS Report Landing Pages—Period A.....	53
Table 4.4: Pageviews (and Unique Pageviews) for Months Before and After Distribution of Survey Invitations on April 8, 2014.....	55
Table 4.5: Coastal Update Respondents by Age Group (N=42).....	62
Table 4.6: Coastal Update Respondents by Location (N=42).....	62
Table 4.7: Coastal Update Respondents by Affiliation (N=42).....	62
Table 4.8: Information in Coastal Update of Most Interest to Subscribers.....	64
Table 4.9: Coastal Update Subscribers Identifying Potential Social Media Platforms for Promotion of SoSS Report.....	66
Table 4.10: Respondents Indicating Reading of Theme Papers—Survey of Coastal Update Subscribers.....	69
Table 4.11: Respondents Indicating Use of Theme Papers—Survey of Coastal Update Subscribers.....	70
Table 4.12: Respondents Indicating Reading of Theme Papers—Survey of ESSIM SAC Members (N=10).....	80
Table 4.13: Respondents Indicating Use of Theme Papers—Survey of ESSIM SAC Members (N=10).....	81
Table 4.14: Drafting Process for State of the Scotian Shelf Report Theme Papers (Personal Communication w/H. Breeze).....	90

List of Figures

Figure 4.1: COINAtlantic.com Landing Page for SoSS Report.....	50
Figure 4.2: Daily Visits to SoSS Report Landing Page A, May 31, 2011-April 8, 2014...	56
Figure 4.3: Daily Visits to SoSS Report Landing Page B, May 31, 2011-April 8, 2014...	56

Abstract

This thesis is a case study of awareness and use of the *State of the Scotian Shelf (SoSS) Report*, a state of the marine environment report produced by the Canada Department of Fisheries and Oceans (DFO) and co-published with the Atlantic Coastal Zone Information Steering Committee (ACZISC). Originally intended as an evaluative support for the now-defunct Eastern Scotian Shelf Integrated Management (ESSIM) Initiative, the *SoSS Report* was completed and published as a standalone product, despite the initiative's end. The case study utilized multiple methodologies to search for evidence of awareness and use of the report in the coastal zone management community of practice, as well as to investigate the nature of the report's usage. Web traffic analysis, via Google Analytics and citation analysis via major scientific citation sources, was used to determine evidence of awareness and use. Online surveys were distributed to two audiences to evaluate readers' opinions of the report's value and determine the range of ways in which the report is used. Further detail was revealed by conducting interviews with eight members of the former ESSIM Stakeholder Advisory Committee, which oversaw the report's development. Insights about the report's development, publication, and reception are presented, with discussion focusing on the various uses the report serves for its varied audiences. Conclusions regarding the effectiveness of the report's publication and promotion are presented, with recommendations for increasing the awareness and use of the *SoSS Report* and future state of the environment reporting endeavours by DFO and other organizations.

List of Abbreviations and Symbols Used

ACZISC - Atlantic Coastal Zone Information Steering Committee
COIN - Coasts and Ocean Information Network
CRFM - Caribbean Regional Fisheries Mechanism
DFO – Canada Department of Fisheries and Oceans
DPSIR - Driving Forces, States, Impacts, and Responses framework
EBSA - Ecologically and Biologically Significant Area
EIUI - Environmental Information: Use and Influence
ESSIM - Eastern Scotian Shelf Integrated Management
FAO - Food and Agriculture Organization of the United Nations
GEA - Global Environmental Assessment
GESAMP – Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection
GOMC - Gulf of Maine Council on the Marine Environment
ICOM - Integrated Coastal and Ocean Management
IP - Internet Protocol
MPA - Marine Protected Areas
NGO - Non-Governmental Organization
OHSAR - Ocean's Habitat and Species at Risk
OSPAR - Convention for the Protection of the Marine Environment of the North-East Atlantic
PDF - Portable Document Format
PON - Provincial Oceans Network (Nova Scotia)
SAC - Stakeholder Advisory Committee
SOE - State of the environment report
SOME - State of the marine environment report
SoSS - State of the Scotian Shelf
UN - United Nations
UNEP - United Nations Environment Programme
US - United States

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Chapter 1: Introduction

Modern environmental management is a complex task that requires managers to consider a wide range of variables, and adjudicate between a wide range of competing interests. Ecosystems are extremely complex systems, held together by a delicate balance of interdependent flora, fauna, and non-biotic processes. The challenge of maintaining that balance is exacerbated by the fact that managed ecosystems are managed because they serve as vital resources for humans: literal founts of natural resources such as lumber, oil, and natural gas, but also habitats, agricultural land, fishing and hunting sites, and tourist attractions. The management of these resources is further complicated by the fact that a variety of actors can claim a stake in any one of them: the same section of land and sea that provides a way of life for local fishermen can also be the location of publicly-owned natural gas reserves, privately-owned cottages along a scenic coastline, and the primary habitat of a protected species. The task becomes more complicated still when anthropogenic climate change is factored in to the equation, as ecosystems worldwide see the first- and second-order effects of a rapidly warming climate. Against this multivariate backdrop, environmental managers must identify the correct information resources from among the enormous volumes of available scientific information in order to make informed and effective decisions and balance the demands of sustainability and human need.

This need for periodic and effectively organized scientific information has given rise to the production of State of the Environment (SOE) reports, also known as environmental assessments. Various governments, non-governmental organizations, and

inter-governmental partnerships have produced SOE reports since 1972, when the United Nations (UN) Conference on the Human Environment recognized that responsible environmental management, in order to be effective, would have to be conducted on a global scale, and informed by the highest quality scientific information possible (UN, 1972). This same period of UN activity produced the first SOE, the “unofficial report” to the United Nations titled *Only One Earth* (Ward & Dubos, 1972). Though SOE reports can vary in scope, from *The 2009 State of Nova Scotia's Coast* report (2009), produced by the government of Nova Scotia and discussing the particulars of that province's coastal environment, to the *Global Environmental Outlook* report (2012), produced by the United Nations Environment Programme (UNEP) and assessing the state of the entire world's environment, their purpose is generally the same. This purpose is to provide a comprehensive aggregation of the available scientific knowledge regarding a particular environment or ecosystem. These assessments have the ultimate goal of providing credible, legitimate, and salient information about the diverse range of human environments, considering the conflicting purposes these environments often serve, and providing an invaluable resource that can help inform both the public and the responsible governmental and industrial decision makers in environmental management.

Do these reports serve their intended purpose? In a 2003 *Marine Pollution Bulletin* viewpoint piece (Wells, 2003), focused on State of the Marine Environment (SOME) reports, Wells argued that the potential of these resources is frequently unfulfilled. He suggested that “the value of the process of preparing SOME reports may be underappreciated and [that] many excellent SOME products have been under-used.” (p. 1219). Despite the large-scale resources required to produce such documents, and their

obvious potential to serve as valuable information resources, Wells suggested that “most SOME reports are written and published, receiving considerable attention for a short while, but often shelved and seldom used other than as reference works” (p. 1219): a potentially colossal waste of opportunity and resources. Are the relevant decision makers even aware of the existence of these reports? Do they consider them credible, legitimate, and salient enough to use as knowledge resources? Is their decision-making process ultimately influenced by the information contained within?

At the time of Wells' *Marine Pollution Bulletin* piece, the study of scientific information's influence on policy making was in its infancy; in the decade since Wells raised these concerns, a substantial body of scholarship has developed investigating the degree to which environmental managers and policymakers are aware of, use, and are influenced by scientific information when making decisions. One notable, large-scale effort in assessing the impact of SOEs is the Global Environmental Assessment Project, launched in 1995 by William C. Clark, Nancy Dickson, Jill Jäger, Sheila Jasanoff, Robert O. Keohane, and James J. McCarthy, and culminating in the publication of *Global Environmental Assessments: Information and Influence* (Mitchell, Clark, Cash, & Dickson, 2006), a collection of essays reviewing the project's findings.

The Environmental Information: Use and Influence Research Initiative (EIUI), founded at Dalhousie University in 2007 by Wells and MacDonald (www.eiui.ca), studies the awareness, use, and influence of scientific information, with a particular focus on marine scientific information. The initiative conducts interdisciplinary research in partnership with governmental, non-governmental, and intergovernmental organizations that produce and distribute marine scientific information, such as the Nova Scotia

Department of Fisheries and Aquaculture, the Gulf of Maine Council on the Marine Environment (GOMC) and the Food and Agriculture Organization of the United Nations (FAO). The bulk of this research takes the form of collaborative case studies of the impact of particular reports, using methods ranging from citation analysis (Avdić, 2013; Cordes, 2004; Hutton, 2009) to surveys and interviews with potential users and stakeholders in marine environmental management (Cossarini, 2010; Cossarini, MacDonald, & Wells, 2014; Soomai, Wells, & MacDonald, 2011). Collectively, these case studies comprise a substantial body of knowledge with the simultaneous goals of improving the academic understanding of publication impact and providing practical advice on best practices to partner organizations.

The case study presented herein investigated awareness and use of the *State of the Scotian Shelf Report (SoSS)* (Department of Fisheries and Oceans, 2011) under the aegis of EIUI and in partnership with the Canada Department of Fisheries and Oceans (DFO) and the Atlantic Coastal Zone Information Steering Committee (ACZISC). The *State of the Scotian Shelf Report* is a SOME report created by the DFO and co-published and hosted online by the ACZISC on its Coasts and Ocean Information Network (COIN) Atlantic website. The report is produced in a modular format, with a large context document providing an overview of the socio-economic and environmental conditions of the Scotian Shelf and (to date) 13 shorter “theme papers” addressing particular areas of interest, such as climate change or ocean acidification.

The *SoSS Report* was originally conceived as an evaluation support for the Eastern Scotian Shelf Integrated Management Initiative (ESSIM), a federal initiative to develop “long-term direction and a common basis for integrated, ecosystem-based and adaptive

ocean management” (Department of Fisheries and Oceans, 2013, para. 2). Accordingly, the theme paper categories for the *SoSS Report* mirror the intended evaluation areas for ESSIM. However, following a lengthy period of development, the ESSIM Initiative was left in legislative limbo when ministerial approval was withheld. As of the date of this study, the initiative is, for all intents and purposes, discontinued. This leaves the *SoSS Report* in an unusual position. Its original purpose and audience (stakeholders in the ESSIM Initiative) was lost, but the report was published on the grounds that it still constituted an effective information resource for coastal zone managers on the Scotian Shelf.

The current case study was approached differently than previous EIUI case studies of awareness, use, and influence. In response to requests from partner organizations for steps to be made towards synthesizing the results of EIUI's research to develop recommendations for SOME best practices, it was decided that this study would use the *State of the Scotian Shelf Report* as a launching point to investigate what end-users look for in a state of the environment report and how they put it to use.

This study of the *State of the Scotian Shelf Report* asked the following questions:

- a) What was the motivation for creating the *State of the Scotian Shelf Report*?
 - By what process was the report created?
 - How was the scope of the report determined?
- b) How were stakeholders involved in the process of creating the *State of the Scotian Shelf Report*?

- Do members of ESSIM's Stakeholder Advisory Committee find that their involvement in the process led to a document that reflects their information needs? Why or why not?
- Are members of ESSIM's Stakeholder Advisory Committee satisfied with the end product of the *State of the Scotian Shelf Report*, with regard to its content, format, distribution, promotion, and availability?

c) What evidence is there of awareness and use of the *State of the Scotian Shelf Report* in the relevant communities of practice?

- If potential audience members have used the report, how did they use it and how helpful did they find it?
- If potential audience members are aware of the *State of the Scotian Shelf Report* but have not used it, why did they decide not to use it? How might they have used it?
- If potential audience members are aware of the *State of the Scotian Shelf Report*, how did they become aware of it? What methods of promotion would users prefer?

d) Do readers of the *State of the Scotian Shelf* find the report's modular, digital format helpful?

- Could potential audience members who are not currently using the *State of the Scotian Shelf Report* be drawn into the audience by a change in formatting or distribution?
- What format(s) would members of the various potential audiences

(eg. researchers, educators, coastal zone managers, and industry)
consider optimal for SOME reports generally? Are different
formats better for different audiences?

e) Based on the findings of the case study, what recommendations can be made for
future production of SOE reports by the DFO and other organizations?

f) Based on the findings of the case study, what recommendations can be made for
effective promotion and dissemination of future SOE reports by the DFO and
other organizations?

Chapter 2: Literature Review

2.1 State of the Environment Reporting: Origins, Characteristics, and Selected Examples of the Form

The 1972 United Nations Conference on the Human Environment was “an attempt at forging a basic common outlook on how to address the challenge of preserving and enhancing the human environment” (Handl, 2013), marking an epochal shift in the approach of governments to the management of the world's ecosystems and the response of the international community to large-scale environmental degradation. The resulting declaration of the conference, acknowledging the need for “a common outlook and for common principles” (United Nations, 1972, para. 1) regarding environmental issues, proclaimed that the “protection and improvement of the human environment is a major issue which affects the well-being of peoples and economic development throughout the world” (para. 3) and, by extension, “the duty of all governments” (para. 3). The declaration's impact on the approach of governments to the field of environmental management was significant and, in this age of rapidly advancing climate change, oceanic deterioration, and controversies over fossil fuel extraction, is perhaps more significant than ever. However, for the purposes of this study, the most significant statement of the *Declaration of the United Nations Conference on the Human Environment (1972)* was buried near the end, in the 20th of the declaration's 25 articulated principles: a proclamation that the promotion of scientific information related to environmental problems was of paramount importance to the emerging cause of proactive environmental management, reflected in a call for “the free flow of up-to-date scientific information and

transfer of experience” (para. 30) to support responsible environmental decision-making. Ward and Dubos's (1972) groundbreaking SOE was commissioned for the conference in service of this principle, which would ultimately lead to the development of the field of state of the environment reporting, a concerted attempt by governmental, non-governmental, and inter-governmental bodies to bring scientific information to bear as a tool for responsible policy making.

Today, SOE reports are produced by a variety of organizations around the world, ranging from non-governmental organizations (NGOs) and regional, intergovernmental organizations such as the Gulf of Maine Council to global, international governance bodies, such as the United Nations Environmental Programme. SOE reports can vary considerably in the scope of their subject matter and audience: *The 2009 State of Nova Scotia's Coast Report* addresses a Nova Scotian audience about concerns related to that province's coastal environment while UNEP's *Global Environmental Outlook* report aims to provide information about the environment of the earth to the governments of each of the UN's member countries. However, despite these differences in scope, SOE reports generally share common functions, well-articulated by the Australian Department of the Environment's (2013) “About State of the Environment Reporting” web resource. First, SOE reporting seeks to make useful and relevant scientific information about the environment available to policymakers in a comprehensible and easily digested format in order to “support decisions about environmental policies and management at [various] scales” (Australian Department of the Environment, 2013, para. 5). At the same time, such reports are not intended as purely internal government documents: they are typically released to the public in an effort to raise awareness about the issues facing the

environment (Australian Department of the Environment, 2013). These two goals are complementary: by providing policymakers with a strong, evidence-based decision-making aid while promoting environmental awareness on the part of their constituents, SOE reports aim to create a positive feedback loop, leading to “increased awareness, among decision-makers and the public, of the status and implications of the condition of the [environment] and pressures on it” and, ultimately, “more informed environmental management decisions that lead to more sustainable use and effective conservation of environmental assets” (Australian Department of the Environment, 2013, para. 6).

As noted above, the United Nations itself produces globally-oriented SOE reports as a response to its own call for information resources to be made readily available to policymakers. Of necessity, these reports provide large-scale information that is intended for use by policymakers in vastly different environmental and political contexts. By contrast, SOE reports with a more limited scope tend to be more strongly targeted to particular geographic spheres of influence or management initiatives. Examples of this tendency include the *State of the Gulf of Maine Report*, which was produced by the Gulf of Maine Council as a natural outgrowth of its goal of “supporting region-wide information gathering and sharing” (Gulf of Maine Council on the Marine Environment, 2012, p. 10) to promote public awareness and address gaps in the science policy interface, and *The 2009 State of Nova Scotia's Coast Report*, produced by the Government of Nova Scotia's Provincial Oceans Network (2009) to promote public awareness and engagement with the province's then-planned effort to develop an integrated coastal management strategy to ensure the sustainability of the Nova Scotian coastal environment (Soomai, MacDonald, & Wells, 2011a). This focus on education and practicality is essential to the

nature of SOE reports, which must not only collect scientific information in a format that is accessible to readers who may lack a scientific background, but identify the scientific information that is most relevant to the issues facing its target audience in order to serve its purpose as a policy- and decision-making support.

Because SOE reports must make large volumes of complex scientific information digestible by audiences who may lack the capacity to evaluate traditional, academically published scientific research, it is no surprise that much attention is paid by their producers to comprehension, readability, and format. SOE reports are often documents of high aesthetic quality, in contrast to traditional academic journal articles: a glance at any of the theme papers of the *State of the Scotian Shelf Report* will reveal a plethora of high-resolution images that serve to hold the reader's attention and serve as a reminder of the subjective appeal of environmental resources, rather than actively illustrating the concept being discussed in the text of the report. While the standard format for an SOE report is a single, large, omnibus document covering a range of issues related to the environment, recent years have seen increased attempts to present information in other, potentially more accessible formats. These attempts range from issuing supplemental documents such as fact sheets alongside the main report to presenting the entire report in a “modular” format that favours a series of shorter, thematically-focused documents over a single, one-time omnibus. Additionally, some reports are tailored specifically to the needs of policymakers.

The record of SOE reports in achieving the goals outlined above is mixed. The availability of authoritative scientific information for policymakers, along with the large-scale intergovernmental approach to environmental management called for by the UN's

1972 Conference Declaration, has been credited with the successful international response to pressing environmental issues such as acid rain and the depletion of the stratospheric ozone layer (Mitchell, Clark, & Cash, 2006). At the same time, pressing issues such as global warming, the attendant change in the Earth's climate, and the increasing rate at which the planet's fossil fuels are being depleted, all issues identified as pressing in the original UN declaration (United Nations, 1972), remain of paramount concern today, with seemingly no immediate prospects for international political consensus on a responsible approach, despite the longstanding scientific consensus being well-known to policymakers. Clearly, SOE reports have the potential to contribute greatly to the cause of evidence-based policymaking; equally clearly, the producers of these reports have reason to investigate how and why these reports succeed or fail in their stated goals, in order to forge best practices for the SOE reporting field.

2.2 Studying the Impact of State of the Environment Reports

As noted above, the 2003 *Marine Pollution Bulletin* editorial (Wells) argued that there is a significant likelihood that the “value of the process” (p. 1219) of generating SOE reports may be underestimated by policymakers, and that the scientific information contained within them may be underutilized in the decision making process (the editorial focused particularly on marine environmental reports, or SOME reports, but its arguments certainly apply to the broader field of SOE reporting). In the years immediately following the publication of Wells's editorial, a growing field of research into the awareness, use, and influence of SOE reports emerged; indeed, some of this research took that very editorial as its impetus. Two notable efforts in this cause are the Global Environmental

Assessment (GEA) Project and the Environmental Information: Use and Influence (EIUI) Research program. The GEA Project is a large-scale, long-term effort by a consortium of scholars “directed at understanding the role of organized efforts to bring scientific information to bear in shaping social responses to large-scale environmental change” (Mitchell, Clark, Cash, & Dickson, 2006, p.ix), which compiled the results of its initial case studies into a series of volumes published between 2004 and 2006. The EIUI program, founded by MacDonald and Wells of Dalhousie University, conducts similar interdisciplinary case studies into the use of marine scientific information in policy formulation and environmental management, often in the form of student-led projects (for instance, this study). This section will consider the methods by which these studies have been conducted by researchers in the field, with a particular emphasis placed on studies conducted by the EIUI program.

Nutley, Walter, and Davies (2007) argue that one of the great challenges to measuring the “use” of any kind of research is defining exactly what use means. Nutley et al. begin with the observation that the “most common image of research use is of an instrumental process that involves the direct application of research to policy and practice decisions” (2007, p. 34). However, they go on to propose that information is “often used in much more indirect, diverse and subtle ways,” which are commonly referred to as conceptual, rather than instrumental, uses (Nutley et al., 2007, p. 34). For instance, a piece of research may have an impact by shaping a policy-maker's understanding of an issue, even if that research does not play an instrumental role in the writing of the final policy. Research may be used *ex post facto* to support a decision that has already been made, or may be used by opposing politicians and policy-makers to critique a decision

they disagree with (Nutley et al., 2007). For this reason, Nutley et al. present a continuum of research uses, ranging from generating awareness and improving knowledge and understanding at the more conceptual end to shaping attitudes and perceptions and directing impacting policy at the more instrumental end (2007). This spectrum is further complicated by the facts that policy-makers are not the only audience that may make use of research—Nutley et al. offer teachers as a prominent example—and that these other users may ultimately have indirect effects on policy through their own use of research (2007). Because of the complexity of the definition of the “use” of information, researchers studying the impact of research have used a variety of methods to attempt to measure use.

Citation analysis, a technique commonly used to measure the impact of research published in academic journals (as well as the impact of the journals themselves), has been frequently adopted by researchers interested in assessing the impact of SOE reports and other grey literature. One of the earliest attempts to apply citation analysis techniques to the investigation of such literature was conducted under the auspices of EIUI (Cordes, 2004), in a systematic study of the publications of the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP). This study was explicitly exploratory: aiming not only to assess the general impact of these publications, but to assess whether citation analysis could even be used for such purposes in the case of grey literature (Cordes, 2004). The study utilized the Web of Science Citation Database to locate citations for a variety of articles and reports published by GESAMP. The searching process required extensive use of “wild card” search strings (Cordes, 2004, p. 4), illustrating a central challenge in applying even basic citation analysis techniques to non-

traditional publications. Unlike academic journal articles, grey literature citations “are not recorded in the citation indexes in a standard way” (p. 4). The resulting citation data was analyzed according to frequency of citation per publication, version of publication being cited (in cases where a report was published both as a standalone report and a journal article), and the disciplines of the journals in which the publications were cited (Cordes, 2004). The study concluded that citation analysis can provide a useful tool for investigating the impact of scientific information published as grey literature, and that the impact of GESAMP publications could be seen in the diverse secondary audience they had developed in the academic community (Cordes, 2004).

While traditional citation analysis can provide some insight into the impact of SOE reports, the differing standards of classifying citations of grey literature in Web of Science and other citation databases can create challenges to collecting such data and significantly limit its usefulness as a measure of use and influence of this genre of literature (Cordes, 2004; Hutton, 2009). A 2009 EIUI case study (Hutton), once again in partnership with GESAMP, therefore sought to develop a “comprehensive metric of the influence of grey literature” (p. 4) that could incorporate a wider variety of sources of citation data. Drawing on work by Vaughan and Shaw (2003) that suggested that hyperlinks between websites function in a manner similar to traditional citations, Hutton (2009) developed a metric of influence drawing upon citation data from Web of Science and Google Scholar, standard Google searches treating hyperlinks as citation data, and citations contained in published monographs. This prototype metric maintained the earlier study's attention to “who cited the literature, in which journals and on what subject areas the citations appear, and citation rates over time,” (Hutton, 2009, p. 138-139), as well as

the citing individual's connection to GESAMP. However, Hutton's expanded analysis, taking a cue from further work by Vaughan and Shaw (2005), also accounted for whether citations were “influential”—drawing on the cited report in a way that shaped the content of the citing document—or “perfunctory”—for instance, a line item in a bibliography that does not utilize the cited report's content in a meaningful way. Hutton (2009) found that increasing the sources of citation data showed expanded evidence of use and influence for a variety of reasons. Incorporating Google Scholar alongside Web of Science expanded the range of traditional citations located, as duplication of results between the two databases was far from 100% (Hutton, 2009). Both Google Scholar and standard Google searching were found to provide a high proportion of influential vs. perfunctory citations, with standard Google searching showing 70% influential citations (Hutton, 2009). Furthermore, results in Google Scholar and standard Google searches provided a larger number of recent results, allowing them to paint a stronger picture of the current impact of the GESAMP reports in question (Hutton, 2009).

The adaptation of traditional citation analysis techniques to study the impact of grey literature clearly shows great promise, as the incorporation of both traditional and non-traditional sources of citation data allows researchers to assess the breadth of a given SOE's impact across a variety of channels, while the greater scrutiny placed upon the nature of the citations themselves—through Vaughan and Shaw's (2005) metric of perfunctory vs. influential citations—provides a clearer picture of the depth of that impact. This perspective was borne out by Avdić's (2013) study of the *State of World Fisheries and Aquaculture* report, published by the UN's Food and Agriculture Organization. With the expanding use of alternative metrics, or “altmetrics,” to factor in

citations from social media platforms such as Twitter in assessing the impact of academic publications (Priem, 2013; Priem, 2014; Priem, Taraborelli, Groth, & Neylon, 2010), there is certainly potential for the development of more advanced metrics to account for the diversity of media through which an SOE report can potentially have impact.

Citation analysis, particularly that which incorporates citations from non-traditional sources such as Google searches, provides a window into the impact of scientific grey literature such as SOE reports. However, reaching a secondary academic audience or provoking conversation amongst the general or interested public is obviously not the primary purpose of such reports, which is providing effective information resources to improve environmental management practices and policies. Accordingly, a significant proportion of the existing research into the awareness, use, and influence of SOE reports draws upon qualitative methodologies, such as surveys and interviews, for acquiring data directly from the intended audiences of these reports. The use of surveys as a tool for investigating impact has been a recurrent feature of EIUI case studies involving organizations from the Gulf of Maine Council to the governing bodies of Trinidad and Tobago (Cossarini, 2010; Soomai, 2009; Soomai, MacDonald, & Wells, 2011b).

The benefit of using surveys in this regard is clear: they allow for a broad sampling of potential audience members for a report, enabling researchers not only to determine whether the intended audience has read a report, but how they have used it in their work and how it has influenced their decision making. The challenge of surveys as a tool of research is in identifying a potential survey audience that has significant overlap with the actual audience of the report. In light of this challenge, SOE reports with a particular geographic focus, or those developed in support of particular integrated

management initiatives, may prove ideal vehicles for survey-based studies, as they often overlap with existing identified audiences for scientific information in that area. For instance, a study of the *State of the Gulf of Maine Report* (Soomai, MacDonald, & Wells, 2011a) was able to survey both the Gulf of Maine Council's members, who had a stake both in the development of the report and the management of the region, as well as the subscriber base of the organization's *Gulf of Maine Times* newsletter, an audience that by its nature has a strong interest in scientific information related to the region and is the direct recipient of promotional efforts for the report itself. In cases where there is a larger gulf between the producers of an SOE report and its audience, significantly more care is required on the part of researchers to identify a relevant audience. A study investigating the impact of information produced by the United Nations on fisheries management in Trinidad and Tobago (Soomai, Wells, & MacDonald, 2011) required the researchers to identify appropriate audiences across a range of stakeholder groups, with no guarantee that the individuals surveyed would have been direct recipients of promotion of the information in question. This approach was useful to the current study, as the *SoSS Report* was produced to support the former ESSIM Initiative and was exclusively promoted to the readership of the ACZISC's *Coastal Update* Newsletter, providing two ready-made audiences for a potential survey.

As a research tool, interviews serve as an excellent complement to questionnaires, and have been utilized in studies investigating the impact of SOE reports. Drawing on Snape and Spencer's (2003) work examining the characteristics and advantages of qualitative research methods, an EIUI case study conducted in conjunction with the Gulf of Maine Council (Cossarini, 2010; Cossarini et al., 2014) used interviews with Council

members as its primary investigative method, on the grounds that the close contact interviews create between researcher and subject allow “data collection to be interactive and for emergent issues to be probed” (p. 48). Unlike surveys, which are significantly more rigid due to the instruments being developed in advance and distributed to the recipients who complete them independently, interviews allow for the researcher to probe the subject to elaborate on unexpectedly interesting points that may arise in the course of the interview. Furthermore, Snape and Spencer (2003) note that qualitative data allows for dynamic analysis that “is open to emergent concepts and ideas which may produce detailed description and classification, identify patterns of association, or develop typologies and explanations” (qtd. in Cossarini, 2010, p. 48).

There is ample support in the existing literature for utilizing both quantitative and qualitative methods to examine the impact of SOE reports in the academic and other literature, in the increasingly large online community of scientists and other individuals with an interest in environmental issues, and in the decision making process of policymakers and other environmental managers. Research by Brannen (2005) into the mixing of methodological approaches suggests that there is potential for research to draw on both quantitative and qualitative methods to investigate the impact of SOE reports. Brannen (2005) suggests that a pluralistic methodological approach may be appropriate “for research [intended] to inform policy and for practical rather than scientific research” (p. 174), as such practical advice can be informed by the strengths of both research methods. For instance, quantitative data can provide a concrete base of facts, while qualitative data can “flesh out” the picture by providing social context for the quantitative findings. Brannen (2005) goes on to discuss the variety of ways in which these methods

can be combined by researchers: these approaches will be discussed in greater detail below, as Brannen's insights into the combination of methodologies served as a foundation for the structure of this study.

2.3 Salience, Legitimacy, and Credibility: Metrics for Evaluating the Usefulness of SOE Reports

The question of whether SOE reports are read or referred to by environmental managers and other policymakers and whether they ultimately have an impact on decision-making raises an obvious corollary: what characteristics define an SOE report as an effective information resource? As Elizabeth McNie (2007) notes, useful scientific information will improve environmental decision-making “by definition” (p. 17), by expanding the range of possible solutions to an issue and enabling policymakers to make informed choices; however, if the producers of SOE reports do not know how to generate useful information there is a substantial risk that they will “focus narrowly on increasing the supply of scientific information, funding more research that can lack any correlation to the information needs of decision-makers” (p. 17). The system by which traditional academic scientific information is established as useful is well known: research that passes a rigorous peer-review process and is published in a reputable academic journal has been determined to be a useful contribution to scientific enquiry (Cronin, 2005). Obviously, no such single system exists to determine the value of SOE reports, which are produced outside of these traditional academic channels, to policymakers and other stakeholders in environmental management, whose information needs are diverse and whose interests in the issue may be divergent or even diametrically opposed (Ernst, 2004; Jacobson, Lisel, Carter, Hockings, 2013; Shanley & Citlalli, 2009). As such, researchers

into the impact of SOE reporting have sought to establish metrics by which the usefulness of scientific information to decision-makers can be evaluated. One common metric considers the balance of a report's salience, legitimacy, and credibility (McNie, 2007; Mitchell, Clark, & Cash, 2006).

McNie (2007) describes salient information as information that is “relevant to the specific context in which it will be used” (p. 19) and thus responds to the particular “information needs of the decision makers” (p. 20). Mitchell, Clark, & Cash (2006) identify necessary preconditions for the salience of information: to be considered salient, information “must be responsive to local conditions and concerns, must link to issues on which decision makers focus and over which they have control, and must be timely, coming before—but not too long before—relevant decisions get made” (p. 314). These preconditions are largely echoed by McNie (2007), who highlights the importance of timeliness, as well as “ecological, temporal, spatial, and administrative scales” (p. 20). These scales incorporate such considerations as the “political landscape” and “existing public policy and decision making processes” (p. 20). Essentially, when compiling scientific knowledge into SOE reports, creators must keep in mind the types of decisions a SOE is intended to inform and the avenues by which those decisions will be made if the product is to constitute useful scientific information.

The significance of the importance of salience as a characteristic of useful information is intuitive; yet, all too often it seems that scarce resources are invested in the production of scientific information that fails to meet the information needs of decision-makers (Mitchell, Clark, & Cash, 2006). This risk is perhaps more pronounced in the case of SOEs with a multinational or even global scale. Mitchell, Clark, & Cash (2006)

observe that a common failure of SOEs produced by the United Nations is a tendency to overlook the concerns of developing countries and the “dramatic ways in which preservation policies influence the lives and livelihoods” (p. 315) of the citizens of those countries. Nonetheless, difficulties in achieving salience will impact any SOE report that attempts to influence “multiple audiences” (p. 315), which, considering the diverse range of stakeholders in any ecosystem that plays host to human affairs, is essentially any SOE report. Any organization looking to produce salient scientific information to influence decision-making will have to perform a balancing act between the competing interests of a range of stakeholders.

Similar challenges exist for SOE reports that aim to provide legitimate information: that is, information that is perceived to have been produced by individuals and organizations that are “free from political suasion or bias” (McNie, 2007, p. 20) and through processes that have “considered the values, concerns, and perspectives” (Mitchell, Clark, & Cash, 2006). Mitchell, Clark, & Cash (2006) state that “the notion that if assessments are conducted in support of policy, then those affected by those policies should be involved in the process” (p. 321) is central to the concept of legitimacy. Legitimacy, then, is dependent on process rather than product to a great degree, as audiences judge whether a report is legitimate “based on who participated and who did not, the processes for making choices, and how information was produced, vetted, and disseminated” (Mitchell, Clark, & Cash, 2006, p. 321). Even information that is highly salient to the information needs of decision makers may be ignored if its process of production is perceived by the intended audience to favour the interests of the creators of the report over those of the report's audience. This focus on the process by which

scientific information is generated and disseminated will be further investigated in section 2.4 of this thesis.

Finally, for the audience of an SOE report to determine that its information is credible, they must perceive this information to be “accurate, valid, and of high-quality” (McNie, 2007, p. 20) and, at the least, consider it to offer “a better guide to how the world works than competing information” (Mitchell, Clark, & Cash, 2006, p. 317). Achieving credibility with an audience can be significantly more challenging for SOE reports and other “grey literature” than it is for scientific research published via the regular channels of academic or scholarly discourse. As noted earlier, the institutionalized peer review process of major scientific journals serves to bestow credibility upon academic scientific research, as the information that is approved for publication in these journals benefit from the journals' established credibility. Furthermore, such academically published science has the primary target audience of other scientists, whose investment in the established process encourages them to grant it credibility. Not only do most SOE reports lack an established third-party to bestow credibility on them via an anonymous peer review process, they are also prepared for a much more diverse audience, including policymakers and other stakeholders, who may not use the same heuristics to evaluate credibility.

Mitchell, Clark, & Cash (2006) note that often “policymakers and other audiences cannot evaluate message content and must assess credibility through the proxies of credentials and process” (p. 318). They go on to note that, while opinions over what constitute acceptable credentials differ, it is generally agreed that audiences “tend to trust sources that have provided accurate information in the past” (p. 318), particularly if the sources are known to have “the training to identify accurate information” (p. 318) and

expected to “report that information honestly” (p. 318). As with salience and legitimacy, the significance of acknowledging and taking into account “local conditions” (Mitchell, Clark, & Cash, 2006) is central to establishing the credibility of scientific information, once again highlighting the importance of process alongside the product itself.

The attributes of salience, legitimacy, and credibility have been utilized by the EIUI Research program in previous case studies, both as a conceptual underpinning (Cossarini, 2010) and as a primary framework for data analysis (Soomai, 2009). Soomai's 2009 study investigated the use of SOE reports by the United Nations Food and Agriculture Organization (FAO) and the Caribbean Region Fisheries Mechanism (CRFM) by a variety of stakeholder groups in Trinidad and Tobago, including scientists, policymakers, and fishermen. The stakeholders were surveyed via a semi-structured questionnaire, which investigated their perception of the usefulness of the scientific information produced by the bodies in question. The study found that the salience, legitimacy, and credibility of this scientific information was negatively impacted by the limited involvement of stakeholder groups in the production process. For instance, a substantial portion of members of the surveyed group of fishing industry stakeholders, including all the actual fishermen surveyed, “viewed the information as irrelevant to their livelihood as the assessments did not address the real issues affecting them and as a result they were not motivated to change their fishing practices” (Soomai, 2009, p. 57). These findings largely corroborate the conclusions reached by Mitchell, Clark, & Cash (2006) about the importance of taking into account the views of divergent groups of stakeholders when producing SOE reports.

2.4 Stakeholder Engagement and Co-production of Knowledge

A recurring theme in the discussions of salience, legitimacy, and credibility highlighted above is that the process by which an SOE report is developed can have as much impact on the usefulness of its scientific information as the content of the product itself, particularly if the process involves stakeholders who are in the report's prospective audience. Indeed, Mitchell, Clark, & Cash (2006) go so far as to declare that SOE reports are “better conceptualized as social processes rather than published products” (p. 308).

Mitchell, Clark, & Cash's (2006) conclusion that the process of generating SOE reports is as important, if not more important, than the report's themselves—echoing the point made earlier by Wells (2003)—extends from their observations of the interplay between the SOE attributes of salience, legitimacy, and credibility. The most common cause of this interplay resulting in the detriment of an SOE report's usefulness is an overemphasis on credibility, manifested in allowing the process to be exclusively controlled by “the most respected scientists” (Mitchell, Clark, & Cash, 2006, p. 323) and attempting to “isolate the process from political influence” (p. 323). This attempt to remove political influence from a process that is explicitly intended to influence the public in general and politicians and policymakers in particular is antithetical to the success of the reports' goals: as Mitchell, Clark, & Cash (2006) note, such an approach will “have little influence since it will have ignored the questions most salient to policymakers and stakeholders” (p. 323). Notably, the reverse can also occur, for instance in attempts to generate highly salient information without adequately consulting the scientific community, as scientists may be forced to make recommendations based on “tentative or premature results” (Mitchell, Clark, & Cash, 2006, p. 323), thus raising

questions about the credibility of the information contained in a report. Furthermore, attempts to foster legitimacy can come at the expense of credibility. Mitchell, Clark, and Cash (2006) note that involving “stakeholders or scientists who are brought in because they can represent the views and concerns of audiences that assessors hope to influence” (p. 323) can result in the report being viewed as less than credible by other scientists and even some policymakers.

These findings regarding the potential mismatch of priorities between scientists creating SOEs and the potential audiences for those reports were supported by a recent study (2013) by Battaglia, Meloni, and Cautillo. The study surveyed citizens of the Municipality of Pisa to investigate the contrast between their conceptions of environmental issues facing their city and the assessment of scientists producing a local SOE report, which was created without extensive stakeholder consultation with the intention of educating citizens and local policymakers regarding environmental issues (the exact name of the report is not given in the translated article). In 2010, at the same time the latest edition of the local SOE report was published, a survey was conducted of citizens of the Municipality of Pisa to “to collect indications on the population’s perceptions of the local environmental conditions and policies” (Battaglia, Meloni, & Cautillo, 2013, p. 5). The study found that both the SOE report and the public overlooked different salient environmental issues: citizens overlooked certain issues addressed in the report because they lacked the technical knowledge and access to data required to know that these issues were salient to their concerns, while the assessment creators overlooked environmental issues with significant policy implications, such as waste management and city cleanliness, because such issues are not traditional avenues of scientific inquiry

(Battaglia, Meloni, & Caudillo, 2013). The result was that a process intended to provide citizens and policymakers with relevant environmental information, by excessively focusing on the end product's credibility, had failed to maximize the report's salience, and, by extension, harmed its credibility with its intended audience (Battaglia, Meloni, & Caudillo, 2013).

Mitchell, Clark, and Cash (2006) note that attempts to generate influential reports do not necessarily have to involve trade-offs between attributes. In fact, effective involvement of local stakeholders in the development of SOE reports can create a positive feedback loop amongst the attributes. For instance, in the case of the movement to combat acid rain, the effort to improve salience and legitimacy by increasing stakeholder participation in SOE creation had a salutary effect of improving the credibility of said SOEs, as they were able to complement scientific research with quality local knowledge (Andonova, 2006). Effective engagement of stakeholders alongside scientists in the process of generating SOE reports can thus improve all three attributes simultaneously, resulting in reports that maximize their value and impact (Mitchell, Clark, & Cash, 2006).

As noted above, it is this potential mutual reinforcement of attributes that leads Mitchell, Clark, and Cash (2006) to two complementary conclusions: that “influence flows from the process by which it creates knowledge rather than from the reports it may produce” (p. 324) and that, thus, “the content and form of [SOE] reports are poor predictors of their influence” (p. 324). Mitchell, Clark, and Cash (2006) propose abandoning the existing model of the SOE process that relies on scientists' attempts to communicate the best available scientific information to audiences, and replacing it with a model that views the SOE process as relying on

long-term dialogues and interactions in which potential users of an [SOE] educate scientists about their concerns, values, priorities, resources, and knowledge of the problem while scientists educate potential users about the nature, causes, consequences, and alternatives for resolution of the problem at hand as well as the ways such knowledge is arrived at. (p. 324)

Stakeholder participation in the SOE process, if conducted effectively, ultimately fosters all the of the attributes of successful reports: salience, since the involvement of policymakers and other stakeholders allows scientists to focus their efforts on presenting the science that provides the best decision-making support for the actual decisions being made; legitimacy, because extended dialogue between scientists and end-users serves to reassure those users that their concerns are being taken into account in the generation of scientific information; and credibility, because those stakeholders, industrial or otherwise, who are perceived as responsible for the environmental problem being addressed can provide valuable data that is otherwise unavailable to scientists, while the perception that their concerns about the process are being heard decreases their distrust of the knowledge produced by the SOE process (Mitchell, Clark, and Cash, 2006). A similar cooperative approach to the production of knowledge in SOE reporting was a key recommendation of the Battaglia, Meloni, and Caudillo study (2013), which endorsed a growing trend towards hybrid approaches to knowledge production that are “able to capture both expert and lay knowledge” (p. 12).

Since being introduced in Mitchell, Clark, Cash, and Dickon's *Global Environmental Assessments: Information and Influence* (2006), the idea of treating the SOE reporting process as an opportunity for local co-production of knowledge has been put into practice by the Government of Nova Scotia's Provincial Oceans Network (PON) to create *The 2009 State of Nova Scotia's Coast Report* (2009), providing a practical

model for how SOE creation can be situated as part of an ongoing dialogue between scientists, stakeholders, and the public. The primary goal of *The 2009 State of Nova Scotia's Coast Report* was to establish “a baseline of available information to guide the development of [a provincial] sustainable coastal development strategy” (Soomai, MacDonald, & Wells, 2011b, p. 4). Prior to the creation of the report, policymakers and government experts affiliated with the PON were consulted in order to determine a list of six priority issues to focus on in the report (Soomai, MacDonald, & Wells, 2013c). Various internal PON groups were then responsible for developing a set of initial documents for the prospective writers of the report, including

a scoping report describing the content of each section of the technical report; contact information for key resource persons; a list of information sources; a list of contacts for accessing information; a compilation of information on the six priority issues, including a global perspective with references; and a 2-4 page outline which described and defined each of the issues. (Soomai, MacDonald, & Wells, 2011b, p. 5)

These documents provided the necessary information for the six specialists charged with developing the chapters of the report, which were each focused on one of the six priority areas identified by the initial consultations with policymakers (Soomai, MacDonald, & Wells, 2011b). The process of writing the report involved extensive input and peer review by both provincial government departments and the DFO (Soomai, MacDonald, & Wells, 2011b). When completed, the report was distributed in a variety of digital and physical formats, each with their own potential use. These formats include a full-length technical report for the scientifically fluent, a condensed report for policymakers and the public, and a series of fact sheets for quick reference (Soomai, MacDonald, & Wells, 2011b).

Following the report's publication, feedback from the public and specific

stakeholder groups was solicited via surveys developed by the EIUI research program and distributed at eight open houses held by the Government of Nova Scotia to promote the report (Soomai, MacDonald, & Wells, 2011b). Further feedback was solicited from the public via a telephone survey similar to the one distributed at the open houses, as well as from selected stakeholder groups was solicited at a meeting held at Dalhousie University on June 14, 2010 (Soomai, MacDonald, & Wells, 2011b). This feedback, in addition to providing insight into the awareness, use, and influence of the report, was used to inform the government about which of the six identified issues should be given priority in the Government's then-planned coastal management initiative (Soomai, MacDonald, & Wells, 2011b). While this process did not follow Mitchell, Clark, and Cash's (2006) prescriptions to the letter (for instance, feedback from the public was solicited only after the report was published, and thus could only inform future versions of the report and the policy responses of decision-makers to its contents), it does demonstrate growing awareness on the part of SOE report creators of the necessity of engaging stakeholders, policymakers, and the public in an ongoing conversation regarding scientific knowledge and its impact on policy issues.

2.5 Eastern Scotian Shelf Integrated Management Initiative and the State of the Scotian Shelf Report

By the time the members of the Eastern Scotian Shelf Integrated Management Initiative came to develop the *State of the Scotian Shelf Report*, they had the benefit of drawing on the scholarship that had been published in recent years on the use and influence of scientific grey literature on this topic in policy making. ESSIM also benefited from established local knowledge following several other recent regional efforts to

develop effective SOE reports: for example, *The 2009 State of Nova Scotia's Coast Report*, which had provided a model for stakeholder and engagement in Nova Scotian coastal management issues, and the *State of the Gulf of Maine Report*, the modular format of which was adopted by ESSIM for the *SoSS Report*. Furthermore, the institutional knowledge generated by the creation of the *State of the Gulf of Maine Report* was drawn on directly, with *State of the Gulf of Maine Report* editor Jay Walmsley (2010) also providing editorial services for the *SoSS Report*.

Founded in 1998, the ESSIM initiative was the first instance of a Canadian integrated coastal management initiative with an offshore focus (McCuaig & Herbert, 2013). As an integrated management initiative of the Oceans Act, ESSIM was comprised not just of regulators and policymakers in the coastal zone management field, but also regional industry sectors and other stakeholders with a vested interest in the management of the region's coastal resources (McCuaig & Herbert, 2013). During the first eight years of the initiative, its primary focus was “the development of an Integrated Ocean Management Plan to provide long-term direction and commitment for integrated, ecosystem-based and adaptive management of all marine activities in or affecting the Eastern Scotian Shelf” (McCuaig & Herbert, 2013, p. viii). The primary product of this planning phase was the Eastern Scotian Shelf Integrated Management Plan, a multi-year strategy highlighting ESSIM's objectives and laying out “high-level management strategies” (McCuaig & Herbert, 2013, p. x). Subsequently, the ESSIM initiative reoriented its efforts for the 2006-2011 period to focus on the “implementation of the objectives and management strategies in the ESSIM Plan, particularly those associated with the Collaborative Governance and Integrated Management goal” (McCuaig &

Herbert, 2013, p. x). It was during this phase that the SOE reporting that would produce the *State of the Scotian Shelf Report* was initiated, with the intention of both providing knowledge support to policymakers at ESSIM and laying the groundwork for future assessments of the ESSIM Initiative's success (H. Breeze, personal communication, 2013).

As previously noted, the ESSIM Initiative drew on the model of the Gulf of Maine Council on the Marine Environment's *State of the Gulf of Maine Report* for its format, development process, and even its editors and authors. The primary motivation for this approach was to draw upon the experience of the GOMC in developing a large-scale project of regional SOE reporting using limited resources (H. Breeze, personal communication, 2013). Like the GOMC, ESSIM had limited resources to devote to the production of an SOE report. After hiring *State of the Gulf of Maine Report* editor-in-chief Jay Walmsley to oversee the *SoSS Report*, ESSIM settled on emulating the modular format of the GOMC report. A modular format, which entails presenting the report through a series of “theme papers” focused on particular topics rather than a single omnibus report, was seen to have advantages financial and otherwise (H. Breeze, personal communication, 2013). Financially, the process is expedited because it is easier to acquire approval from all governing parties for smaller, self-contained documents, reducing the length of the process as well as its cost. Furthermore, production of each individual theme paper can be initiated on a “funds available” basis, allowing the project to advance in the absence of government approval of outlays for the entire project (H. Breeze, personal communication, 2013). Other advantages of the modular approach include the ability to frequently update the theme papers for specific, rapidly changing issues without

reviewing the entire report and is a more attractive proposal to authors, whose comfort with and expertise in a specific issue featured in one theme paper may not extend to the widely varied issues facing the Scotian Shelf and its managers (H. Breeze, personal communication, 2013).

The reporting and writing process for the *SoSS Report* maintained the ESSIM Initiative's commitment to effective stakeholder engagement. The ESSIM Initiative included a Stakeholder Engagement Committee (SAC), which consisted of representatives of the industry sectors and other stakeholders with vested interests in the resource and environmental management of the Scotian Shelf (McCuaig & Herbert, 2013). The SAC was intimately involved with the process of determining the goals and areas of interest expressed in the ESSIM Plan, which were then used to inform the selection of topics to be covered in the *SoSS Report's* theme papers (H. Breeze, personal communication, 2013). Furthermore, a subcommittee consisting of members of the SAC was appointed to closely oversee the drafting process of each theme paper. Final approval for each theme paper could only be acquired with the consent of DFO coordinator Heather Breeze and the entire SAC. Table 1 below, provided by Breeze, demonstrates an outline of the drafting process that was applied to each theme paper, though in referring to the “Steering Committee” it does not note the distinctions between the subcommittee of the SAC and the broader committee, which was only involved in its entirety during the approval phase (H. Breeze, personal communication, 2013).

Table 2.1: Drafting Process for State of the Scotian Shelf Report Theme Papers (Personal Communication w/H. Breeze)

Task	Participants	Due Date
Review of scope of paper and DPSIR framework	Coordinator and authors	2 weeks
Draft table of contents	Authors	2 weeks
Review of draft table of contents, DPSIR	Steering Committee	2 weeks
Draft theme paper	Authors	3 months
Steering Committee and peer review	Peer reviewers Steering Committee	2 weeks
Authors incorporate review comments	Authors	2 weeks
Approval by Coordinator and/or Steering Committee (if needed)	Coordinator, Steering Committee	
Layout	Channel Communications	2 weeks

Clearly, the process by which the *SoSS Report* was developed was consistent with the established norms of effective SOE reporting as highlighted in this literature review. The *SoSS Report*, being regional in scope, was connected directly to a specific regional environmental management initiative, providing it with a natural audience and a clear sense of the necessary issues to be addressed. Stakeholder engagement was an essential part not just of the report's production, but of the development of the ESSIM Plan, which itself formed the impetus for the creation of the *SoSS Report*. The production of the report drew on local knowledge not just from stakeholders, but from the successful SOE reporting done by the GOMC's recent *State of the Gulf of Maine Report*. The *SoSS Report* was created in a format intended to improve the accessibility of particular issues to end-users, and was hosted online and promoted by the Atlantic Coastal Zone Information

Steering Committee (ACZISC, which has longstanding ties both to the DFO and to the communities of practice with a stake in the management of the Scotian Shelf. Yet despite the apparent quality of the SOE process, the preliminary data collection phase discussed in section 3.2 of this thesis suggests that, to date, usage of the report has been limited. Was this simply a matter of the report losing its natural audience following the disbanding of the ESSIM Initiative? Was it a matter of insufficient or ineffective promotion of the report? Did the form of stakeholder engagement utilized by the ESSIM Initiative fail to imbue the report with salience and legitimacy in the eyes of stakeholders? Contra Mitchell, Clark, and Cash (2006), are there issues related to the content and format of the report which affected its impact? These questions complement the research questions that this study sought to answer.

Chapter 3: Methodology

3.1 Introduction

This study had the benefit of drawing on the experiences and results of several projects conducted by members of the Environmental Information: Use and Influence Research (EIUI) program for its study design. Previous EIUI studies of the role of marine environmental information in the policy- and decision-making process have used a range of methodologies both qualitative—surveys and interviews with relevant individuals in the communities of practice—and quantitative—citation searching and analysis conducted via both academic and traditional search engines. To best assess the awareness and use of the *State of the Scotian Shelf Report*, the decision was made to apply a mixed-methodology approach in the study design, employing a combination of qualitative and quantitative methods to develop a detailed picture of awareness and use of the *SoSS Report*. Whereas citation analysis can provide evidence of awareness and, to some extent, use of the report in research circles, interviews and surveys of potential audience members can illuminate awareness and use of the report in the communities of practice for which the report was primarily intended. In addition to citation analysis, cooperation from the ACZISC Secretariat allowed for the inclusion of another quantitative data source: namely, web analytics data for the COINAtlantic website, which is the exclusive online host of the *SoSS Report*.

This study benefited from a preparatory period of several months. While initial discussion about conducting the study occurred between the researcher, the EIUI research team, and the Canada Department of Fisheries and Oceans (DFO) in May, 2013, the primary data collection period did not commence until April, 2014. This preparatory

period allowed for a preliminary round of quantitative data collection. As Brannen (2005) has noted, quantitative data collected prior to primary data collection can provide useful insight for a study's design. With this perspective in mind, a preliminary citation search and web analytics analysis were conducted in August 2013, in order to obtain an initial understanding of awareness and use of the report.

3.2 Preliminary Data Collection

3.2.1 Citation Searching

Citation searching and analysis have been key elements of several EIUI case studies (Cordes, 2004; Hutton, 2009), including work recently completed in collaboration with the Food and Agriculture Organization of the United Nations (FAO) (Avdić, 2013). Accordingly, citation searching was selected as a preliminary data collection method for the *SoSS Report* case study. The intention of this early citation searching was not to develop a detailed analysis of citations of the *SoSS Report*, but simply to determine how many citations there were of the theme papers. Three sources were selected for this preliminary study: Web of Science, Google Scholar, and Scopus.

Developing a thorough search strategy for the *SoSS Report* was challenging, largely due to the modular nature of the report, the broad nature of the theme papers' titles, and the inconsistency of authorial credits listed in the individual theme papers. The report is published as a collection of theme papers, each with its own individual title. No single paper is referred to by the title *State of the Scotian Shelf Report*. The individual theme papers are given straightforward, informational names, such as *Climate Change* for the paper on climate change or *Ocean Acidification* for the theme paper on ocean acidification. However, titles cannot simply be entered into the search tools of a citation

database in order to find results specific to the *SoSS* theme papers. Furthermore, authorial and editorial credits are inconsistently assigned among the different modules. For instance, the *Scotian Shelf in Context* theme paper gives credit to neither an author nor an editor, the *At Risk Species* paper credits both author Dan Walmsley and editor Jay Walmsley, and the *Primary and Secondary Producers* paper credits author Stephanie Boudreau and the members of the DFO steering committee but gives no editor credit.

In light of these challenges, a decision was made to search for the primary *Scotian Shelf in Context* paper by name, while also using author searches to locate the cited publications of selected *SoSS Report* authors in the citation sources. As Jay Walmsley was editor for the entire *SoSS Report* project, she was also the subject of an author search in Web of Science, Scopus, and Google Scholar, in addition to Dan Walmsley and Stephanie Boudreau.

3.2.2 Google Analytics for COINAtlantic Website

Since 2005, Google has offered its internet traffic monitoring service Google Analytics for free to any interested party. Though a premium version is available for a fee, the free version provides robust functionality for users who wish to track web traffic statistics for their website(s). ACZISC, which provides the exclusive web hosting for the *SoSS Report* on its COINAtlantic website, has maintained a Google Analytics account for the site since its relaunch in April 2011. As the first modules of the *SoSS Report* were published along with the launch of the redesigned site, web traffic data is thus available for the entire lifetime of the report's publication. Google Analytics was used to capture pageviews, unique pageviews, bounce and exit rates, average visit length, and the number of users who entered the page directly during the period April 1, 2011-August 31, 2013.

3.3 Primary Data Collection

The period for primary data collection occurred in April and May 2014. As previously noted, mixed methods, both quantitative and qualitative, were utilized. The quantitative methodologies were nearly identical to those utilized in the preliminary data collection phase, and were carried out to obtain quantitative data that was roughly contemporaneous to the qualitative data. The qualitative methodologies consisted of online surveys distributed to two possible audiences for the *SoSS Report* and semi-structured interviews with members of the former ESSIM Stakeholder Advisory Committee.

3.3.1 Citation Search

The updated citation search was conducted using the same methods used in the preliminary data collection phase, with two significant alterations. The first was a reduction in scope: only the Web of Science and Google Scholar searches were updated during primary data collection. Since Web of Science and Scopus are comparable in scope, it was assumed that searching Web of Science would be sufficiently informative. The second change was to the search methods applied to the Web of Science database. In addition to repeating the search terms from the preliminary data collection phase, a search was conducted following the Google Scholar search, using the author names and article titles that were discovered in Google Scholar, in order to discover whether these articles were present in Web of Science but not located due to shortcomings of the search strings utilized.

3.3.2 Google Analytics for COINAtlantic Website

The web-traffic analysis conducted during the preliminary data collection phase was limited by the incompatibility between the types of data collected by Google

Analytics and the methods ACZISC uses to host and promote the *SoSS Report*. Following the analysis of preliminary data, recommendations were made to ACZISC to optimize the COINAtlantic site to provide more granular data for the *SoSS Report*.

These recommendations aimed at potentially tracking PDF downloads. Two possibilities were suggested: either purchase a plug-in for the organization's web content management system, Joomla, that is designed to enable Google Analytics to track PDF downloads as virtual pageviews, or create a simple landing page for each PDF to allow pageviews to serve as a proxy for PDF downloads. While neither of these options would provide retroactive tracking of PDF downloads, they would still provide more detailed information than was obtained at the preliminary data collection stage. Although ACZISC opted to purchase and install the Joomla plug-in, technical difficulties prevented the plug-in from being successfully implemented. There was no choice but to proceed with a more limited data set, which did not encompass PDF downloads.

In light of the inability to track PDF downloads, additional types of data provided by the Google Analytics service were utilized in order to obtain deeper analysis. Google Analytics allows a user to determine the sources of incoming and outgoing traffic to a particular page, by tracking the “page paths” of all visitors to the site. The data were retrieved for the *SoSS Report* landing page, as well as each theme category's landing page (the *SoSS Report* landing page gives users direct access to the theme papers, but also allows them to browse a series of sub-landing pages that isolate the theme papers by category, e.g. Climate Change).

Like the citation search results, analysis of the Google Analytics data for the *SoSS Report* website would provide context for the findings of the qualitative research phase. Analysis aimed to determine the success of the ACZISC's approach to promoting the

SoSS Report by revealing what percentage of the site's traffic to date was driven by announcements in the *Coastal Update* Newsletter or internal browsing of the COINAtlantic site, versus what percentage was driven by individuals actively seeking information about the Scotian Shelf through Google searching and other methods.

3.3.3 Surveys

Members of the potential audience for the *State of the Scotian Shelf Report* were surveyed to obtain a broad range of data regarding the awareness and use of the report. These surveys were administered using the online survey software Opinio. Invitations to participate in surveys were distributed by EIUI's partner organizations ACZISC and DFO. The format of the surveys followed methods used in other studies of organizations producing grey literature (e.g., Soomai, 2009; Soomai, Wells, & MacDonald, 2011). Two separate audiences were invited to complete the surveys.

The first survey was designed for the 5,500 subscribers of the ACZISC's *Coastal Update* e-Newsletter (see Appendix B). Subscribers were deemed a suitable audience for this survey because the newsletter is the primary vehicle for promotion of the *State of the Scotian Shelf Report*. An invitation to participate in this online survey was distributed directly to the *Coastal Update* subscriber listserv by the ACZISC on April 8, 2014. A reminder was distributed by the ACZISC approximately three weeks after the initial invitation, as the top line-item in the *Coastal Update* e-Newsletter itself. A final reminder was issued at the ACZISC Roundtable Meeting on May 7, 2014. The survey was closed on May 14, 2014.

The second survey was designed for the 45 members, former members, and alternate members of the ESSIM Initiative's Stakeholder Advisory Committee. As these

individuals had some involvement in defining the scope of the report and its theme papers, and are stakeholders in the management of the Scotian Shelf, they were considered a suitable audience from whom to obtain data on both the development of the report and its eventual awareness and use. The invitation to participate in this survey was distributed to the former members of the Stakeholder Advisory Committee by the EIUI partner contact at DFO on April 8, 2014. A reminder message was distributed on April 22, two weeks after the survey period opened. The survey closed on May 14, 2014.

A statement about the anonymity of participants and confidentiality was included in the first screen of both online surveys, as well as the invitation messages distributed to the participants. The statement informed participants that completion of the online surveys would be interpreted as consent to participate in the study. All recipients of the invitation messages were encouraged to complete the surveys.

Quantitative and qualitative data analysis methods were used for the data obtained from the questionnaires. Quantitative results, including number of responses and averages, were compiled internally by the Opinio survey software. For textual responses, themes were identified and coded according to methods described by Ryan & Bernard (2003). This method of analysis was similar to work completed in other case studies (e.g. Soomai, 2009).

3.3.4 Semi-Structured Interviews

Semi-structured interviews with members of the ESSIM Initiative's Stakeholder Advisory Committee were conducted to obtain further depth in understanding regarding the development of the *State of the Scotian Shelf Report*, as well as information about the awareness and use of the report by the primary audience. In addition, the interviews

sought to obtain information about what users expect or prefer in State of the Environment reports generally.

All 45 members, former members, and alternates of the Stakeholder Advisory Committee were invited to participate, thereby maximizing the number of possible interviews. Invitations were distributed via e-mail to potential participants. Participants signed two consent forms: one prior to the interview, giving consent to participate, and one after the interview's conclusion, to confirm that their responses could be used in the analysis (see Appendix F).

All interviews were audio recorded and the recordings were transcribed manually. Analysis of these interviews used methods utilized by past EIUI case studies, which followed techniques of theme identification described by Ryan & Bernard (2003). Interview transcripts were stripped of identifying information and then combined and organized by question, so that all responses to each question were grouped together, regardless of the order that the question was asked in the semi-structured interviews. Then, following techniques of theme identification described by Ryan & Bernard (2003), the interview transcripts were systematically coded according to the themes identified in each response. Following this coding process, the codes for each response were extracted and grouped together according to question, with the transcript itself removed to allow for careful attention to the themes. This process allowed for some quantitative analysis of interviewees' responses, by identifying the number of times particular themes appeared in the interviews.

3.3.5 Ethics Approval

Because this study utilized qualitative data collection methods to solicit the

personal opinions of individuals, ethics approval for the study was sought from the Dalhousie University Research Ethics Board. The ethics application, submitted and approved in February 2014 (see Appendix A), outlined the purpose of the study, the recruitment methods for the qualitative methodologies, the survey instruments, and the interview protocol. The processes outlined in the ethics application were followed closely in this study. Ethics approval was not sought for the quantitative methods, as they did not involve personal or private information.

Chapter 4: Results

4.1 Preliminary Data Collection

4.1.1 Citation Search

Web of Science and Google Scholar were the first sources searched, in August 2013. First, an exact phrase title search was performed for the search string “Scotian Shelf in Context.” Then, author searches were performed for “Walmsley, D.,” “Walmsley, J.,” and “Boudreau, S.” Once the authors were located in either Web of Science or Google Scholar, the respective outputs were manually scanned for the titles of any of the theme papers from the *SoSS Report*. The Web of Science search produced no results, while the Google Scholar search produced two results that cited the existence of the report as examples of outputs of the ESSIM Initiative, rather than refer to the actual content of the reports. The same search strategy was then applied to the Scopus database, once again producing no results.

4.1.2 Google Analytics for COINAtlantic Website

Preliminary web traffic data for the *State of the Scotian Shelf Report* section of the COINAtlantic site were collected from Google Analytics on September 1, 2013, using the date range of April 1, 2011-August 31, 2013. Table 4.1 provides the output from Google Analytics.

Table 4.1: Preliminary Google Analytics Data for *SoSS Report* Landing Page

Pageviews	1475
Unique Pageviews	1007
Average Time on Page (in minutes)	01:48:00
Entrances	744
Bounce Rate	48.12%
% Exit	37.08%

The “pageviews” statistic tracks the total number of times the page was viewed during the period it was active, whereas the “unique pageviews” statistic tracks the number of unique internet protocol (IP) addresses that accessed the site: thus, for the April 1, 2011-August 31, 2013 period, a total of 1007 users accessed the page a total of 1475 times. Accordingly, 468 pageviews constitute return visits. Another significant measure given in Table 3.1 is the “entrances” statistic, which indicates how many users entered the COINAtlantic site by directly accessing the page hosting the *SoSS Report*. Accordingly, it can be concluded that approximately 50% (744/1475) of users reached the *SoSS Report* page by referral from an external source, rather than by navigating through the COINAtlantic site. The “bounce rate” indicates the percentage of these entrances that were concluded without the user interacting with the page's content: a bounce rate of 48.12% suggests that, at most, 385 entrances (i.e., 744 less 48.12% or 358 entrances) resulted in a user accessing the PDFs that comprise the *SoSS Report's* content.

4.1.3 Analysis of Preliminary Data

The results of the citation search provided little in the way of analytical challenge. The paucity of citations in three major sources rather conclusively showed that the *SoSS Report* had not generated a secondary audience in the research community, unlike certain

other State of the Environment (SOE) Reports, such as the FAO's *State of World Fisheries and Aquaculture* (SOFIA) Report (Avdić, 2013). For the purposes of this study, this finding suggested that if a research audience had not developed for the *SoSS Report*, then the focus of investigation could be placed solely on individuals in the communities of practice for which the report was originally intended.

Analysis of the web traffic data provided by Google Analytics was more complicated, due to incompatibilities between the measurements used by the Analytics tool and the methods employed by ACZISC to promote the *SoSS Report*. While Google Analytics provides detailed web traffic data for actual web pages, it does not track downloads of PDF files. As the *SoSS Report* is distributed exclusively in PDF form, strict limitations are placed on the granularity of Google Analytics data as it relates to the modules of the report: though the traffic data shows how many users have accessed the web page from which they can access the theme papers of the report, it does not allow determination of whether they accessed the theme papers themselves or which, if any, theme papers they accessed. This limitation is compounded by ACZISC's approach to promoting the *SoSS Report*. The report was promoted through announcements of the publication of each individual theme paper in the ACZISC *Coastal Update Newsletter*, which reaches roughly 5500 individuals in the coastal zone management community of practice. These announcements had, prior to this preliminary data finding, been accompanied by direct links to the PDF of the theme paper in question, rather than the *SoSS Report* landing page. Accordingly, a degree of uncertainty was introduced into the Google Analytics traffic data, as users could potentially access the report's theme papers without ever visiting the web page, suggesting that the traffic data for the *SoSS Report*

page may have under-reported user interest in the report.

Despite the limitations of the Google Analytics data, results of the preliminary data collection, combined with the knowledge of the report's history as a product of the abandoned ESSIM Initiative, suggest that the *SoSS Report* may not, at the time of data collection, have found a large audience. These results provided direction for the primary data collection which aimed to determine what end-users in the communities of practice want from a State of the Environment Report, in regard to content, format, and distribution, and with the goal of providing recommendations for DFO's future approach to State of the Environment Reporting.

4.2 Primary Data Collection

4.2.1 Web Traffic Analysis for COINAtlantic Site (Google Analytics)

Web traffic data for the landing page of the *State of the Scotian Shelf Report* on the Atlantic Coastal Zone Information Steering Committee's COINAtlantic website was captured with Google Analytics for two periods: the first covering the period between the report's publication and the distribution of online surveys for this study (May 31, 2011-April 8, 2014, hereafter Period A) and the second covering the two months following the commencement of the survey period (April 9, 2014-July 9, 2014, hereafter Period B). The aim of the second survey period was to determine whether invitations to participate in a survey related to the *SoSS Report*, distributed to over 5,000 potential audience members, would serve in themselves to increase awareness of and access to the report.

Analysis of the web traffic data was complicated by a discovery that showed that the findings of the preliminary data period were incomplete: the *SoSS Report* is, in fact, hosted on the COINAtlantic site via two separate landing pages, identical in every fashion

save for their URLs. The two URLs are <http://www.coinatlantic.ca/index.php?/state-of-coast-and-ocean/state-of-the-scotian-shelf> (hereafter Landing Page A) and <http://www.coinatlantic.ca/index.php?/state-of-the-scotian-shelf> (hereafter Landing Page B). The challenges this discovery posed to data analysis will be elaborated on below; the most immediate effect was to question the conclusions of the preliminary data analysis, as the presence of an entire additional set of traffic statistics meant that those conclusions were based upon an incomplete data set.

The two *SoSS Report* landing pages, as mentioned above, are identical in format. Each offers a brief description of the Scotian Shelf and provides background about the ESSIM Initiative and the report's development and content. A horizontal navigation bar at the top of the page categorizes the theme papers by seven categories: State of the Scotian Shelf (an introduction and the *Scotian Shelf in Context* theme paper), Biodiversity (the *At-Risk Species*, *Marine Habitats and Communities*, *Incidental Mortality*, and *Invasive Species* theme papers), Climate Change (the *Climate Change and its Effects on Ecosystems, Habitats, and Biota* and *Ocean Acidification* theme papers), Productivity (the *Primary and Secondary Producers* and *Trophic Structure* theme papers), Fish Status (the *Fish Stock Status and Commercial Fisheries* theme paper), Marine Quality (the *Water and Sediment Quality*, *Ocean Noise*, and *Marine Debris* theme papers), and Emerging Issues (the *Emerging Issues* theme paper). By hovering their cursor over these categories, users can access a drop-down menu to see a series of direct links to the PDFs of the theme papers in that category. Below the introductory paragraphs, a vertical list offers links to landing pages for each of the theme categories: from these landing pages, users can also access the PDFs directly. Importantly, for the purposes of this analysis, the majority of

links present on the *SoSS Report* landing pages serve to bring users directly to PDFs of the theme papers and most of the remaining links bring users to sub-landing pages that serve only to link to the same PDFs, while only three links on the landing pages direct users to other online locations. Figure 4.1 below depicts the landing page format.



Figure 4.1: COINAtlantic.com Landing Page for SoSS Report

Web Traffic Statistics and Analysis: Period A

For each page that it has been set to monitor, Google Analytics captures six basic statistics: pageviews, unique pageviews, average time on page, entrances, bounce rate,

and exit percentage (it also tracks “page value” for users interested in monetizing their page through Google's Google Ads service, but for the purposes of analysis this category is not relevant). A “pageview” is any individual instance of access to the website, while “unique pageviews” constitute access to the website by distinct internet protocol (IP) addresses (each IP address to access the site counts for one unique pageview, regardless of the number of times it accesses the site). “Average time on page” is the mean duration of time that users keep the page open in their browser window. “Entrances” refer to each instance that the page was the first page on the server to be accessed by a user during a session. “Bounce rate” refers to the percentage of sessions that begin with the page (i.e., Entrances) and then end without clicking links to enter further into the site. Finally, “exit percentage” refers to the percentage of visits to the website that ended with the page in question (Google, 2014). Table 4.2 presents these basic statistics for Landing Pages A and B during Period A.

Table 4.2: Basic Analytics for Landing Pages A and B—Period A (May 31, 2011-April 8, 2014)

Landing Page	Pageviews	Unique Pageviews	Avg. Time on Page (in minutes)	Entrances	Bounce Rate	Exit %
A	1388	756	01:09:00	243	39.51%	23.05%
B	1954	1290	01:31:00	983	45.68%	36.90%
A+B	3342	--	--	1226	--	--

The discovery of a second, identical landing page for the *SoSS Report* shows the findings of preliminary data collection (which only captured data for Landing Page B) in a new light. Where preliminary data collection suggested only 1475 pageviews for the landing page, the latest findings more than double that number, with a total of 3342

pageviews. The unique pageviews statistics cannot be combined in the same way, because a unique IP address viewing Landing Page A could also be a unique IP address viewing Landing Page B: as such, all that can be determined from this data set is that between 1290 and 2046 (1290 + 756) unique IP addresses accessed the two landing pages during Period A. These statistics together reveal a substantially larger degree of access to the *SoSS Report* than was previously anticipated. Moreover, these two statistics present a floor, rather than a ceiling, for access to the report: prior to the results of preliminary data collection, notices regarding the report in ACZISC's *Coastal Update* newsletter contained direct links to the PDFs for each theme paper, rather than the landing page. As a result, any access to the report driven directly by *Coastal Update*, the primary venue through which the report has been promoted, was not captured by Google Analytics.

Unfortunately, the degree to which access to the *SoSS Report* landing pages resulted in access to the theme papers themselves cannot be conclusively determined. As previously established, the COINAtlantic site's Google Analytics service is not presently able to track PDF downloads, preventing any statistics from being captured for individual theme papers; instead, the bounce rate and exit percentage statistics must be used to make limited inferences about access to the theme papers. By comparing the entrance and bounce rate statistics, it can be determined that 147 individuals entered the COINAtlantic site at Landing Page A and proceeded to click on at least one link on the page (this number was determined by deducting the bounce rate from 100% and applying the resulting percentage to the entrance number). A similar calculation for Landing Page B determines that 534 users entered the COINAtlantic site at that page and proceeded to click on at least one link. Likewise, the low exit rates for both landing pages (39.5% and

45.7%, respectively) suggest that users who access the landing page during their COINAtlantic session are likely to click on at least one link. As the majority of links on the landing pages connect directly to PDFs for the theme papers, and most of the others connect to pages that showcase links to specific categories of PDFs for the theme papers, it can be reasonably inferred that the majority of individuals to access the *SoSS Report's* two landing pages went on to access at least one of the theme papers. As noted, this constitutes a floor on usage, but not a ceiling, and suggests that the *SoSS Report* has found an audience of a few thousand persons since its 2011 publication.

Google Analytics also provides data regarding referral sources for traffic to a given page. Table 4.3 illustrates the top five referrers for *SoSS Report* landing pages A and B.

Table 4.3: Top Five Referrals to *SoSS Report* Landing Pages—Period A

Landing Page A Referrers	Pageviews Generated	Landing Page B Referrers	Pageviews Generated
(direct)	657	Google	849
Google	577	(direct)	811
Google (Canadian)	53	Google (Canadian)	114
www.aczisc.dal.ca	14	dfompo.gc.ca/science/coecde/soto/backgroundeng.asp	50
Bing (search engine)	12	dfompo.gc.ca/science/coecde/soto/Scotianeng.asp	17

By a significant margin, the majority of referrals to both landing pages are either referrals from Google's search engines or “direct” referrals. A direct referral encompasses users who type the page's URL directly into their browser navigation bar, as well as “visitors who clicked on the links from their bookmarks/favorites, untagged links within emails, or

links from documents that don't include tracking variables (such as PDFs or Word documents)” (Park, 2009, para. 2). Accordingly, any referrals generated by promotional notices for the report distributed in the *Coastal Update* newsletter would be captured as “direct” referrals. While not every “direct” referral is necessarily a referral from *Coastal Update*, such a large number of “direct” referrals certainly suggests a significant portion were generated by regular notices in *Coastal Update*.

The referral statistics suggest that the *Coastal Update* promotional efforts have seen some success in generating awareness of the report, with up to 1468 referrals potentially resulting from these efforts (with the caveat that an exact number of pageviews generated by *Coastal Update* cannot be determined because the emailed links were not tagged for the purposes of generating Google Analytics data). The high number of Google generated referrals suggests either that the *SoSS Report* landing page is well-optimized to appear in Google search results for the Scotian Shelf—thus generating awareness of the report amongst individuals interested in the region—or that existing awareness of the report leads users to search for it directly. Furthermore, the fact that referrals are responsible for the majority of pageviews suggests that users of the report are unlikely to access it during a standard visit to the COINAtlantic website.

Web Traffic Statistics and Analysis: Period B

The goal of analyzing Google Analytics data for Period B was to determine whether events related to this case study played a role in raising awareness and, by extension, increasing access to the *SoSS Report*, particularly the distribution of survey and interview invitations to potential audience members and a presentation of draft conclusions and recommendations at the 2014 Coastal Zone Canada Conference in June.

Table 4.4 depicts total pageviews for a series of month-long periods leading up to and following the initial distribution of survey and interview invitations on April 8, 2014.

Table 4.4: Pageviews (and Unique Pageviews) for Months Before and After Distribution of Survey Invitations on April 8, 2014

	Landing Page A	Landing Page B
November 9-December 8, 2013	14 (7)	28 (25)
December 9, 2013-January 8, 2014	19 (12)	32 (18)
January 9-February 8, 2014	30 (10)	100 (41)
February 9-March 8, 2014	32 (17)	87 (37)
March 9-April 8, 2014	110 (50)	124 (48)
April 9-May 8, 2014	74 (34)	137 (55)
May 9-June 8, 2014	14 (6)	108 (49)
June 9-July 8, 2014	50 (15)	24 (14)

Though rates of access to the *SoSS Report* landing pages were above average in 3 of the 6 Landing Page/Measurement Period combinations, the results were not consistent enough to declare that access to the report increased during the period of this case study's public-facing activities. Notably high access rates in the month the survey was available does suggest that the surveys, which were available to over 5000 individuals and contained a direct link to the report, did motivate access to the report and may have motivated respondents to report more positive views of the report.

Access to the two landing pages for the *SoSS Report* also remained consistent since the report's publication. Figures 4.2 and 4.3 chart daily visits to each landing page: with occasional peaks, access has generally remained in the vicinity of 0-10 page views per day since the report's publication.

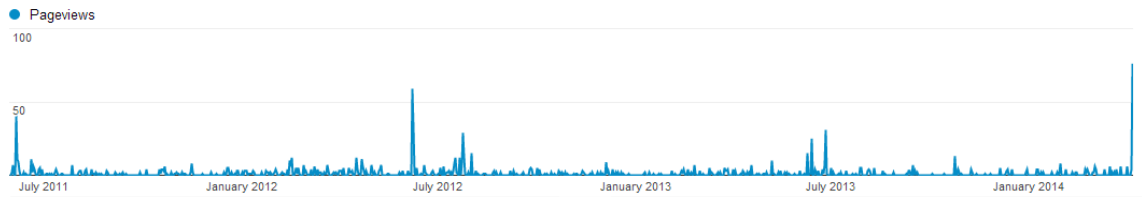


Figure 4.2: Daily Visits to SoSS Report Landing Page A, May 31, 2011-April 8, 2014

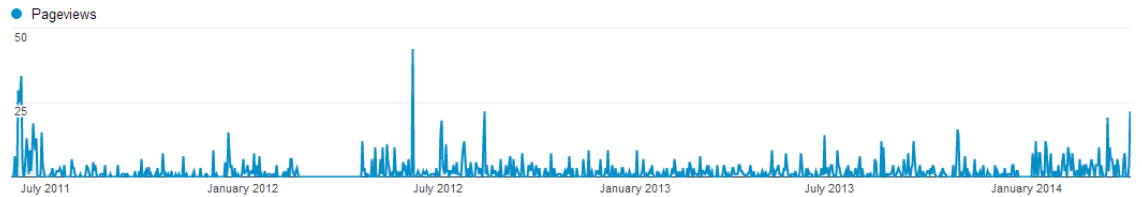


Figure 4.3: Daily Visits to SoSS Report Landing Page B, May 31, 2011-April 8, 2014

Value of Google Analytics for Studying Awareness

The determinations made here, based upon data obtained from Google Analytics, are necessarily restricted by the lack of optimization of the COINAtlantic website and ACZISC's awareness raising activities for Google's service. While Google Analytics is a powerful tool that can offer a diverse and customizable range of metrics for a given website, these metrics do not necessarily support the purposes of this study (and other, similar studies) in an “out-of-the-box” fashion. Rather, in order to maximize the value of data obtained by Google Analytics, both the website itself and the promotional activities of the website owner should be customized to capture the most salient data. The full nature of the shortcomings of Google Analytics for this study are further explored below, along with recommendations for optimizing websites for future studies in this vein.

4.2.2 Citation Searching and Analysis

Whereas the web traffic data analysis provided quantitative evidence of general

awareness of the *State of the Scotian Shelf Report*, citation searching and analysis aims to provide quantitative evidence of a specific form of use: utilization of the *SoSS Report* as a referenced source in new literature, whether in primary academic venues or other grey literature reports. By their very nature, state of the environment reports are not primarily intended as a source for new scientific research, as the focus of such reports is to present a summary of *established* scientific knowledge for an ecosystem in language that a reader without primary scientific expertise can understand. Nonetheless, research into the awareness and use of other SOEs, including recent research conducted by members of the Environmental Information: Use and Influence research team (Avdić, 2013), has found that SOEs can sometimes develop a secondary academic audience and are thus cited as sources in primary literature. Furthermore, Avdić's (2013) study of the United Nations Food and Agriculture Organization's *SOFIA* report found that the report was most likely to be cited in the first paragraph of a paper. This finding suggests that the reports are typically cited as authoritative sources of baseline and/or summary scientific information for the ecosystems in question: a clear demonstration of a given report's credibility. Accordingly, citation searching in academic databases can produce, in addition to direct evidence of use of the report, supporting evidence in favor of the report's credibility in the scientific community.

Results of Citation Search

Citation searches were conducted in Web of Science and Google Scholar, following the search strategies outlined above (while preliminary data collection also searched in Elsevier's popular Scopus citation database, this search was not repeated in primary data collection as it was assumed that Scopus would provide similar results to

Web of Science). The prediction was that there would be little change in the number of citations located, due to the combination of a short period of time between preliminary and primary data collection and the slow-moving process of academic publishing (and subsequent incorporation of primary scientific publications into existing citation databases).

Predictions were confirmed in the case of Web of Science, with no additional citations being located during the renewed search. However, the renewed Google Scholar search returned six documents citing the *SoSS Report* (a seventh result was a document on the COINAtlantic website regarding the ACZISC's activities, which made only passing reference to the report's presence on the website). The documents citing the *SoSS Report* are as follows:

Bundy, A. & Davis, A. (2012). Knowing in context: An exploration of the interface of marine harvesters' local ecological knowledge with ecosystem approaches to management. *Marine Policy*, 38. 277-286. doi: <http://dx.doi.org/10.1016/j.marpol.2012.06.003>

Campbell, I. D., Durant D. G., Hunter, K. L., & Hyatt, K. D. (2014a). Food production. In F. J. Warren and D. S. Lemmen (eds.) *Canada in a changing climate: Sector perspectives on impacts and adaptation* (pp. 99-134). Ottawa: Government of Canada.

Campbell, I. D., Durant D. G., Hunter, K. L., & Hyatt, K. D. (2014b). Production alimentaire. In F. J. Warren and D. S. Lemmen (eds.) *Canada in a changing climate: Sector perspectives on impacts and adaptation* (pp. 99-134). Ottawa: Government of Canada.

Gu nette, S., Ara jo, J. N., & Bundy, A. (2014). Exploring the potential effects of climate change on the Western Scotian Shelf ecosystem, Canada. *Journal of Marine Systems*, 134, 89-100. doi: <http://dx.doi.org/10.1016/j.jmarsys.2014.03.001>

Hastings, K. (2011). *Engaging stakeholders in marine conservation planning: Recommendations for moving forward with a bioregional marine protected area network on the Scotian Shelf* (Unpublished Master's Thesis). Dalhousie University: Halifax, NS.

Ye Yu, J., Üstebay, D., Blouin, S., Rabbat, M., & Coates, M. (2013). Distributed underwater acoustic source localization and tracking. Proceedings from *2013 Asilomar Conference on Signals, Systems and Computers*. Pacific Grove, CA: IEEE.

A subsequent search in Web of Science for the papers located via Google Scholar produced no results.

Analysis of Citation Search Results

Most of the documents citing the *SoSS Report* do so from a management, rather than scientific, perspective. One, an unpublished Master's thesis (Hastings, 2011) dealing with marine management issues on the Scotian Shelf, cites the *Scotian Shelf in Context* paper for information regarding the status of fisheries in the region. Another (Bundy & Davis, 2012), simply refers to the *Scotian Shelf* theme papers in a footnote as an example of collaborative knowledge production. Finally, the chapter from Canada *in a Changing Climate: Sector Perspectives on Impacts and Adaptation* (Campbell, Durant, Hunter, & Hyatt, 2014) is itself a work of grey literature, and cites an unidentified paper (likely *Fish Stock Status and Commercial Fisheries*) in its discussion of the effects of climate change on fish stocks.

The remaining two documents citing the *SoSS Report* are primary scientific journal publications. One (Guénette, Araújo, & Bundy, 2014) explores the implications of climate change on the Western Scotian Shelf and cites the *Ocean Acidification* theme paper's own discussion of the potential effects of increased ocean acidity on ecosystem conditions. The remaining article (Ye Yu, Üstebay, Blouin, Rabbat, & Coates, 2013) cites the *Scotian Shelf in Context* document as part of the background to the study being presented.

Style of Citations of the *SoSS Report*

One notable aspect of the citations located via Google Scholar is the variation in how a citation is presented in a reference list. The following list illustrates each document's approach to identifying the *SoSS Report* in its reference list:

Bundy & Davis

“For instance, recently the ESSIM initiative issued four theme papers for the State of the Scotian Shelf Report: At Risk Species; Marine Habitats and Communities; Trophic Structure; and Ocean Noise.” (Footnote)

Campbell et al.

Shackell, N. and Loder, J. (ed.) (2012): State of the Scotian Shelf Report, <<http://coinatlantic.ca/index.php/state-of-the-scotian-shelf> >

Campbell et al.

Shackell, N. et J. Loder (éd.) State of the Scotian Shelf report, 2012, <<http://coinatlantic.ca/index.php/state-of-the-scotian-shelf>>

Guénette et al

Curran, K., Azetsu-Scott, K., 2012. Ocean Acidification, State of the Scotian Shelf Report. Fisheries and Oceans Canada, Atlantic Coastal Zone information Steering Committee. 28 pp. <http://coinatlantic.ca/docs/ocean-acidification.pdf>

Hastings

DFO. (2011b). The Scotian Shelf in context: State of the Scotian Shelf report. Retrieved from <http://coinatlantic.ca/docs/scotian-shelf-in-context.pdf>

Yu et al.

“The Scotian Shelf in context,” in State of the Scotian Shelf Report. Department of Fisheries and Ocean, Canada.

4.2.3 Online Surveys

Invitations to participate in online surveys were distributed on April 8, 2014 to two audiences, subscribers to the ACZISC's *Coastal Update* newsletter and members of the ESSIM Stakeholder Advisory Committee, by EIUI's partner organizations ACZISC and DFO, respectively. Reminder messages were distributed as planned. Although the

survey period was originally intended to conclude on May 6, 2014, it was extended to May 14, 2014 when the opportunity arose to deliver a further reminder message to *Coastal Update* subscribers at the ACZISC's Roundtable Meeting of May 7-8, 2014.

In total, 66 individuals accessed the survey for *Coastal Update* subscribers, with 49 completing the entire survey. While this is a low response rate relative to the total subscriber base of the newsletter (~5500), it is likely a substantially higher percentage of the portion of *Coastal Update* subscribers with a potential interest in the Scotian Shelf (as the subscriber base for *Coastal Update* is broadly concentrated in the Atlantic Canada region in general, as well as internationally). The survey for ESSIM SAC members was accessed by 14 individuals, eight of whom completed the entire survey. The overall response rate for this survey was 30.4% (14/46).

Responses to Survey of *Coastal Update* Subscribers

Of the 66 individuals who accessed the survey of *Coastal Update* subscribers, eight members of the ESSIM SAC were screened out and invited to complete the survey designed for that committee and 51 proceeded to complete further questions in the survey. Of the latter, 42 completed the demographic questions. Over 64% (27/42 or 64.3%) were over 50 years of age (see Table 4.5), and most had obtained a graduate degree (30/42 or 71.4%), followed by ten (23.8%) who had obtained an undergraduate degree, and 2 (4.8%) who had obtained a college diploma. Almost half of the respondents are located in Nova Scotia (20/42 or 47.6%) (see Table 4.6). Respondents who resided outside of the Atlantic provinces (i.e., selected either “In Canada, but outside of Atlantic Canada,” or “United States,” or “other”) could specify their location. Three based in the United States specified Oregon, Michigan, and Massachusetts; two specified Quebec; two Ontario (one

of whom gave Ottawa as the location); and four others (two Canadians and two who selected “other”) did not specify their location.

Table 4.5: Coastal Update Respondents by Age Group (N=42)

Age group	Number
21-30	6
31-40	4
41-50	5
51-60	14
Over 60	13

Table 4.6: Coastal Update Respondents by Location (N=42)

Location	Number	Location	Number
Nova Scotia	20	In Canada, but outside of Atlantic Canada	6
New Brunswick	8	United States	3
Prince Edward Island	1	Other	2
Newfoundland and Labrador	2		

The affiliation of the respondents is give in Table 4.7. Nearly half (20/42 or 47.6%) are affiliated with a government body, followed by respondents who are affiliated with academic institutions (8/42 or 19%). Two of the respondents who selected “other” noted they had retired (one from a government position) and the third is a consultant with an interest in oceans.

Table 4.7: Coastal Update Respondents by Affiliation (N=42)

Affiliation	Number	Affiliation	Number
Governmental Body	20	Private Sector	1
Non-Governmental Organization	5	My interest in coastal and ocean issues is unrelated to any affiliation	5
Academic Institution	8	Other	3

ACZISC's *Coastal Update* Newsletter

The survey began with a brief series of questions assessing how subscribers interact with the *Coastal Update* newsletter. Of 45 respondents answering, 40 receive the newsletter directly, as an email from the ACZISC Secretariat, four receive it via email forwarding from an individual other than the ACZISC Secretariat, and one reads the newsletter directly on the COINAtlantic website rather than relying on email alerts to direct him or her to the newsletter.

A total of 45 respondents indicated how frequently they read *Coastal Update*. Of these, 27 (60%) indicated reading the newsletter monthly, four (8.9%) indicated bi-monthly, one (2.8%) indicated every three months, eight (17.8%) indicated reading the newsletter a “few times a year,” and five (11.1%) admitted that they “hardly ever read the newsletter.”

A total of 43 respondents answered a question about the information in *Coastal Update* that interests them the most. Table 4.8 shows the total number of times each response was selected, as well as the percentage of the 43 respondents who selected each option. Additionally, one respondent entered the textual response “process.”

Table 4.8: Information in *Coastal Update* of Most Interest to Subscribers

	Total Responses	Percentage of Respondents Selecting Option (n=43)
Government Reports	36	83.7%
NGO Reports	29	67.4%
Upcoming Conferences and Events	20	47.5%
Databases/Portals/Digital Atlases	17	39.5%
Webinars	7	16.3%
Videos/Podcasts	6	14.0%
Other Newsletters	6	14.0%
Deadlines	6	14.0%

Overall, a majority of respondents (83.7%) indicated interest in receiving notices about government reports. Likewise, a slightly smaller majority indicated interest in receiving notices about reports produced by non-governmental organizations. That these two options were the only two to be selected by a majority of respondents is a positive sign for the suitability of *Coastal Update* as a medium for promotion of the *SoSS Report*, which, being co-published by DFO and ACZISC, could be considered to fit either of these categories.

Subscribers sharing material from the *Coastal Update* newsletter with non-subscribers is another way by which awareness of the *SoSS Report* could be raised, further demonstrating the degree to which *Coastal Update* is an appropriate venue for promotion of the *SoSS Report*. A total of 44 respondents responded to a question about sharing *Coastal Update*, with 32 (72.7%) indicating that they do not forward *Coastal Update* to anyone and 12 (27.3%) indicating that they do forward *Coastal Update* to between 1-10 people, showing that promotional notices in *Coastal Update* have the

potential to reach well beyond the ~5500 member subscriber base.

Four respondents chose to leave a textual response, offering additional insight into how and why the newsletter is shared. Of these, two respondents emphasized that they do not share the report habitually, but only when items that interest them appear. Two respondents indicated that they sometimes share individual items from the newsletter and sometimes share the entire newsletter. One respondent reported that some individual items of interest were selected and then shared them via social media venues including LinkedIn, Twitter, and Google+.

Awareness of the *SoSS Report*

In response to a question about awareness, only about half who completed the question (23/45 or 51.1%) noted they were aware of the *Scotian Shelf Report*. These individuals became aware of the report by the following means: 14 (61%) reported becoming aware via the COINAtlantic website, one (4.4%) through DFO displays about the report at events, and the remaining seven (30.4%) selected the “other” option. Three of the latter noted they had been involved in ESSIM or in the creation of the report, one became aware of the report through DFO meetings, and two through courses offered at Dalhousie University (one in courses offered in the Master of Marine Management program).

Promotion of the *SoSS Report*

The 23 respondents who had previously indicated awareness of the *SoSS Report* were queried about the current state of promotion for the report's theme papers and prompted to offer suggestions for expanded promotional efforts. Twenty respondents

entered a response, with 12 (60%) considering current promotional efforts for the *SoSS Report* to be sufficient and the remaining 8 (40%) offering suggestions for expanded promotional methods.

Three of the textual responses emphasized that the report should be promoted through social media platforms, although none of these specified a particular platform as ideal. Two responses suggested promoting the report through the more traditional venue of the popular media. One suggested the use of notices on the DFO website to direct users towards the *SoSS Report*. Another reiterated the value of the report to university students, suggesting that awareness of the report be raised by demonstrating a greater emphasis on its use in a university setting.

These respondents were also queried about the potential use of social media platforms to promote the *SoSS Report*. Respondents could select multiple options from a short list (LinkedIn, Twitter, Yammer, Facebook, and “other”) and/or enter further suggestions in a text box. A total of 20 respondents selected one or more options from the list. Table 4.9 depicts the number and the percentage of the 20 respondents who selected each option.

Table 4.9: Coastal Update Subscribers Identifying Potential Social Media Platforms for Promotion of *SoSS Report*

	Total Responses	Percentage of Respondents Selecting Option (n=20)
Facebook	14	70%
LinkedIn	13	65%
Twitter	9	45%
Yammer	2	10%
Other	2	10%

One textual response simply stated that “anything” would be an appropriate social media promotion: the perceived value is in expanding promotion into social media spheres, rather than any specific platform. A second textual response provided a counterpoint to other respondents, by suggesting that “none of the above” are appropriate venues for promotion of the report. Overall, respondents seem to consider Twitter, Facebook, and LinkedIn to be more appropriate than Yammer, though this may reflect a difference in awareness of the platforms rather than a negative judgement against the fledgling public employee social media platform.

These respondents were also queried about whether they had themselves promoted awareness of the *SoSS Report*. Twenty-two responded to this question, of whom two (9.1%) had promoted awareness versus 20 (90.9%) who had not.

One respondent had not promoted awareness of the report because of being located in the US and, accordingly, where colleagues had limited interest in the region. However, the same respondent noted that some general interest in ESSIM exists amongst colleagues as an example of an ecosystem-based management initiative, once again highlighting the report's value as a source of information regarding policy and management actions, in addition to its scientific content. Conversely, another respondent indicated that awareness of the report had not been promoted because his or her colleagues were already aware of it.

Two textual responses elaborated on respondents' promotion of the *SoSS Report*. One reported informing colleagues about the report's existence so that they could use it as a source of information. The other noted that sharing of the report was limited due to doubts concerning DFO's commitment and intentions regarding integrated management,

once again presenting the idea that the report's value is correlated with its connection to a genuine and active integrated management initiative.

Format of the *SoSS Report*

The 23 respondents who had previously indicated awareness of the *SoSS Report* were queried about the report's digital-only distribution and modular format. All of the respondents indicated that digital distribution through PDF files available on the COINAtlantic website is a suitable method of access for their purposes. Likewise, the 23 respondents indicated that the modular format of the *SoSS Report* is a suitable format for their uses.

Use of the *SoSS Report*

The 23 respondents who had previously indicated awareness of the *SoSS Report* were queried about their reading and use of the report (or lack thereof). Respondents were able to select from a range of options characterizing their reading of each theme paper (Read Entirely, Read Sections, Skimmed Through, Was Aware of but Did Not Read, and Was Not Aware Of). Table 4.10 presents the number of respondents who selected each option for each theme paper (note: while all 23 respondents selected options for at least one theme paper, no respondent selected an option for every theme paper).

Table 4.10: Respondents Indicating Reading of Theme Papers—Survey of *Coastal Update* Subscribers

	Read Entirely	Read Sections	Skimmed Through	Aware of, but did not read	Was not aware of
<i>Scotian Shelf in Context</i>	2	4	8	4	3
<i>At-Risk Species</i>	0	7	3	7	3
<i>Marine Habitats and Communities</i>	1	8	5	6	2
<i>Incidental Mortality</i>	0	2	5	10	3
<i>Invasive Species</i>	0	3	8	8	2
<i>Climate Change and its Effects on Ecosystems, Habitats, and Biota</i>	2	7	4	7	1
<i>Ocean Acidification</i>	0	4	4	9	1
<i>Primary and Secondary Producers</i>	1	0	6	10	3
<i>Trophic Structure</i>	2	0	7	8	3
<i>Fish Stock Status and Commercial Fisheries</i>	0	3	6	8	3
<i>Water and Sediment Quality</i>	1	3	6	8	3
<i>Ocean Noise</i>	1	1	5	10	4
<i>Waste and Debris</i>	0	4	7	6	3
<i>Emerging Issues</i>	1	6	5	7	2

While these responses draw from too small a sample to reach broad inferences about which theme papers have been the most read, they nonetheless demonstrate a broad interest across the context document and 13 theme papers, suggesting that the *SoSS*

Report is salient to the interests of its audience.

Table 4.11 illustrates the number of respondents who indicated using each theme paper.

Table 4.11: Respondents Indicating Use of Theme Papers—Survey of *Coastal Update* Subscribers

	Use		Use		Use
<i>Scotian Shelf in Context</i>	1	<i>Climate Change and its Effects on Ecosystems, Habitats, and Biota</i>	5	<i>Water and Sediment Quality</i>	1
<i>At-Risk Species</i>	0	<i>Ocean Acidification</i>	2	<i>Ocean Noise</i>	0
<i>Marine Habitats and Communities</i>	1	<i>Primary and Secondary Producers</i>	0	<i>Waste and Debris</i>	1
<i>Incidental Mortality</i>	0	<i>Trophic Structure</i>	2	<i>Emerging Issues</i>	3
<i>Invasive Species</i>	1	<i>Fish Stock Status and Commercial Fisheries</i>	2		

Although this data is insufficient to form the basis for broad inferences about use of the *SoSS Report*, it does confirm that the majority of theme papers have seen at least some use, with *Climate Change and its Effects on Ecosystems, Habitats, and Biota* being used more than the other theme papers, followed by *Emerging Issues*.

Of greater interest are the textual responses, which reveal some of the ways in which the report has been used since its publication. Two respondents indicated using one or more of the theme papers as reference material for research, with one specifying that the research was conducted at the undergraduate honours level. Another respondent reported using the report to obtain background information on the ESSIM Initiative and to better understand its objectives, highlighting that the *SoSS Report* is not only a source of scientific knowledge for the Scotian Shelf, but also a source of knowledge about policy

and management actions in the region.

Respondents who had previously indicated awareness of the *SoSS Report*, but also indicated that they had not yet made use of the report, were encouraged to leave textual responses explaining their reasons for not using the report. A total of seven textual responses were entered. Two of these responses indicated that the individuals had not used the report due to lack of interest. Two responses indicated that the report was not used due to time constraints. Two respondents stated that they had not used the report because they had retired, while a further two indicated that the report's subject matter was not salient to their work. Notably, one respondent reported that the report was not used due to doubts concerning DFO's commitment and intentions regarding integrated management, introducing a theme that would arise frequently in later interviews with ESSIM SAC members: namely, the belief that the value of the *SoSS Report* is positively correlated with its connection to an active integrated management initiative. (Note: some responses contained more than one theme.)

The 23 respondents who had indicated awareness of the report were then asked whether they were aware of use of the report by others. Eighteen (85.6%) reported that they were not aware of others who had used the *SoSS Report* and the remaining three (14.4%) indicated they were.

Two respondents used the available text box to elaborate on the type of individuals who they knew had made use of the *SoSS Report*. One was aware of use of the report by colleagues in academia or government, while the other noted use by proponents and regulators of projects in the Scotian Shelf region. Though there were few responses, they suggest that the *SoSS Report* may appeal to a broad range of audiences.

These respondents were then queried about how they thought others could potentially make use of the report. A multiple-choice option was not included, in order to encourage respondents to utilize the provided text box. The goal of this design choice was to solicit suggestions for potential uses of the *SoSS Report* that may not have been considered either in the design of the report or this study. A total of 10 provided textual responses to the question.

The responses emphasized the broad range of uses and audiences that the *SoSS Report* serves. Potential audiences include students (mentioned by three responses), policymakers and decision-makers in the region (mentioned by four), economic stakeholders (mentioned by one), the interested public (mentioned by one), and non-governmental organizations (mentioned by one). Potential uses identified by respondents include providing a basis of knowledge to inform policy development and management actions, as a research resource for both students and professional researchers, as a baseline of environmental conditions to inform an environmental assessment process, and as an awareness raising tool both for emerging issues and hot topics, as well as for promoting conservation goals to the public. Another respondent emphasized that the *SoSS Report* is an excellent complement alongside other information sources, suggesting that the report may have additional benefits as a stepping-stone to further research.

The respondents who had previously indicated awareness of the report were next asked about other SOE reports that they had found useful over the past five years. A total of eight textual responses were entered. Of these, seven indicated that they had found one or more SOE reports useful in the past five years, while one had not. Respondents noted a range of SOE reports with an Atlantic focus, including reports developed by provincial

governments (e.g. *State of Nova Scotia's Coast Report, Towards a Greener Future: Nova Scotia's Climate Change Action Plan, A Coastal Areas Protection Policy for New Brunswick*), the Canadian federal government (state of the parks reports produced by Parks Canada), and non-governmental organizations (*State of the Gulf of Maine Report*, OSPAR reports). One respondent reported finding value in SOE reports from foreign countries (in particular, Australia), reiterating the theme that SOE reports can be useful as a resource for developing jurisdictional scans of environmental management policies.

Respondents Not Previously Aware of the *SoSS Report*

A separate branch of the survey posed questions to the 22 respondents who had previously indicated that they were not aware of the report. These respondents were given a brief description of the report's nature and queried about whether it could potentially be useful to them in their work. A total of 21 respondents responded, of which nine (42.86%) indicated that the *SoSS Report* would be useful to them in their work and 12 (57.14%) stated it would not. This result suggests that there may be potential to increase use of the report by raising awareness of it, as nearly half of those unaware of the report at the start of the survey believed it would be of use to them.

Four respondents left textual responses elaborating on the report's potential usefulness, or lack thereof. Two noted that the *SoSS Report* would not be useful to them because their work is focused on other regions. One respondent indicated that their work focuses on migratory species and that, accordingly, the report may be useful to them, since these migratory species make use of the Scotian Shelf among other ecosystems. The remaining response indicated that the report could be useful indirectly, but declined to elaborate on the nature of this indirect use.

These respondents were then queried about potential methods of promoting the report. Of the 18 respondents who answered the question, nine (50%) recommended promoting the report with media releases, six (33.3%) recommended promoting the report directly through emails from DFO, and three (16.7%) suggested promoting the report through DFO-sponsored displays at conferences related to coastal and ocean management.

These respondents were then asked about the report's format, through questions identical to those asked of the respondents who were previously aware of the report. As with the previous version of this question, 100% of the 18 respondents who answered the question indicated that digital-only distribution of the *SoSS Report* was a suitable method of access. Two respondents elaborated with textual responses: one noted that a benefit of PDF files is that they can be easily acquired and saved to a computer, while the other noted that hard copy distribution would raise the expenses of producing and distributing the report.

Twenty-one respondents entered a response to a question about the modular format, of which 18 (85.7%) indicated that this was suitable and three (14.3%) that it was not. Unfortunately, none of the three respondents who considered the modular format unsuitable were among the two who entered explanatory textual responses. One textual response emphasized that a major benefit of the modular format is ease of information access, as users can easily locate and focus their attention on the particular theme paper topic of interest. The second response provided a caveat, declaring that the modular format was useful as long as it can be saved to a computer. This response suggests that the benefits of modular formatting for SOE reports may be intrinsically linked to a digital-

distribution method.

These respondents were then queried about their use of SOE reports generally over the past five years and four textual responses were provided. One of these reported that he or she had not found any SOE reports particularly helpful in the past five years. One respondent highlighted the *Atlantic Maritime Ecozone* as a particularly useful SOE report. Another respondent did not identify any specific reports, but noted that the summary portions of SOE reports are particularly helpful. The final respondent reported that numerous US-based reports dealing with coastal and ocean areas had been useful, while singling out the *State of the Gulf of Maine Report*.

Twenty respondents input a response to a question about their awareness of use of the *SoSS Report* by others, of whom 3 (15%) indicated that they were aware of others who had used the report, and 17 (85%) noted they were not.

Two respondents offered an elaboration to their answer. The first reported that he or she was aware of colleagues in academia and government using the report to obtain a policy perspective on emerging issues in the region. The other was aware of use of the report by proponents and regulators of projects on the Scotian Shelf. Notably, this second textual response was identical in phrasing to a response given to the version of this question directed to respondents who were aware of the report, suggesting that technical or human error in the survey design may have allowed at least one respondent to answer both questions. However, as only 20 respondents gave responses to the question, it seems likely that the majority of respondents did not see both questions.

The 22 respondents who had indicated a lack of awareness of the *SoSS Report* were then queried about potential uses of the report. Unfortunately, due to human or

technical error in the survey design, the question was also directed to many of the individuals who had previously indicated that they *were* aware of the report, as shown both by the presence of identically phrased answers and one respondent's explicit statement that they had answered this question previously.

Despite the repetitive nature of some responses, responses to this question still highlighted potential uses of the report. In particular, two respondents drew attention to the report's value as a public education tool, with one emphasizing that it could raise awareness of conditions in the Scotian Shelf region, and the second going a step farther to suggest that such awareness building could build public support for the necessity of policies to promote adaptation to changing environmental conditions.

Responses to Survey of ESSIM SAC Members

Eleven of the 14 respondents to the survey indicated the stakeholder category they represented on the ESSIM SAC. Individuals participating in this survey represented the breadth of the stakeholder categories involved in ESSIM's activities. Of the 11 individuals who responded, two (18.2%) represented the federal government of Canada, three (27.3%) provincial or municipal governments, two (18.2%) were industry stakeholders, one (9.1%) represented an academic research organization, and three (27.3%) represented other non-profit organizations, such as community groups or First Nations groups.

Eleven of the 14 respondents to the survey answered a question about their awareness of the *SoSS Report*. Unsurprisingly, given the involvement of the ESSIM SAC in the development of the *SoSS Report*, 10 of these (90.9%) reported awareness of the report. The latter 10 respondents were queried about their involvement with the development of the report. Of these, five (62.5%) noted involvement in the development

of the *SoSS Report*, with two (25%) reporting no involvement and one (12.5%) being unable to recall.

A textual response box was provided to allow respondents to elaborate on their involvement in the development of the *SoSS Report*. Of the five who were involved, three provided textual responses. Two indicated that they were members of the *SoSS Report* steering committee, with one elaborating that his or her involvement included discussion of the emerging issues theme paper and the selection of the Driving Forces, Pressures, States, Impacts, and Responses (DPSIR) framework as the theoretical basis for measuring the state of the Scotian Shelf. A third response indicated that the individual was a federal government representative from the Ocean's Habitat and Species at Risk (OHSAR) branch of DFO and served as co-chair of the ESSIM SAC until retirement prior to the report's completion.

Seven of the 10 respondents who had indicated awareness of the report entered textual responses regarding the perceived audience of the report, with responses emphasizing the diverse range of audiences the *SoSS Report* serves. Five of the seven (71.4%) identified multiple intended audiences for the report, while two that specified one audience group used very general terms, with one identifying “stakeholders who use/have an interest in the area” and the other “informed professionals.” The remaining audiences identified a broad range: the general public (identified twice), stakeholders and users in the region (identified five times), government policy- and decision-makers (identified thrice), professionals in coastal and oceans-related fields (identified twice), non-governmental organizations, researchers, and potential developers (all identified once).

Eight of the 10 respondents indicating awareness of the report responded to a

question regarding the benefit of the SAC's participation to the *SoSS Report*. Of these, seven (87.5%) agreed that SAC participation resulted in a document that reflects the information needs of stakeholders, while one (12.5%) disagreed.

Four respondents elaborated on their responses textually. One response did not directly address the question, simply noting that the *SoSS Report* is “a multi level document addressed to new and habitual users of Scotian Shelf aimed at providing an integrated snapshot.” Another respondent observed that many of the issues addressed in the *SoSS Report* were derived from the content of the ESSIM plan and from concerns expressed by stakeholders in the ESSIM process. The remaining two qualified their positive responses to the question. One observed that the real answer to the original question was “yes and no,” because while stakeholders were given ample opportunity to participate in the report's development, they did not necessarily take full advantage of the opportunity. The second qualified response observed that “input (and therefore output)” into the *SoSS Report* was ultimately limited to those stakeholders who were invited by the government to participate and chose to do so.

The 10 respondents who had previously indicated awareness of the *SoSS Report* were queried about the appropriateness of the final selection of theme paper topics. Nine responded to this question, of which 8 (88.9%) believed that the final selection of topics for the *SoSS Report* was appropriate and one (11.1%) not.

Three respondents elaborated on their answers with textual responses. Two of these provided context for their belief that the selection of topics was appropriate, with one simply stating the diverse range of topics and one emphasizing that the topics selected arose from several years of discussions involving the SAC. The remaining

textual response noted that the selection of topics could be improved by addressing more issues about human uses of the Scotian Shelf.

Use of the *SoSS Report*

The 10 respondents who had previously indicated awareness of the *SoSS Report* were queried about their reading and use of the report. They were able to select from a range of options characterizing their reading of each theme paper (Read Entirely, Read Sections, Skimmed Through, Was Aware of but Did Not Read, and Was Not Aware Of). Table 4.12 presents the number who selected each option for each theme paper.

Table 4.12: Respondents Indicating Reading of Theme Papers—Survey of ESSIM SAC Members (N=10)

	Read Entirely	Read Sections	Skimmed Through	Aware of, but did not read	Was not aware of
<i>Scotian Shelf in Context</i>	4	0	2	1	3
<i>At-Risk Species</i>	2	2	1	2	0
<i>Marine Habitats and Communities</i>	3	2	0	2	0
<i>Incidental Mortality</i>	3	2	0	2	0
<i>Invasive Species</i>	2	1	3	1	0
<i>Climate Change and its Effects on Ecosystems, Habitats, and Biota</i>	2	2	2	1	0
<i>Ocean Acidification</i>	2	0	2	3	0
<i>Primary and Secondary Producers</i>	2	2	0	3	0
<i>Trophic Structure</i>	2	2	0	3	0
<i>Fish Stock Status and Commercial Fisheries</i>	4	1	1	1	0
<i>Water and Sediment Quality</i>	3	0	1	3	0
<i>Ocean Noise</i>	3	1	0	3	0
<i>Waste and Debris</i>	3	2	0	2	0
<i>Emerging Issues</i>	4	1	2	0	0

While these responses draw from too small a sample to reach broad inferences about which papers have been the most read, they nonetheless demonstrate a broad interest across the context document and 13 theme papers, suggesting that the *SoSS Report* is salient to the interests of its audience.

Regarding use of the report, respondents could select as many papers as they had

used from a master list and then elaborate on the nature of their use in a text box. Table 4.13 illustrates the number of respondents who indicated using each theme paper.

Table 4.13: Respondents Indicating Use of Theme Papers—Survey of ESSIM SAC Members (N=10)

	Use		Use		Use
<i>Scotian Shelf in Context</i>	3	<i>Climate Change and its Effects on Ecosystems, Habitats, and Biota</i>	2	<i>Water and Sediment Quality</i>	2
<i>At-Risk Species</i>	2	<i>Ocean Acidification</i>	0	<i>Ocean Noise</i>	2
<i>Marine Habitats and Communities</i>	1	<i>Primary and Secondary Producers</i>	1	<i>Waste and Debris</i>	2
<i>Incidental Mortality</i>	1	<i>Trophic Structure</i>	2	<i>Emerging Issues</i>	3
<i>Invasive Species</i>	1	<i>Fish Stock Status and Commercial Fisheries</i>	2		

One respondent elaborated on use of the *SoSS Report* in a textual response by identifying two uses: in general, the respondent used the theme papers to obtain information about public policy issues pertaining to coastal and ocean management, while making specific use of the theme papers as a resource to assist in the development of policy briefs related to environmental impact assessment processes.

These respondents were also queried about whether they had taken steps to promote awareness of the *SoSS Report* and seven responded to the question. Of these, four (57.14%) reported that they had promoted awareness of the *SoSS Report*, while three (42.86%) had not. Three respondents entered textual responses to elaborate on their answers, all specifying the audiences to whom they had promoted awareness of the *SoSS Report*: one to “former colleagues in provincial government,” another to graduate students and non-governmental organizations that are involved in work in coastal and

ocean areas, and another to fellow members of the Canadian Aquatic Nuisance Species Network.

These respondents were asked about their knowledge of others' use of the *SoSS Report* and seven responded to this question. Of these, five (71.43%) reported that they were aware of others using the *SoSS Report*, while two (28.56%) indicated that they were not. Four respondents elaborated on their answers with textual responses. One respondent confirmed awareness of the use of the report by waste management professionals.

Another identified coworkers at the Canada-Nova Scotia Offshore Petroleum Board as users of the report. A third identified employees of non-governmental organizations as users, specifying that the report was used as an information source for developing briefs and other submissions to government. The final response identified members of the Shipping Federation of Canada and the US Government as users, for the purposes of informing Integrated Ocean Management plans.

Seven of these 10 respondents discussed how the report could potentially be used. Once again, the range of responses illustrates a variety of potential uses that the *SoSS Report* could serve for a variety of audiences. Potential uses identified by respondents were: a reference document for researchers (mentioned by three), a resource for outreach and awareness raising about the region (mentioned twice), a planning tool for managers in the region (mentioned twice), an evaluation tool to assess the outcomes of management plans, an educational resource for teachers at the high school and university levels, a reference for stakeholders wishing to understand the interests of other stakeholders in the region, and an evolving series of snapshots of the conditions on the Scotian Shelf to illustrate trends (mentioned once each).

Nine of the 10 respondents who had previously indicated awareness of the *SoSS Report* responded to a question about why they had not used the theme papers. Five (55.56%) indicated that the question was not applicable since they had made use of the theme papers, two (22.22%) stated that the papers were not directly applicable to their work, and a further two (22.22%) noted that they had either changed careers to a different field or retired.

All respondents to the survey were asked about their use of SOE reports generally. Three identified SOEs that they had found useful in the past five years. The first noted that an SOE on the subject of air quality referencing indexes had been helpful to his or her work. The second identified the *State of Nova Scotia's Coast Report* as a particularly useful SOE. The third respondent could not recall the title of the SOE report on air quality and CO₂ emissions that was particularly helpful, but did note that it had been helpful in completing work on issues related to ocean acidification.

ACZISC's *Coastal Update* Newsletter

The final group of questions, directed to all respondents to the survey, addressed the ACZISC's *Coastal Update* newsletter, the primary venue for promotion of the *SoSS Report* to date. Eight responded, of which five (62.5%) confirmed that they receive the newsletter, while three (37.5%) reported that they did not. Five respondents elaborated that they receive the *Coastal Update* newsletter directly from the ACZISC Secretariat.

Five respondents replied to a question about how frequently they read *Coastal Update*. Three (60%) reported reading the newsletter monthly, while two (40%) read the newsletter “about every two months.”

Five respondents answered a question about the type of information they find

most useful in *Coastal Update*. Of these, four (80%) identified government reports as the information of most interest, three (60%) identified non-governmental organization reports, three (60%) identified information about upcoming conferences and events in the coastal and ocean management field, and once each (20%) identified webinars, databases/portals/digital atlases, and other newsletters.

A total of five respondents answered a question about their sharing of the newsletter, of which 2 (40%) reported not sharing the newsletter, two (40%) reported sharing the newsletter with 1-10 people, and one (20%) reported sharing the newsletter with 11-50 people.

4.2.4 Interviews with ESSIM SAC Members

Following the distribution of invitations on April 22nd, 2014, eight members of the ESSIM Stakeholder Advisory Committee agreed to participate in semi-structured interviews regarding the activities of the SAC; the development, distribution, and promotion of the *State of the Scotian Shelf Report*; and their own use, or lack thereof, of the *SoSS Report* and state of the environment reports generally. These interviews were conducted over the course of May 2014, in person when possible and via phone when logistical issues prevented a face-to-face meeting.

The value of the interviews was greatly enhanced by the breadth of stakeholder groups represented by the eight participants. Three participants represented government agencies on the SAC: two represented the federal Department of Fisheries and Oceans and one the provincial Department of Fisheries and Aquaculture. Three participants represented industry stakeholders in the Scotian Shelf region: one from the oil and gas sector, another the shipping industry, and another the fishing industry. Finally, the

remaining two participants represented community stakeholders: one a First Nations community organization and a second a provincial coastal advocacy organization.

In addition to the range of stakeholder groups represented, interview participants were involved in a variety of specialized roles within the SAC. The SAC was governed by two co-chairs: one representing the government and another community stakeholders in the region. These positions were introduced while the ESSIM process was already underway and were rotating positions, held by more than one member over the course of the SAC's activities. Three participants had held co-chair positions on the SAC: one governmental and two non-governmental. Additionally, one interviewee was involved in the SAC subcommittee responsible for selecting the theme paper topics for the *SoSS Report*, and another was involved in the steering committee that oversaw editorial duties for the production of the *SoSS Report*.

The Role of the ESSIM Stakeholder Advisory Committee

The first portion of the interview focused on the role the Stakeholder Advisory Committee played in the ESSIM process. Interview participants were asked to describe their understanding of the mandate and working processes of the SAC. Particular focus was placed on the role the SAC played in defining the scope of the *SoSS Report*.

The interviewees were largely in agreement about the primary nature of the SAC's mandate: six of eight participants (75%) specified the primary goal of the SAC to be the provision of advice to assist in the development of a management plan for the Scotian Shelf region. Another participant offered a stronger formulation of this theme, stating that the SAC's mandate was “to build or assist with the building of an integrated management plan as a pilot project for ocean management of the Scotian Shelf area” (Interview

Participant B). The remaining participant suggested that tension existed within ESSIM between these two views, with debates occurring over whether the SAC was intended to provide non-binding recommendations or to take an active role in creating policy. Three participants, two governmental and one non-governmental representatives, noted that the SAC would have continued in its advisory role during implementation of the ESSIM plan, had the federal government elected to proceed with implementation.

Two participants (25%) commented on the legislative impetus for the ESSIM Initiative, noting that federal legislation—specifically the 1997 Canada Oceans Act—provided the legislative authority for the DFO to oversee the development of an integrated management plan. One of these participants also noted that the Oceans Act mandated the involvement of stakeholders in the development of the plan and required ministerial assent before the completed plan could be implemented. The interviewees emphasized, both during discussion of the SAC's role and throughout the other portions of the interview, that ESSIM was a pilot project (50%) and, as such, the activities of the SAC constituted a process of continual learning on the part of participants (50%).

The geographical boundaries of ESSIM were another aspect of the ESSIM/SAC mandate that participants introduced into discussion. Two (25%) stressed the fact that, despite the involvement of coastal advocacy groups in the SAC, the boundaries of ESSIM exclude the coastal seas between Nova Scotia and the Scotian Shelf, due to jurisdictional differences between the provincial and federal governments.

The participants were encouraged to share their impressions of the working processes by which the SAC approached its mandate. The primary working process was roundtable meetings of all available SAC members, which served to provide an open

forum for stakeholders to air their views regarding the shape of the ESSIM plan. One participant reported that these roundtable meetings were held with varying degrees of frequency over the course of the development of the ESSIM plan, with meetings being held as often as four times a year at peak activity, and as infrequently as once per year (Participant A). Due to the pilot nature of ESSIM, these meetings served not only to develop consensus advice for the development of the ESSIM, but also to develop the very process by which the roundtable meetings would determine that consensus (Participants D & E).

Four participants (50%) reported that, as the host of the SAC roundtables, DFO played a strong role in directing and supporting the activities of the SAC. The direction of activities was achieved, in the early days of ESSIM, by DFO chairing the roundtable meetings, as well as providing draft management documents to the SAC so that they could provide constructive feedback (Participant B). Support of SAC activities was achieved in a similar fashion, with DFO providing all its available scientific information to the stakeholders so that recommendations could be informed by scientific evidence (Participant D). Two government stakeholder participants (25%) went on to note that DFO's control of the SAC process dwindled over time. This reduction in control coincided with the introduction of a non-governmental co-chair to the SAC, with the result being an enhanced degree of stakeholder influence in the operations of the SAC (Participant F).

One participant highlighted an important distinction about the nature of the advice provided by the SAC: specifically, a distinction between “committee” advice and “council” advice. In this participant's view, advice provided by a member of a committee

is intended to represent that particular committee member and the specific organization he or she represents: for instance, an industry stakeholder would provide advice from the perspective of his or her own company (Participant C). Council advice, by contrast, denotes the member providing advice on behalf of an entire sector, and requires active consultation of other actors in that sector on the part of the council member (Participant C). Although, in name, the SAC was an advisory committee, Participant C believed that it functioned as a council, with the participants serving as representatives of entire sectors, rather than their own particular organizations (a view supported by DFO's own documentation of SAC membership, which categorizes its membership by sector rather than organization).

Participants also drew attention to tensions and conflicts that existed within ESSIM, DFO, and the SAC and affected the committee's working process. Three participants (38.25%) reported the existence of tensions between stakeholders participating in the SAC, which one participant observed was an inherent result of the fact that stakeholders naturally possess conflicting interests in the region:

Some stakeholders had differences; the differences among the stakeholders had to do with mandates. The government people have law and mandates that govern the work that they're doing at the table, so their roles are a bit different from the non-governmental people. The non-governmental people, the industry association folks, are there to represent interests about the use of that space pertaining to their industry. The community people are there because, of course, everything at some point comes down to the community, whether it be Halifax, or Nova Scotia, or... the communities that exist along the Atlantic coast, who basically have been there a very long time, who have interests about how that ocean space is utilized. (Participant D)

One government representative confirmed that these tensions between stakeholders were anticipated and accounted for by establishing conflict resolution mechanisms early in ESSIM's activities (Participant H). Another of these three participants emphasized a

particular tension between fishing industry representatives and the other categories of stakeholders, suggesting that, given their existing ties to the Fisheries branch of DFO, they were inclined to view the increased input from other stakeholder groups as diminishing of their existing influence. Two participants also identified a tension between the Fisheries and Oceans branches of the DFO as affecting the ESSIM process. Furthermore, five participants (63.75%) reported a perceived lack of commitment to the ESSIM project on the part of the upper-levels of DFO (a perception perhaps confirmed by the eventual abandonment of ESSIM by DFO); these five participants included industry representatives, community group representatives, and even one government representative.

Two participants, as noted above, were directly involved in SAC subgroups related to the *SoSS Report*—one on the subcommittee for theme paper topic selection and one on the steering committee for the report—and were able to provide some insight into the working processes of those subgroups. The participant involved in theme paper selection noted that DFO provided support for the subgroup's activities by identifying particularly relevant pieces of information within the corpus of scientific information provided to SAC members. The participant involved in the *SoSS Report* steering committee noted that members of the committee included provincial and federal government representatives, non-governmental organization representatives, and community representatives, but did not include representatives of industry stakeholders. The participant reported that the steering committee played a full editorial role in the development of the report, including selecting authors for each theme paper and reviewing and providing feedback on drafts submitted by those authors. Table 4.14,

provided by EIUI's partner contact at DFO, elaborates on the process by which the steering committee and authors collaborated to produce the *SoSS Report's* theme papers.

Table 4.14: Drafting Process for State of the Scotian Shelf Report Theme Papers (Personal Communication w/H. Breeze)

Task	Participants	Due Date
Review of scope of paper and DPSIR framework	Coordinator and authors	2 weeks
Draft table of contents	Authors	2 weeks
Review of draft table of contents, DPSIR	Steering Committee	2 weeks
Draft theme paper	Authors	3 months
Steering Committee and peer review	Peer reviewers Steering Committee	2 weeks
Authors incorporate review comments	Authors	2 weeks
Approval by Coordinator and/or Steering Committee (if needed)	Coordinator, Steering Committee	
Layout	Channel Communications	2 weeks

Development of the *State of the Scotian Shelf Report*

The second portion of the interview protocol concerned the development of the *State of the Scotian Shelf Report*. Questions in this portion of the interview concerned the intended audience of the report, the selection of theme paper topics, and the potential benefits of engaging stakeholders in the process of developing the report.

Like the survey respondents, the eight interview participants identified a diverse range of intended audiences for the report. Four participants (50%) saw the public as a

primary intended audience for the report, three (38.75%) mentioned government decision-makers (with one specifying that the managers of ESSIM would have been the primary audience), and four (50%) identified stakeholders in the region. Two participants (25%) were divided over whether scientists were also an audience for the report: one observing that “it's not very important scientifically, because it's all stuff that's been available and that people in the science community have known for a long time” (Participant C) and the other that, precisely because the report collects a comprehensive account of current knowledge, it could serve to help scientists identify “key areas of research needs” in the region (Participant H).

Participants identifying the public as a primary audience of the *SoSS Report* emphasized its potential as a public education or awareness-raising tool. Three (37.5%) observed that scientific knowledge, in its typical form, is written at a level that is too technical for a layperson to understand. These participants believed that, by translating this knowledge into a format that a member of the interested public can understand, the report can encourage public engagement with the policy issues affecting the Scotian Shelf. One participant offered a more specific formulation of this theme, suggesting that the *SoSS Report* would have served to build public support for ESSIM and the cause of integrated management generally, by bringing significant issues to the attention of the public (Participant C).

The participants identifying government decision-makers as a primary intended audience for the report focused their attentions on the then-anticipated ESSIM initiative. In this context, the report would have provided an information resource to help in the planning of management actions and then, subsequently, would have helped evaluate the

impacts of those actions when the report was updated to reflect new information. For this reason, one participant observed that the usefulness of the report was diminished due to the conclusion of the ESSIM Initiative. Another participant took a contrary view, suggesting that, although the report may have originally been intended for government, “it sort of expanded to a state of the environment report that is much bigger and much broader than the ESSIM plan” (Participant F).

Participants identifying regional stakeholders as a primary audience for the report highlighted the significance of establishing a mutually agreed-upon basis of knowledge about the current state of the ecosystem. Two participants (25%) stressed that this common basis of knowledge could foster cooperation between stakeholders by preventing arguments over the basic facts of the condition of the ecosystem. One observed that government provision of scientific information in any form serves this purpose, and ensures that “everybody's working from the same song-sheet” (Participant A). Furthermore, the participant claimed that for many stakeholder groups, the availability of credible baseline scientific information provided by the government saves time and resources from being spent hiring consultants to fill knowledge gaps. This participant also noted that, when forced to obtain baseline scientific information on their own, industry groups cannot be as certain that the information they acquire from consultants is credible.

Six of the eight participants (75%) felt that the range of theme paper topics selected for the *SoSS Report* was comprehensive, with one of these highlighting the *Emerging Issues* theme paper as particularly valuable. One of the two participants who did not consider the theme paper topics comprehensive made a purely semantic objection, arguing that it is not possible to achieve comprehensiveness because there is no “end” to

knowledge (Participant D). The other raised a more specific objection: namely, the lack of information on the topic of marine munitions buried on the Scotian Shelf. The participant noted that this shortage of information was related to an absence of information-sharing between government agencies, in this case DFO and the Department of National Defence. The participant revealed that this omission reduced their confidence in the value of the information contained in the report, since the interviewee was forced to “wonder how much [controversial material] was edited out” (Participant C).

Three participants (37.5%) reported that the process of stakeholder engagement practised during ESSIM and the development of the *SoSS Report* was beneficial in building trust and relationships between stakeholders and government. One participant noted that bringing a range of stakeholders together to develop a plan encouraged the identification of common ground and facilitated consensus-building (Participant D). Another participant took a more instrumental view of the benefits of stakeholder engagement, noting that engaging stakeholders in the development of the report encouraged them to familiarize themselves with the available information, while the process of developing an integrated management plan prompted each stakeholder to begin planning concrete actions to accomplish the goals identified in the plan (Participant F).

Participants were less emphatic about the benefits of stakeholder engagement when focused particularly on the development of the report, primarily due to practical factors. Two participants (25%) observed that the involvement of stakeholders in the development of the *SoSS Report* resulted in a document that better met the information needs of users. However, two other participants noted that there were limits to the relationship- and trust-building benefits of stakeholder engagement in the report's

creation: one of these participants believed these benefits were limited because the *SoSS Report* theme selection subcommittee and steering committee were subgroups with very small membership, and the other because the *SoSS Report* was developed well into the larger ESSIM process, when relationships between SAC members had already been developed.

One participant felt that ESSIM's stakeholder engagement practices were not as successful as they could have been, on account of what the participant considered to be intransigence on the part of stakeholders from the fisheries industry (Participant A). In this participant's view, the fisheries industry had less incentive than the other stakeholders to cooperate because there were already established networks of communication and cooperation between the fisheries sector and the Fisheries branch of DFO. The participant elaborated that, as the fisheries sector is the stakeholder with the largest impact on Scotian Shelf conditions at present, representatives of that sector had a disincentive to see information about those conditions be shared more widely.

Format, Distribution, and Promotion of the *State of the Scotian Shelf Report*

The third portion of the interview protocol focused on the format and distribution of the *State of the Scotian Shelf Report*. Questions here addressed three topics: the exclusive hosting of the report on the ACZISC's COINAtlantic website, the digital-only distribution of the report, and the report's modular format.

Six participants (75%) agreed that the COINAtlantic website is an appropriate venue for hosting the *SoSS Report*. One participant contrasted the COINAtlantic website favourably with that of the DFO, noting that “government websites are not particularly user-friendly” (Participant D). Three participants (37.5%) also suggested that

COINAtlantic is a preferable venue to the DFO website because it is external to government and perceived by stakeholders and the public to be more objective. Despite this, two participants (25%) suggested that it would be beneficial for awareness and accessibility of the report to reference and link to it from the DFO website. COINAtlantic was also deemed an appropriate venue on its own merits, with three participants (37.5%) highlighting that the ACZISC's established networks in the coastal and ocean management communities provide the organization with a built-in audience for promotion, leading to higher awareness of the report. In contrast, one participant (Participant E) expressed concerns that hosting the report on the COINAtlantic site would reduce overall use, though that participant acknowledged being unable to think of a preferable alternative.

Participant B rejected the premise of the question outright, arguing that the hosting venue for the *SoSS Report* is ultimately less relevant to awareness and use of the report than sustained promotional efforts:

The thing is that if you want the report to be generally viewed, or viewed again and again, and so and so forth, it needs to be re-pushed, if you'll excuse my expression, periodically. So if you don't keep it under the noses of people like me or anybody else, or the people who would have an interest in it, or a growing interest, or newcomers. If you don't push it, they're not going to find it. And so it has a limited consumption in its present location. So, you know, a little press release, a little something in the *Chronicle Herald*, in fisheries publications, whatever you have, that makes occasional reference to it and has a link to where the full report exists...If you just post it and leave it there, nothing happens.

(Participant B)

In this participant's view, it is not enough to promote the report when it's "new." Rather, sustained efforts must be made to maintain awareness of the report. Further participant discussion of potential promotional efforts will be highlighted later in this section.

The participants were generally supportive of the digital-only approach to the distribution of the *SoSS Report*. Six (75%) attested that the digital format is suitable. Some focus was directed towards the perceived shortcomings of print copy distribution: participants noted that hard copies are difficult to distribute, update, and amend compared to digital copies (Participant D); that hard copies are often neglected after their initial publication (Participant E); and that hard copies are potentially wasteful of environmental and economic resources (Participants E & F). Furthermore, two government representatives observed that the PDF files provided on the COINAtlantic website allow users to print off and create their own hard copies if they feel that a physical format would be more useful. Four participants (50%) observed that print copies are less relevant in a digital age, when increased access to broadband internet connections greatly enhances the accessibility of digital information; one participant specifically noted that front-line workers in the fishing industry are more technologically savvy than is typically assumed (Participant F).

Some participants, including some of those who considered the digital-only format appropriate, expressed some reservations about the lack of print copies. Participant D observed that digital-only distribution may still discourage access on the part of older members of the public, as well as individuals located in rural areas with poor broadband access; despite these reservations, the participant concluded that these concerns would likely no longer be a problem within ten years, as broadband access increases and the older generation is increasingly populated by individuals who are comfortable with information technology. Participant A noted that a limited print run of copies distributed to interested organizations and venues could serve to raise awareness and use of the

report, particularly since the participant considered the theme papers to have an aesthetically pleasing design. The strongest reservations about digital-only distribution were raised by Participant C, who suggested that a formal report is an inappropriate way to disseminate information on the internet:

From my experience, people don't read things online. They watch videos, text—Twitter, Facebook, you know...the general public isn't downloading and reading documents that are over four, five, six pages at the most. So even though the chapters are more bite-sized, they're still fairly lengthy, you know...twenty, thirty, forty pages...I'm not sure that you'd have a bunch of people reading it.

In this participant's view, a commitment to digital distribution should come coupled with a commitment to explore the potential of multimedia formats to better convey information to the interested public via the internet. Moreover, the participant argued that, because DFO makes no use of social media to promote the report, interested users who are not already *Coastal Update* subscribers will only locate the report online if they are actively searching for it. Participant C also attested to the virtues of hard copies, arguing that they serve to maintain awareness of the report by their very nature as persistent physical objects: in the participant's words, a physical copy is “in front of you, at least,” while the digital world is “at your recall.” Furthermore, the participant voiced a belief that hard copies of the theme papers would make an ideal promotional vehicle for the *SoSS Report*, as they could be distributed at events relevant to coastal and ocean management.

The interviewees were unequivocally supportive of the modular format of the *SoSS Report*, with seven (87.5%) affirming that this format is suitable and one offering no opinion. Six participants (75%) emphasized that a key advantage of a modular format is that it allows users to focus their attention on the subject they are most interested in, as each individual document treats a single, specific theme. While one participant suggested

that this tight focus may inhibit serendipitous information discovery by allowing users to set aside information on topics that don't already interest them, the participant did not consider this a sufficient reason to reject modular formatting. Along a similar vein, some participants noted the length of theme papers as an advantage over omnibus documents: one participant said that the theme papers are appealing to read because they are concise, while two took the opposite tack, arguing that large, omnibus documents may prove intimidating to potential users and thus inhibit use. Some participants also noted the advantages of modular formats to the producers of reports: three stated that by creating a series of smaller documents, a modular format facilitates updating or amending documents. Participant H went on to note that modular formats also present fiscal advantages for government organizations, as they allow for funding to be sought in smaller increments for each individual theme paper.

Four participants spoke to the question of whether the producers of the *SoSS Report* had adequately considered the information needs of potential users when developing the report. One simply noted a belief that the producers of the report did consider the needs of users when designing the report. Another spoke about the challenges of tailoring a report to the needs of a varied audience:

[what information a user requires depends] on the individual or the organization. It's a range... I'm not exactly sure how to answer that. Research scientists need extremely detailed data, and you compare that to the needs for an educational purpose and they're completely different. (Participant H)

This participant emphasized that the developers of the report focused on providing information that would be perceived as objective and credible. Other participants attested to the benefits of stakeholder engagement to the relevance of the documents to the information needs of users: three (37.5%) strongly agreed that the stakeholder

engagement process had such benefits, with two going so far as to say that trust in the content was improved due to the efforts by DFO to engage stakeholders.

Use of the *State of the Scotian Shelf Report*

Six of the eight participants (75%) confirmed having read one or more of the theme papers. The two participants who had not read any theme papers provided different reasons for not reading. One reported that time constraints prevented accessing the theme papers, even though the participant acknowledged that the theme papers could be relevant for work-related purposes. The other non-reader had a very simple reason: prior to the interview, the participant had not been aware that the theme papers were published! This individual extrapolated from this lack of awareness to the broader public:

So if I don't know that the chapters, like you're saying, were produced in little, smaller versions, then I seriously doubt that many of the public would know that. And that's who those chapters were intended for, more public consumption.
(Participant C)

However, this participant did confirm having read the technical report that formed the basis for the *State of the Scotian Shelf Report*.

The participants who confirmed having read one or more of the theme papers were queried about their general impressions of the documents. They generally thought that the reports were written at an appropriate technical level for stakeholders and the interested public. Participant G specifically noted that it was a challenge to the producers of the report to write the document at an appropriate level for a range of audiences and affirmed a belief that the producers of the *SoSS Report* were successful in that regard. Participant D emphasized the importance of writers who are capable of translating between scientific and non-scientific contexts, noting that without these services a significant quantity of

scientific knowledge would simply be unavailable to the general public.

Some participants reported some reservations about the writing level of the *SoSS Report*. Participants A & B observed that there are limits to the range of individuals who will be able to comprehend the information in the *SoSS Report*, even after efforts have been made to make this information clear to a non-technical user. Both identified the general public (in contrast to the interested public) as an audience for which the report's writing level might be too technical. Participant B also spoke about government officials, particularly ministers, as an audience for which the report may be too technical, suggesting that senior bureaucrats may be required to translate information from the report into briefing notes and that producers of the *SoSS Report* might consider producing prepackaged briefing notes for this purpose, potentially expanding the use of the information by politicians and the general public.

Participant F articulated a more specific concern about the report's content. This participant noted that the data presented in charts and the back of each theme paper was difficult to interpret without having read the entire document. The participant went on to suggest that these indicators could be clarified for the reader with a simple system of colour coding: data in green if the indicator was improving, red if it wasn't, and uncoloured if the data was unchanged since the last update. However, the interviewee also expressed concern that adopting such an approach may lead readers to simply glance at the chart and ignore the more detailed content of the report.

The participants were equally divided in use of the report, with four having made use of one or more of the theme papers to some degree and four having made no use of the papers. Two (25%) also indicated that they were aware of others making use of the

report, though they declined to specify the nature of this use. Of the four participants who had not used the theme papers, reasons varied. Two did not use the theme papers because of a change in career; one retiring, one moving to a different field within government. A third reported that current work did not provide enough time to consult the theme papers, even in cases where the participant believed that they could prove useful. Finally, the fourth participant who had not used the theme papers was simply unaware of their existence prior to the interview.

Participants who had used the theme papers included industry group representatives, a member of a community group, and a government representative. One industry representative reported using the theme papers to obtain background information on the region to inform the decision-making process of the member's organization. The other reported citing the theme papers directly in intra-organizational documents recommending particular management actions in the region. The community group representative confirmed using the report to obtain background information to inform activism related to fisheries issues on the Scotian Shelf. Finally, the government representative, despite reporting only limited use of the papers due to a job relating more to the provision of scientific information than the use of it, reported using the papers to add to a stock of general knowledge of the region.

Much like the survey respondents, all eight interviewees were able to identify a range of potential uses for the *SoSS Report* and the scientific information it contains. Many of these responses focused on the potential of the information to inform various decision-making processes in the region. Two participants (25%) saw the *SoSS Report* as a potential aid to the risk assessment process. Along a similar line, Participant C

suggested that the report could serve to inform management decisions by regulators, singling out the designation of Ecologically and Biologically Significant Areas (EBSAs) as a potential use. Similarly, one government representative considered the information in the *SoSS Report* to be potentially useful in designating Marine Protected Areas (MPAs), classifying species at risk, and generally determining the scope of regulations on the fishing industry's activities on the Scotian Shelf. One further participant suggested that the report would be useful to organizations in the fishing industry, which could use the report to inform their applications for usage licenses. Two participants (25%) noted that, in the absence of government provision of scientific information, it is difficult for industry groups to gain access to credible information about environmental conditions in the region.

Some participants, particularly community group representatives, highlighted the value of the report to members of the public. Three (37.5%) considered the report a potentially effective public education tool. Participant C explained that the report is effective because it allows an individual in an educator's role to draw on the credibility of the government to enhance his or her own credibility to speak on the issue. Two participants (25%) suggested that the report could also be useful as a research aid for members of the interested public trying to educate themselves on issues in the region, both emphasizing that the report provides a solid basis of information at a writing-level comprehensible to a lay reader, as well as a list of references as a basis for future research.

Elaborating on the report's potential use as a public education tool, three participants (37.5%) argued for a connection between the *SoSS Report* and public

engagement with participatory democracy. Two (25%) noted that the *SoSS Report* is useful not merely for providing information about scientific conditions, but also for understanding the potential impacts of proposed legislative and regulatory actions in the region. One participant elaborated at length:

So all these different levels of government, when they're going to do something, they're going to make some change that will impact on this geographic area for which these theme papers provide some fundamental information. So those are some examples of the kinds of developments—and they're usually things in the future, they're new things that happen all the time—that you want to be able to understand. And government solicits—this is the other thing that people forget—government solicits public input.

But most of the public, there's a whole crowd of them that might have an interest, but they're too—they know they don't know anything much about it. They're *concerned*, but they're not *confident* about it....[they] don't have the confidence to speak up, to write a letter to the government, or to participate in these things, because they just feel ignorant, like they just don't know. (Participant D)

Thus, two participants specifically identified the report as a support to democracy, as it serves the stated interest of the government to encourage citizen participation and input to democratic decision-making and the interests of those members of the public who wish to give input but feel ill-informed to express their opinions to managers and policymakers with experience and knowledge of the ecosystem conditions on the Scotian Shelf.

Two participants (25%) considered the potential value of the *SoSS Report* to academic researchers. One, while declaring that the report would not be highly useful to primary scientists because it deals with information they are likely to already be familiar with, nonetheless acknowledged that the report could prove useful in establishing an authoritative baseline of ecosystem conditions:

[citing the report allows scientists to say] “we didn't come up with this out of thin air. This study's real, because we cited the *Scotian Shelf Report*. And because we dropped that name, it gives more credence to what we're doing with that paper.”

And, yeah, I think the *Scotian Shelf Report* fits into the exact same thing.
(Participant C)

The other participant reiterated a reason for believing the report was useful as a support to independent research: in addition to establishing baseline conditions in the region, the report provides a list of references which will be useful to academics in conducting further research.

Participants were generally proud of the work that ESSIM and the SAC had done in creating a management plan and developing the *SoSS Report*, and were similarly generally disappointed with the perceived lack of support for ESSIM at the upper levels of DFO and the initiative's eventual conclusion in the absence of ministerial support. One participant in particular put forth the argument that the awareness and use of the *SoSS Report* is greatly inhibited in the absence of ESSIM. In this participant's view, the potential value of the report was closely tied its connection to an established integrated management program, which would provide stakeholders with a clear forum to put the knowledge gained from the report to use in airing their views. Furthermore, the participant believed that a key public education benefit of the *SoSS Report* would be to build public support for the activities of ESSIM, as well as to promote the cause of integrated coastal and ocean management generally.

Updating the *State of the Scotian Shelf Report*

The participants were also queried about how often they felt the *SoSS Report* needed to be updated in order to remain current. Five (62.5%) specified a time frame for updating the report, with four declaring that the report should be updated every five years (the time frame that DFO currently plans to follow in updating the report) and one

offering a range of three to five years. Three participants emphasized that regular updating of the report is necessary in order for it to remain useful. One went further, suggesting that the report's usefulness will actually increase with regular updating, as multiple “snapshots” of ecosystem conditions will ultimately combine to reveal trends in the ecosystem (Participant E). Another participant expressed a strong lack of confidence in the DFO's commitment to consistently update the report, along with the concern that the report's usefulness would be lost if his or her concerns came to pass (Participant A).

Two participants (25%) suggested that a five-year updating schedule could be better executed if, rather than undertake a major updating project every five years and release the updated theme papers all at once, DFO implemented a staggered or rotating basis for updating the papers; for example, updating three theme papers each year, with the entire *SoSS Report* being updated over the course of the five-year cycle. The interviewees emphasized multiple potential benefits to this approach to updating the report. First, such an approach would reduce the size of funding requests by the report's producers by spacing them out over time, extending the fiscal benefits of the modular format beyond the initial production of the report (Participant E). Second, it would improve the overall currency of the information, as at any given time a large proportion of the theme papers would have been updated more recently than they would be if the entire report was updated every five years, which in turn would accelerate the rate at which the report could capture certain ecological trends (Participant E). Finally, a staggered schedule would prevent a sudden increase in workload for the report's creators as the end of the five-year cycle approaches (Participant F).

Some participants suggested the updating of the *SoSS Report* as a prime

opportunity to also expand the report's scope, both geographically and with regards to subject matter. One participant noted that the *Emerging Issues* theme paper will need to be expanded to encompass new issues as they emerge, and further observed that, should some of these emerging issues become major issues in the region, it may be appropriate to develop new theme papers to look at these issues in more detail. A government representative noted that DFO plans to update *Emerging Issues* every two years, rather than the five-year schedule of the larger report, precisely because that theme paper deals with issues where the stock of available knowledge is rapidly increasing. One participant reiterated an earlier concern at the exclusion of marine munitions as a subject, whether as its own theme paper or as a subsection of the *Marine Debris* theme paper.

Regarding the report's geographical scope, two participants (25%) suggested that the boundaries addressed by the report be expanded to include the coastal areas between the Scotian Shelf and Nova Scotia. A community group representative reported that personal use of the report was inhibited due to a primary interest in the region being coastal issues, an interest shared both by the individual's broader organization and members of the interested public in the interviewee's community. Another participant stressed that most stakeholders participating in the SAC had a greater interest in coastal issues than open ocean issues, despite the limited scope of ESSIM's boundaries excluding such areas. Both of these participants agreed that awareness and use of the report would be increased if the report were expanded to address issues and report ecosystem conditions affecting coastal areas.

General Use of State of the Environment Reports

As some participants had made little or no use of the *SoSS Report* theme papers, they were asked questions related to the use of state of the environment (SOE) reports generally. One affirmed limited use of SOE reports. As with the *SoSS Report*, the participant reported that use was limited by two factors: exogenous time constraints and the fact that the participant's organization tended to utilize scientific information to address highly specific concerns, and were thus more likely to begin with primary scientific publications that have a narrower focus. Another participant reported that use of SOEs had been limited during the participant's career due to a lack of an SOE for the participant's jurisdiction: the interviewee had been primarily responsible for management decisions in the Scotian Shelf region and retired prior to the publication of the *SoSS Report*. Nonetheless, the participant attested that had such information been available, it would have been useful in carrying out job responsibilities. A third participant reported that use of SOEs was limited because current employment was focused more on the provision of scientific information than the application of it.

Despite making limited use of other SOE reports, these participants were still able to identify a range of potential audiences and uses for such reports. All three participants identified NGOs as a primary audience for SOE reports. Two of these, both government representatives, suggested that government employees with environmental management responsibilities were a primary audience for SOEs. These two participants also identified industry stakeholders as potential audiences for SOEs, though one specified that they were a primary audience while the second considered them a minor audience. One participant observed that such reports can be useful in planning management actions, while another thought that they are also useful for NGOs seeking to hold governments

accountable for the outcomes of these actions. Participant H also noted that NGO advocacy in general benefits from access to this sort of scientific information.

Participant D expanded upon the earlier theme of the primacy of government provided scientific information to participatory democracy. This participant emphasized the belief that government has a responsibility to be proactive in providing comprehensible scientific information to the public:

We must remember who paid for these studies in the first order: it was the taxpayer who paid for this work to be done. But just doing it isn't fulfilling it. There is an accountability of government to the people who paid for that work to make that work accessible to them in a way they can understand. And I think that State of the Environment and State of the Ocean Reporting is an effort in that regard and I think it's extremely important.

Participant D went on to note that both government and the public benefit from the provision of accessible scientific information:

if you want more people to be reasonable, and talk about these issues, about ways, and in so doing, find solutions, find different ways of approaching things.... because institutions of government, they're not hot beds of new ideas often. So the public can come forward and have new ways of doing things that can perhaps contribute to this, but if you don't have the information from the get go, you stifle and you undermine the confidence of those people to talk about things in their own society and influence how things are done and to give them a stake, at which point you've lost that common ground. (Participant D)

This participant concluded that, while the final goal of participatory democracy is to reach common ground between government and stakeholders, ultimately “the onus is on the institutions of government to provide that information” to create the conditions for reaching common ground.

Participants' Final Remarks

After the completion of the prepared questions of the interview protocol, each participant was given the opportunity to share any final remarks they had on the subject.

This gave each participant the opportunity to either address issues of importance to them that had not come up earlier, or to reiterate themes that they felt were particularly important. Each participant's final remarks will be discussed in this section.

Participant A focused on the geographical boundaries of ESSIM and the *SoSS Report*. This participant reiterated that the report's scope should be expanded to include coastal areas and further argued that any integrated management plan for the region would benefit from the inclusion of coastal areas under its jurisdiction. In this participant's experience, the success of integrated coastal and ocean management efforts depended on the inclusion of near-coastal areas, because such initiatives depend on stakeholder engagement and near-coastal areas see a much higher proportion of human activity. The participant concluded that any future efforts to establish an ICOM plan for the Scotian Shelf would be more successful if the geographical boundaries were expanded.

Participant B commented on two issues: the conclusion of ESSIM and future promotional efforts for the *SoSS Report*. Regarding ESSIM, the participant expressed the view that the closure of the initiative came about because of insufficient support from the upper levels of DFO. The participant argued that the initiative should have been authorized to proceed with implementing its plan, and noted a belief that in the long-term some form of integrated management will have to be established for Nova Scotia's coastal and offshore areas, given the range of stakeholders with an interest in those regions:

There is a lot of recognition that, especially around the coast of Nova Scotia, energy is interested—wind, and tidal, and wave energy—there are humongous resources available that could be tapped. Aquaculture is a growing interest, and needs to be a growing interest: it's a renewable resource in many respects, but there's tons of issues waiting out there that could benefit from some sort of office, a planning or management system, that will allow them all to live together in

harmony, and, you know, then you don't have conflicts and things that like that.
(Participant B)

Finally, this participant observed that integrated management has had success in some regions of Canada and noted a connection between the concept of integrated management and the production of SOE reports, as integrated management initiatives were being launched contemporaneously with ESSIM all over Canada, with attendant publication of accompanying SOE reports.

Regarding future promotional efforts for the *SoSS Report*, the participant simply reiterated the belief that it would benefit from “being segmented and pushed in public press type of venues or places” (Participant B). The participant concluded by suggesting that sustained promotional and updating efforts for the *SoSS Report* could potentially aid in the future establishment of a new ICOM initiative for the region:

But, making use of the report, my experience is that if you don't put it under people's noses it soon gets forgotten... if the science was used, if the report was used, in a policy format—to make policy with it—to actually create a government institution or program or whatever it is. If it was needed to be there, that work could be resurrected as the framework for the work that is needed in the future. But the details may no longer be there by the time it gets there.
(Participant B)

Participant D revisited the belief that the scope of the *SoSS Report* should be expanded in future editions, both in geographic terms and in its subject matter. The participant reiterated that ESSIM and the *SoSS Report* suffered for excluding Nova Scotia's coastal areas from their jurisdiction, particularly since many developments of public interest will occur in those coastal areas in the near future. The participant acknowledged that jurisdictional differences between the federal and provincial governments motivated the exclusion of coastal areas from the initiative's boundaries, but maintained that the scope should be expanded in the future. Due to limited scientific

capacity on the part of the provincial government, the participant believed that the responsibility for providing scientific information for the coastal areas is a federal responsibility. The participant further noted that Nova Scotia's coast are a data rich area, scientifically speaking, and that, accordingly, it is entirely within the government's ability to provide scientific information about them to the public, should it so desire.

Participant D also returned to the idea that future editions of the *SoSS Report* must identify new issues for the *Emerging Issues* theme paper and spin major emerging issues off into their own theme papers if they are of sufficient relevance to management in the region. The participant noted one such issue for inclusion: namely, the prospect of developing wind farms in Nova Scotia's bays. Notably, including this issue in the *SoSS Report* would also serve to expand its geographical scope into coastal areas. The participant concluded by reiterating that the availability of scientific information that can be understood by non-scientists is crucial to the cause of effective environmental management.

Participant E focused on the challenges and potential benefits of integrated management initiatives. This participant argued that integrated management's value is in providing a clear forum for stakeholders to discuss and mediate between their potentially conflicting interests in the region, highlighting the fact that management actions related to one stakeholder group's activities in a particular ecosystem inevitable affect all stakeholders. In the absence of such an initiative, the participant observed that stakeholders may lack the opportunity to share input on management issues that are not directly related to them but will ultimately affect their interests. The participant expressed some scepticism about the motives of ESSIM SAC members, suggesting that some

attended primarily to keep abreast of potential management actions that could potentially affect their interests in the region; however, the participant also noted that these motives nonetheless acted as an incentive to encourage participation on the part of stakeholders. The participant concluded that, despite the challenges that exist in obtaining investment from all stakeholders in the region, integrated management initiatives are ultimately worth the effort.

Participant G emphasized the benefits of stakeholder engagement in the ESSIM planning process and the development of the *SoSS Report*. In this participant's view, interactions between regional stakeholders and between stakeholders and government agencies present an excellent opportunity for all involved to better understand each others' interests:

I think that's one of the major things that comes out of initiatives like the Stakeholder Advisory Council [sic] work and then, sort of more focused initiatives like developing the *State of the Scotian Shelf* theme papers. Again, it's getting people into rooms to share different perspectives about how to deal with some of these issues, and how to address issues that we all have as common concern, but maybe are coming at different solutions or are addressing them from different places. So it's just getting people from a lot of different backgrounds together, working on issues of common concern. That would be my closer. (Participant G)

Returning to the theme that the ESSIM planning process was an ongoing learning experience, Participant H spoke about how the *SoSS Report* benefited from following a model established by the *State of the Gulf of Maine Report* produced by the Gulf of Maine Council on the Marine Environment. In addition to having a model to refer to when selecting the report's format, the participant noted a benefit that arose from learning from the mistakes of the earlier process: the producers of the *SoSS Report* altered their procedures for selecting and contracting writers for the theme papers. Without being specific, the participant reported that the developers of the *SoSS Report* “approached a lot

of the contracting differently....so we were better able to identify the right type of individuals who could do the research and synthesis for us and actually write the [papers].” (Participant H). This participant emphasized the importance of writers who can translate scientific information between contexts in a manner comprehensible to the lay-reader.

Participant C was unable to provide final remarks due to a scheduling conflict cutting the interview short, and participant F declined to offer any further comments, affirming that the interview had covered all subjects the participant wished to address.

Chapter 5: Discussion

5.1 Google Analytics Data

The use of Google Analytics data from the COINAtlantic website offered the opportunity to address the third research question, “What evidence is there of awareness and use of the *State of the Scotian Shelf Report* in the relevant communities of practice?” and its attendant sub-questions. Google Analytics can be used to acquire evidence of awareness by determining the number of visits and unique visitors to the *State of the Scotian Shelf Report* landing page, assess the relative popularity of individual theme papers by comparing download statistics, and evaluate the success of online promotional efforts for the *SoSS Report*. Google Analytics also provides longitudinal data, revealing any shifts in rates of access over the period following the report's publication.

5.1.1 Evidence of Awareness and Access for *SoSS Report* Landing Page at COINAtlantic

The results of Google Analytics data collection confirm that there is awareness of and access to the *SoSS Report*, though it is not possible to determine exact measurements. Statistics for Period A are particularly relevant in this case, confirming that at least 3342 visits were made to the two *SoSS Report* landing pages during the first two years and of the report's availability. The same statistic also confirms that these visits were made by at least 1290 unique visitors, and potentially as many as 2046 (an exact number of unique visitors cannot be determined because a unique visitor to Landing Page A may also be a unique visitor for Landing Page B).

Notably, these statistics provide a lower rather than an upper boundary for access to the *SoSS Report* page because, prior to the preliminary data collection phase of this study,

many notices promoting the *SoSS Report* in the *Coastal Update* newsletter linked directly to the PDFs of the theme papers, rather than either of the two landing pages. As Google Analytics does not track PDF downloads by default, and the COINAtlantic site had not yet attempted to accommodate alternative methods of PDF tracking, any users accessing the PDFs directly from links in *Coastal Update* were not noted by Google Analytics. Furthermore, Google Analytics is obviously unable to capture any instances of the theme papers being shared by users who had downloaded the PDFs. As such, there is potential for the rates of access to the report to be substantially higher than the statistics already indicate.

The relative consistency in rates of access to the report over time suggests that interest in the report is not time-sensitive and that awareness of the report has remained steady despite the limited promotion of the report. As such, the potential exists to increase access to the theme papers by raising awareness amongst potential audience members, even nearly three years following the original publication of the theme papers (a point that was also raised frequently in the interviews with former ESSIM SAC members).

5.1.2 Evidence of the Effectiveness of Promotional Efforts for the *SoSS Report*

Referral data for the two *SoSS Report* landing pages provides limited evidence that notices in the ACZISC's *Coastal Update* e-Newsletter, the primary promotional effort made on behalf of the report, have been effective in raising awareness of and driving access to the *SoSS Report*. Direct referrals were the highest and second highest sources of referral to Landing Pages A & B, respectively (cf. Figures 4.2 and 4.3). Direct referrals encompass access to the site through bookmarks, via the manual entry of the URL into a

browser's navigation bar, and through clicking on links embedded in emails. As manually entering URLs is not typical web user behaviour, it seems likely that a substantial number of these direct referrals were referrals from links in the *Coastal Update* newsletter.

Google Analytics can specify the origins of direct referrals if the referring links are tagged with a particular code: however, as these codes were not utilized in the *Coastal Update* notices, it is not possible to determine precisely how many direct referrals resulted from the newsletter.

5.2 Citation Searching

As with past EIUI case studies (Avdić, 2013; Hutton, 2009), multiple methodologies were utilized to develop a broad picture of awareness and use of the *SoSS Report*. Citation searches in Google Scholar and Web of Science were employed to provide evidence of awareness of the report in the research and professional communities, as well as direct evidence of a particular type of use of the *SoSS Report*. Furthermore, recent research into the use of the *SOFIA* report (Avdić, 2013) has suggested that SOE reports may most frequently be cited as an authoritative source to establish baseline conditions for the ecosystem being investigated, thus providing evidence of the cited report's credibility.

The number of citations located by the two search engines is far too small to draw strong conclusions about awareness and use of the *SoSS Report* or perceptions of the report's credibility. However, the citations that were located demonstrate that the theme papers have been used as information resources for the development of primary scientific documents (e.g., Ye Yu et al., 2013), academic studies of marine policy (e.g., Bundy & Davis, 2012; Hastings, 2011), and further grey literature and policy documents (e.g.,

Campbell et al., 2014a; 2014b). Even within this small sample size, the *SoSS Report* demonstrates relevance to the information needs of a variety of audiences, a point that was also emphasized by survey respondents and interview participants.

5.3 Online Surveys

Online surveying is another data collection tool that has been used with success in past EIUI case studies (e.g., Soomai, 2009). Online surveys offer the opportunity to obtain both qualitative and quantitative data from a much larger audience than could conceivably be interviewed. The cooperation of the ACZISC in distributing invitations to the subscriber list for the *Coastal Update* newsletter was invaluable, as was the DFO's assistance in distributing invitations to members of the former ESSIM Stakeholder Advisory Committee. The surveys distributed to both audiences primarily address research questions C & D (see pp. 6-7). The survey results provide insight into the degree of awareness and use of the report that exists in two major targeted audiences and, more significantly, elucidate the highly varied nature of that use. Furthermore, the survey results capture readers' and users' opinions of the *SoSS Report's* content, its modular, digital-only, and efforts by the report's producers to promote awareness of the theme papers. Finally, the survey distributed to former ESSIM SAC members provided limited insight into research question B, "How were stakeholders involved in the process of creating the *State of the Scotian Shelf Report?*" although the semi-structured interviews with SAC members were substantially more illuminating in this regard.

5.3.1 Coastal Update Newsletter

Assessing the frequency at which subscribers to *Coastal Update* actually read the newsletter suggests the potential efficacy of notices in the newsletter as an awareness

raising effort for the *SoSS Report*, which is particularly useful to know as the *Coastal Update* newsletter was the primary source of promotional efforts for the report. A majority of respondents (60%) to the survey of *Coastal Update* subscribers indicated reading the report monthly, as did a majority of the ESSIM SAC respondents who indicated receiving the newsletter. Furthermore, in both surveys a majority of *Coastal Update* readers indicated that their primary interest in the *Coastal Update* newsletter was to be informed about government and NGO reports.

Overall, these responses suggest that promotional notices for the *SoSS Report* are likely to be seen by a large percentage of *Coastal Update* subscribers. While the respondents to the survey may be an unrepresentative sample (i.e., individuals who are more likely to read the newsletter than other subscribers), their responses may simply suggest that interested individuals are likely to see promotional notices for the *SoSS Report*. Furthermore, the fact that not every respondent reads the newsletter every month highlights the importance of sustained/frequent promotion of the report in order to maintain awareness.

Finally, many survey respondents indicated that they share items of interest in the *Coastal Update* newsletter with colleagues, suggesting another means by which awareness of the report is generated. The observation that some subscribers share *Coastal Update* via social media is an important finding from the responses about sharing, as it indicates that existing networks on established social media sites may have an interest in coastal and ocean issues, highlighting a new medium through which the *SoSS Report* could be directly promoted.

5.3.2 Awareness of the SoSS Report

In both surveys, most respondents indicated awareness of the *SoSS Report* and its theme papers. However, it is difficult to extrapolate from the small sample size of the *Coastal Update* subscribers to reach conclusions about awareness of the report in the broader communities of practice that form the target audience for the *SoSS Report*.

With regard to the *Coastal Update* survey, the proportion of respondents who indicated that they were not aware of the report (almost 50%—see p. 65) may be the most significant finding, particularly in light of the number of respondents indicating that they read *Coastal Update* for information about government reports. As respondents were interested enough in the Scotian Shelf region and state of the environment reporting to complete a survey on the subject, the substantial portion of respondents who were unaware of the report suggests a need to increase awareness of the report through increased promotional measures. That respondents who were unaware of the report are subscribers to *Coastal Update* and pay some attention to email messages from that mailing list implies that promotional notices in the *Coastal Update* newsletter alone may not be sufficient to generate awareness of the report, even among subscribers with an interest in the subject. This finding further highlights the potential benefits of promoting the report through additional venues, such as social media and conferences.

5.3.3 Promotion of the SoSS Report

A majority of respondents (60%—see p. 62) indicated that they believe the current methods of promotion for the *SoSS Report* to be sufficient. This result is perhaps unsurprising, as the respondents were invited to participate in the survey via the *Coastal Update* newsletter, the same vehicle that is used for promotion of the report. As such,

respondents are disproportionately likely to be attentive readers of *Coastal Update* notices and thus more likely to consider this an adequate vehicle for promotion. However, the responses of the minority offer insight into potential approaches to improve future promotions of the *SoSS Report*.

One candidate for expanded promotion of the *SoSS Report* is the use of popular social media platforms. Three respondents commented specifically in textual responses on the idea of promoting the *SoSS Report* via social media. When directly queried about the use of social media platforms, 20 respondents identified one or more platforms as appropriate venues to promote the *SoSS Report*, with the majority selecting more than one of the proffered options. The high number of responses selecting more than one social media platform suggests that an appropriate social media strategy to promote the *SoSS Report* would not focus on one specific platform.

Other notable suggestions for promoting the report included notices in traditional media venues, such as local newspapers and television news programs, notices on the DFO website, and direct promotion of the report to students in a university setting. These responses highlight the potential for promotion of the report in different venues and, importantly, towards different audiences (for instance, news items in the mainstream media aims to raise awareness of the report amongst the general public, while an increased emphasis on use in university settings takes a more targeted approach, with a narrower audience and more specific intended uses).

Some responses also obliquely suggested other means of promotion for the *SoSS Report* and its theme papers. When queried about what material in the *Coastal Update* newsletter interests them, almost half (45.6%) of respondents indicated an interest in

receiving notices about upcoming events related to coastal and ocean issues. This may suggest a venue for direct, in-person promotion of the report, as it demonstrates that a large number of individuals with an interest in the field of coastal and ocean management wish to keep abreast of conferences and other events related to the field.

5.3.4 Format of the *SoSS Report*

The vast majority of survey respondents indicated that the modular, digital-only format was suitable for their purposes, while the few who indicated otherwise declined to elaborate. Respondents highlighted the advantages that both aspects of this format provide to information access. The modular format facilitates the location of subject specific information within the report. The digital distribution offers greater accessibility and allows for users to save the files directly to their own digital devices and transfer them to other reading devices if desired.

5.3.5 Use of the *SoSS Report*

Results of both surveys provided evidence of use of almost all of the *SoSS Report's* theme papers. Though insufficient to reach broad statistical inferences regarding rates of use, this evidence shows that the range of theme papers is salient to the interests of individuals in the coastal and ocean management community. Moreover, textual responses reveal that the *SoSS Report* is being read and used by a varied audience for a variety of purposes. The breadth of possible audiences for the *SoSS Report* is also confirmed by responses of participants from the ESSIM SAC, who varied greatly in their identification of the primary audience for the *SoSS Report*. As these results are the basis of one of the primary conclusions of this study, the findings regarding use of the report will be discussed in greater length in the “Conclusions and Recommendations” chapter.

5.3.6 Stakeholder Engagement in the Development of the *SoSS Report*

One of the dominant themes in the relevant literature is the significance of stakeholder engagement in the development of SOE reports (Battaglia, et al., 2013; Mitchell, Clark, & Cash, 2006). As the *SoSS Report* was developed with the participation of the ESSIM Stakeholder Advisory Committee, a survey of the SAC provided a method to assess whether the stakeholder engagement process had succeeded in creating a document that was viewed as salient, legitimate, and credible by its intended audience. Respondents descriptions of their involvement in the development of the *SoSS Report* were consistent with the procedures described by McQuaig & Herbert (2013), suggesting that their recollections of the process were sound despite being several years removed from the committee's period of highest activity.

While the majority of respondents agreed that the involvement of the ESSIM SAC in the selection of theme paper topics for the *SoSS Report* resulted in a document that better suits the information needs of its users, some expressed caveats that highlight the challenges of engaging stakeholders effectively. One respondent emphasized that, even though stakeholders were given the opportunity to participate in the development of the report, they did not necessarily take advantage of that opportunity, suggesting that some stakeholders may not have perceived a clear benefit to active participation in SOE development. Another user observed that because stakeholder engagement, as practiced by ESSIM, involved only those stakeholders who were explicitly invited to participate by DFO, the views of non-invited stakeholders were excluded. This highlights a potential obstacle to assessing the effectiveness of the process, since stakeholders who were not involved in the development of the report cannot be reasonably queried about whether the

stakeholder engagement process suitably addressed their information needs. The ESSIM SAC process was addressed in greater detail by the interview portion of this study.

5.4 Interviews with Former ESSIM SAC Members

Semi-structured interviews, due to their labour intensive nature, necessarily collect qualitative data from much smaller sample sizes than online surveys. However, this method possesses several advantages over a survey, due to the direct interaction between interviewer and participant: participants are typically willing to commit a greater degree of time to answering questions and are less likely to simply decline to answer an open-ended question (a recurrent problem with online surveys), while the interviewer is given the chance to probe interesting responses and ask follow-up questions when unanticipated themes arise.

Interviews for this study were conducted with a broad range of former members of the ESSIM Stakeholder Advisory Committee: members representing community groups, provincial and federal government departments, and the shipping, fishing, and oil and gas industries were interviewed. These interviews provided further insight into research questions A, B, C, and D (see pp. 6-7).

5.4.1 The Role of the ESSIM Stakeholder Advisory Committee

Stakeholder engagement has been identified as a crucial element in the development of SOEs that are salient, credible, and legitimate (McNie, 2007; Mitchell, Clark, & Cash, 2006). Stakeholder engagement was employed, under the broader umbrella of the ESSIM Stakeholder Advisory Committee, to identify the scope and themes of the *SoSS Report*. The interviewees were broadly in agreement about how stakeholder engagement was conducted during the ESSIM process. The DFO, particularly

in the early stages of ESSIM, set the agenda for roundtable discussions that allowed all stakeholders to air their views and advocate for their sector's interests in the region.

Advice was only presented to DFO by the SAC when consensus was reached between members of the committee, placing a priority on compromise between divergent views. Over time, DFO's agenda-setting role was diminished—for instance, some participants claimed that development of the *SoSS Report* itself was initiated on the impetus of the SAC—and its primary role became one of facilitating discussion by providing relevant information and documentation to the SAC.

The focus of existing scholarship on the use of stakeholder engagement in the production of SOEs has been on the potential of such engagement to improve the salience of the end product to the needs of users, as well as improving the product's credibility and legitimacy by building trust between the report producers and the report's users. The responses of participants to questions regarding the value of the SAC's activities support this notion. Participants repeatedly emphasized the benefit of the availability of scientific information with a government imprimatur, while many expressed the belief that the product was more relevant to their information needs as a result of the SAC's involvement in the development of the report.

The responses of the interviewees also suggested another benefit of stakeholder engagement, both to the SOE reporting process and the broader cause of integrated coastal and ocean management. This was the potential to mediate tensions between the competing interests of different stakeholder groups. Indeed, DFO anticipated the possibility of such tensions, as one participant reported that conflict resolution measures were established from the outset of ESSIM. Several interview participants implied a

suspicion of the motives, interests, and commitment of other stakeholder groups involved in the development of the ESSIM plan and the *SoSS Report*. However, despite these misgivings, nearly all interviewees expressed trust in the value of the ESSIM plan and the *SoSS Report*, suggesting that they believed that the sum of multiple dissenting viewpoints was indeed an acceptable consensus that reflected the interests and information needs of all stakeholders involved in the SAC.

A further benefit of stakeholder engagement, identified by some participants, accrued to the government agency conducting the engagement. By confronting stakeholders with the scientific information that was deemed relevant to the management of the Scotian Shelf region, and allowing stakeholders to gain insight into the potential future state of management in the region, DFO was able to indirectly encourage stakeholders to familiarize themselves with this information and alert their respective organizations to alter their own strategic planning in preparation for the introduction of an ICOM initiative.

While only two interview participants were involved in the subcommittees directly responsible for the development of the *SoSS Report*—one in the subcommittee that finalized theme paper topic selection and the other on the steering committee that performed editorial duties during the writing of the theme papers—they were able to provide some insight into how stakeholder engagement was used specifically to improve the report. DFO's role in the subcommittee was similar to its role in the SAC at large: bringing relevant information to the attention of members, facilitating discussions, and encouraging the development of consensus between participants. In this particular case, the consensus sought was an agreement regarding which theme paper topics would form

the basis for the *SoSS Report*. For the *SoSS Report* steering committee, both DFO representatives and the other stakeholders on the committee played the same role: reaching consensus about which authors to hire for each theme paper, and then guiding the theme paper through a drafting and review process until it was approved for publication. Stakeholders were thoroughly engaged throughout the development of the *SoSS Report*. The responses of the majority of interview participants, indicating that the scope of themes identified by the report is comprehensive, suggest that the stakeholders themselves believe that this process served its intended purpose.

The findings regarding the involvement of the SAC in both the ESSIM Plan and the *SoSS Report* support the conclusions reached by Mitchell, Clark, and Cash (2006) and McNie (2007) about the benefits of stakeholder engagement to SOE development. Moreover, they highlight further benefits of the process to both the end product and the eventual goal of integrated management in the region.

5.4.2 Development of the *State of the Scotian Shelf Report*

Beyond the procedural matters covered above, the interviews provided insight into participants' perceptions of the intended audience, scope of themes, and other matters relevant to the development of the *SoSS Report*.

Participants identified a range of audiences for the *SoSS Report*, as well as a range of uses. These responses are consonant with the results of the online surveys, which revealed that the *SoSS Report* serves a broad range of uses for a broad range of audiences, and further reveal that this multi-purpose nature, if not necessarily a conscious plan on the part of the report's developers (as different participants identified different audiences and purposes), was established during the development of the report. These results highlight a

major aspect of the value of SOEs: credible scientific information presented at a lay-reader's reading level is required for so many uses that such a document is inherently multi-purpose, fulfilling a variety of functions without needing to be specifically tailored to any one of them.

One participant's observation highlights potential limitations on the benefits of stakeholder engagement. A suggested theme paper topic on the subject of undersea storage of munitions (or, at least, an undersea munitions subsection in the *Marine Debris* theme paper) was excluded because of a lack of information sharing on the part of the Department of National Defence. Even if stakeholders are able to reach a consensus regarding what information is most salient to their needs, if that information is not available to the producers of the SOE it cannot be included. Furthermore, if this exclusion occurs not because the information is unknown, but because of a lack of intra-governmental cooperation and information sharing, there is the risk that the legitimacy of the report will be damaged in the eyes of users, who may impute this occurrence to political motivations (as, indeed, Participant C did when addressing the issue of marine munitions).

5.4.3 Format, Distribution, and Promotion of the SoSS Report

Participants were broadly satisfied with the current modular, digital-only format of the *SoSS Report*. The modular nature of the report was seen as beneficial to users. A modular format facilitates rapid information retrieval and allows the user to avoid information that is irrelevant to their focus. To producers, it facilitates a sectional approach to producing and updating the report, requiring fewer major financial outlays that would require high-level approval. While some participants expressed minor

reservations about the digital-only format, the general consensus was that this format provides the widest degree of potential distribution in a cost-effective fashion, while allowing users the option of creating their own hard copies, should they so desire.

Concerns about impediments to access for users with low technological ability or lack of quality broadband connections were acknowledged by some participants, but largely dismissed as a fading concern in an age where internet use is widespread and broadband penetration ever increasing.

Participants were also broadly satisfied with the distribution of the report via the ACZISC's COINAtlantic website. While many participants were supportive of the idea of cross-linking the report on the DFO's own website, the general consensus was that the *SoSS Report*, with its strong regional focus, would benefit greatly in awareness amongst the relevant communities of practice by being hosted and promoted by an organization with strong ties to those communities.

Despite the general approval of the digital format of the *SoSS Report*, some participants argued that the current digital-*only* distribution model may be limiting both awareness of and access to the theme papers. A few participants noted the value of hard copies, not as a primary method of distribution, but as a supplemental promotional tool. Limited print runs of particular theme papers could, for instance, be distributed to attendees of coastal and ocean management-related events, encouraging direct access to a particular theme paper and raising awareness of the digital location of the entire *SoSS Report*. This notion was also supported by some survey responses, which indicated that one of the major interests of *Coastal Update* subscribers is receiving notices about upcoming events in the field, confirming the potential of such events as a promotional

venue to interested individuals.

One participant raised the cogent point that the particular format of the digital distribution model may be limiting. The participant's argument focused on the fact that lengthy documents published online may be out of step with the information consuming habits of internet users. Potentially, the information contained in the *SoSS Report* theme papers could be repackaged in multimedia formats or in brief summary documents for consumption by the general public, while the more in-depth theme papers would still be available for professionals in the relevant communities of practice (or members of the interested public looking for more detail). Another participant observed that there are risks to presenting this information in briefer formats, as some members of the audience who would have otherwise accessed the theme papers may settle for a condensed version of the report and not seek any further information.

Participants discussing the promotion of the report were generally united in the belief that not enough has been done to promote awareness of the theme papers. Both interview participants and survey respondents identified additional ways to better promote the report, whether by repackaging the information in more accessible formats, distributing promotional hard copies, or making use of social media to tap further into networks of professionals in the coastal and ocean management field. Increased rates of promotion may be as important as changes to the methods of promotion, if not more important. If the *SoSS Report* is intended to continue as a living document that is updated every five years, awareness must be maintained over time. Accordingly, simply promoting the theme papers once every five years when they are updated is not a sufficient level of promotion to maintain the highest possible rates of awareness and use.

5.4.4 Use of the *SoSS Report*

Participants' discussion of the report provided direct evidence of use of the report by multiple audiences. Community group use, industry use, and government use of the information contained in the theme papers were all confirmed by participants. Notably, given the limited sample size, the interview responses provided evidence of the varied potential uses of the *SoSS Report*, the challenges inherent to producing such a multi-purpose document, and the existence of barriers to use of the *SoSS Report* and SOE reports generally.

The varied potential uses of the *SoSS Report* by various audiences will be discussed at greater length in the “Conclusions and Recommendations” chapter of this thesis. Notably, the responses of interview participants were consistent with those of survey respondents in identifying a wide range of actual and potential uses of the *SoSS Report*. These results, as noted earlier, highlight the value of SOE reports, which can fulfil the information needs of a range of readers who lack scientific expertise, while at the same time emphasizing the challenge of accurately measuring rates of use.

In addition to presenting challenges to the accurate measure of rates of use, the multi-purpose nature of SOE reports presents a challenge to report producers. A single document (or single collection of documents, in the case of SOEs in modular formats), must translate scientific information from specialized technical language to a language level that is suitable for audiences who may have divergent interests, needs, and reading ability. The case of the *SoSS Report*, as seen in the interview responses of a participant deeply involved in the report's production, illustrates some methods of addressing these challenges. First, as repeatedly noted throughout this thesis, actively engaging

stakeholders during the production of SOE reports helps SOE producers tailor their documents to the needs of users, provided that the stakeholders engaged are representative of the audiences for the report. Furthermore, in the particular case of the *SoSS Report*, the participant noted that the report's producers benefited from reference to previous experience developing the *State of the Gulf of Maine Report*, particularly with regard to the process of identifying authors with the appropriate skill set to approach the challenge of translating scientific information into broadly readable language while still maintaining the necessary detail. This response highlights a benefit of research into the production of SOE reports: by identifying best practices from diverse SOE-producing organizations, such research can aid organizations that wish to approach SOE production in new regions and ecosystems.

Interview participants also identified several barriers to use of the *SoSS Report* by its intended audiences. Unsurprisingly, lack of awareness was identified as a significant barrier. One participant expressed strong interest in both the eventual fate of the ESSIM plan and the *SoSS Report* but was unaware of the publication of the theme papers until halfway through the interview. The existence of such a lack of awareness on the part of a highly interested party underscores participants' calls for improved promotion of the report. Another barrier identified was time constraints: one representative of an industry group reported a strong interest in using the report to inform organizational decision-making, but lacked the resources necessary to devote time to studying the theme papers. Addressing SOE use generally, some participants also noted that they had made limited use of SOE reports during their careers due to the lack of such reports that addressed the ecosystems for which they had managerial jurisdiction.

5.4.5 Updating the *SoSS Report*

Interview participants were unequivocal in emphasizing the importance of regular updating of the *SoSS Report* if it is to remain a useful document. Participants generally considered DFO's planned five-year updating cycle to be appropriate for the *SoSS Report*, with most identifying this as an acceptable period of updating prior to being informed that this was DFO's plan. However, some participants raised suggestions about DFO's approach to this five-year updating cycle, recommending a staggered schedule where selected theme papers are updated each year and the entire report is updated over the course of five years, rather than simply undertaking a large-scale revision project every five years. The potential benefits of this approach will be discussed in greater detail in the “Conclusions and Recommendations” chapter of this thesis.

5.5 Limitations of the Methods

Each of the methods employed in this study exhibit limitations, some of which are inherent to the methods themselves and some of which are due to their use in this case study. The inability of a single method to fully measure awareness and use of the *SoSS Report* was a primary motivation for the mixed-methodology approach, which used qualitative data sources to elaborate on the context provided by quantitative data (Brannen, 2005).

5.5.1 Limitations of Google Analytics Data

While Google Analytics is a versatile tool for obtaining evidence of awareness and access to the *SoSS Report* and evaluating the success of online promotional efforts, it cannot determine whether those who access the page are satisfied with the report, establish whether those who access the report are reading it, or capture evidence of use of

the report. In this study, the value of Google Analytics data was further limited by a lack of optimization of the COINAtlantic website for the purposes of data capture. Examples of this sub-optimal website configuration include the existence of two identical landing pages for the *SoSS Report* (preventing the establishment of a clear bounce/exit rate or unique visitor count), the inability to track PDF downloads (preventing the determination of the relative level of interest in the individual theme papers), and the lack of embedded codes to track referrals in *Coastal Update* notices (limiting the strength of conclusions about the success of the newsletter's promotional efforts for the report). Encountering these limitations ultimately resulted in a clearer understanding of how Google Analytics might be used in future studies of this nature, which will be discussed at greater length below.

5.5.2 Limitations of Citation Data

While citation searching is valuable for providing direct evidence of a specific type of use, it is also inherently limited because many potential uses of the *SoSS Report*, such as public education or as an information resource for a recommendation to management, will not be captured by traditional citations. As such, citation searching is perhaps the method to most benefit from the inclusion of other methods, because using it in isolation would narrow the focus of the study. Furthermore, limiting the citation searching to well-established academic citation sources may have narrowed the focus even further. As a publicly available document with a wide range of uses, the potential may exist to locate evidence of awareness and use of the *SoSS Report* on the broader internet, via targeted searches using the basic Google search engine. These challenges reflect the complexity of the very concept of “using” information, as any single means of

measuring use is unlikely to capture all types of uses (Nutley et al., 2007).

In addition to the above limitations, inherent in the nature of the specific method, the use of citation searching in this study was limited by the short period of time that had passed between the publication of the *SoSS Report* and the conduct of the search. Both the academic/scientific journal publishing process and the process by which published articles are cited are slow-moving processes. Furthermore, recent research (Avdić, 2013) shows that the number of citations for a report may increase with successive editions, as a series of snapshots of the state of the ecosystem begin to reveal trends. This is a theme that would also arise in interviews with ESSIM SAC members. As such, a citation search conducted only three years after the publication of the first edition of the report is not likely to reflect the full extent of the use of the theme papers. The limited citation data obtained for the *SoSS Report* supports this idea. Of the two primary scientific publications citing the *SoSS Report*, one was first published in 2013 but did not appear in searches prior to June 2014, while the other was first published in June 2014 and was rapidly accounted for by Google Scholar.

5.5.3 Limitations of Online Survey Data

While online surveys allow for questions to be distributed to a much larger number of people than could conceivably be interviewed (provided that a suitable method for distribution of invitations is available), response rates can have a strong impact on their value as an investigative tool. In this study, two surveys were delivered: one, sent to a mailing list of ~5500 people, was accessed by 66 individuals; the other, sent to a mailing list of 46 people, was accessed by 14 individuals. While the subset of the *Coastal Update* mailing list that overlaps with the audience of the *SoSS Report* is likely

substantially smaller than 5500 people, making the relevant response rate likely higher than a straightforward calculation would suggest, neither of these rates are high enough to reach statistical conclusions about the readership of the *SoSS Report*. As such, the value of these surveys was stronger in cases where qualitative data was captured to augment the limited quantitative data.

The value of qualitative data captured by surveys highlights another limitation of online surveys: the reluctance of respondents to take advantage of text fields that offer them the opportunity to elaborate on their responses. Even for questions that omitted any multiple-choice option in favour of asking an open-ended question with a text box for responses, a majority of respondents declined to enter a textual response in many cases. Accordingly, even the valuable qualitative data captured by these surveys is limited to presenting the views of a subset of respondents. Semi-structured interviews were included as a component of this study's methodology for precisely this reason, as an interview setting greatly reduces the chances of participants ignoring a question, allowing for substantially more qualitative data to be captured.

5.5.4 Limitations of Interview Data

While semi-structured interviews allow for in-depth qualitative data to be acquired, their labour intensive nature necessarily limits sample sizes. Furthermore, interviews conducted for this study could only be conducted with those ESSIM SAC members who voluntarily replied to an invitation to participate. As a result, the broad range of stakeholders interviewed for this case study unfortunately did not include any members of the “Academics” category of stakeholders; this was particularly notable since survey results suggested that the *SoSS Report* has found some degree of use as a

teaching aid and as references by students in marine management programs.

Chapter 6: Conclusions and Recommendations

6.1 Conclusions

Interview Participant D aptly summarized the questions about the *State of the Scotian Shelf Report* that originally motivated DFO to approach EIUI about conducting this case study: “Who uses it and what do they use it for? Should it be continued?” The original impetus for this study was narrow and evaluative: to determine whether evidence of use of the *SoSS Report* could be located, despite the fact that the report was published outside of its original context, the ESSIM Initiative's now defunct management plan. The answer is yes. This case study has located multiple pieces of evidence of use of the report, in first-hand testimonials from interview participants and survey respondents, second-hand reports of use by others not involved in this study, and citations in published papers.

More significant than the mere existence of evidence of use of the *SoSS Report* is the diverse range of uses and potential uses that interview participants and survey respondents were able to identify for it. Responses identified the following extensive list of potential audiences for the *SoSS Report* (presented in alphabetical order):

Activist:

- community groups
- environmental activists
- First Nation's groups
- members of the interested public
- non-governmental organizations with an environmental focus

Educational:

- high school students
- high school teachers
- university professors

- university students

Government:

- government officials
- individuals outside the region with an interest in integrated coastal and ocean management
- politicians

Industry:

- fishing industry stakeholders in the Scotian Shelf region
- labour groups affiliated with regional industries
- oil and gas industry stakeholders in the Scotian Shelf region
- shipping industry stakeholders in the Scotian Shelf region
- telecommunications industry stakeholders in the Scotian Shelf region

Research:

- researchers investigating coastal zone management practices
- scientists producing original research

Amongst these potential audiences, the following uses for the *SoSS Report* were identified:

Educational:

- as an educational tool for science teachers at the high school level.
- as an educational tool for university professors in the subjects of marine and environmental management.
- as a public educational tool for community activists attempting to raise awareness of environmental issues.
- as a public educational tool for community activists attempting to raise awareness of salient local environmental management and policy issues.
- as a private educational tool for individuals who wish to learn about environmental issues affecting their region and community.

Government/Industry Management:

- as a reference document for stakeholders involved in planning in an ICOM context.
- as an information resource for conducting risk assessments and environmental impact assessments.
- as an information resource to help designate potential Species at Risk, Marine Protected Areas, and Ecologically and Biologically Significant Areas.

- an argumentative support for managers, in government or industry, advocating for or defending management decisions.
- an information resource for consultants providing advice to industry groups.
- as an evaluative tool for measuring the success, or lack thereof, of established environmental management plans.
- as a compendium of salient policy issues to clarify potential actions to policymakers.
- as a method of outreach from government to stakeholders in region, demonstrating that the government understands stakeholder concerns.
- as a reference for governments interested in past ICOM efforts.

Research:

- as a starting point for future research, due to comprehensive list of references.
- as an authoritative reference for scientists and researchers seeking to establish accepted environmental conditions in primary literature.
- as a reference for organizations looking to produce SOE reports of their own.

These two lists encapsulate a far greater range of potential audiences and uses for the *SoSS Report* than were expressed by any one participant in the study, including those who were intimately involved in the creation of the theme papers. Notably, despite the opinion of some stakeholders that industry groups would have less interest in the contents of the report than other stakeholders, participants representing industry groups were emphatic about the value of the report to their organizations and other organizations in their sector. Clearly, scientific information conveyed in less technical language, like that contained in the *SoSS Report* and other SOE reports, is used in a variety of contexts. This finding highlights both the essential value of the *SoSS Report* and other SOE reports and the difficulty of establishing exact quantitative measures of use. Use occurs in a variety of ways across a variety of audiences, identifying ideal venues for surveying or interviewing all potential users is a challenge (Nutley et al., 2007). The use of mixed methods serves to

ameliorate the shortcomings of each individual method, as online surveys provide greater breadth of audience while interviews allow for more depth in discussion of particular uses.

In addition to degree and types of use of the *SoSS Report*, this study also sought to determine reasons why individuals may choose not to use the report. Indeed, some survey respondents and interview participants reported that, despite being aware of the *SoSS Report*, they had made no use of it. For the most part, reasons for not using the *SoSS Report* were not issues that the report's producers could conceivably address—retirements, changes in career, and jobs that do not focus on the Scotian Shelf were three common reasons—but, in some cases, reasons were connected to actions of the report's producers, particularly with regard to limited promotional efforts.

Lack of awareness is a significant obstacle to use that is directly tied to the success of DFO's promotional efforts for the report. Many individuals surveyed or interviewed for this study argued that better efforts could be made to promote awareness of the *SoSS Report*. A range of promotional strategies was suggested, including promoting the theme papers via popular social media networks, distributing hard copies of the theme papers at ocean and coastal events, and releasing promotional notices to the mainstream media. The variety of suggestions recalls the report's varied uses and audiences, and suggests that an optimal promotional strategy for the *SoSS Report* (and other SOEs) would involve promotion via multiple channels in order to maximize exposure to the range of potentially interested individuals.

Interview participant B's point that “if you don't put [the report] under people's noses it soon gets forgotten” highlights another important aspect of promotional efforts

for SOEs. In order to be effective, report promotion must be sustained over time. Sustained promotion is essential to building and maintaining awareness of the *SoSS Report* (and other SOEs) for two reasons. First, individuals' needs for scientific information may not coincide exactly with the promotional effort accompanying initial publication of a given theme paper. Second, as participant C observed, even individuals who were aware of and even had made use of the theme papers in the past may not necessarily remain aware of the report on a permanent basis, particularly since files on a digital device lack the immediate presence of hard copies on a bookshelf. An optimal approach to promoting an SOE will accordingly require sustained promotion via multiple venues.

When a review of available literature on SOE development and use revealed that the value of SOE reports may be strongly tied to the process that developed them, rather than just simply the product itself (McNie, 2007; Mitchell, Clark, & Cash, 2006; Wells, 2003), the scope of this study was expanded to consider how stakeholders were engaged in the process of developing the *SoSS Report* and how that engagement impacted user's perceptions of the final product. Interviews with participants in the ESSIM Stakeholder Advisory Committee confirmed that stakeholders were consulted throughout the process of developing the *SoSS Report*, in accordance with best practices for maximizing the salience, legitimacy, and credibility of environmental reports (Mitchell, Clark, & Cash, 2006). Notably, the strongest point of involvement for SAC members was in selecting the topics to be covered in the *SoSS Report* theme papers: this is significant because recent research (Battaglia et al., 2013) has suggested that disparities exist between government and citizen perception of the most salient environmental management issues in a given

region.

Interviews largely confirmed the findings of Mitchell, Clark, and Cash (2006). Participants felt that the involvement of stakeholders in the development of the *SoSS Report* led to an improved product that addressed issues relevant to their interests (salience). However, the benefits of stakeholder engagement in the production of the *SoSS Report* went beyond those identified in previous studies. With direct regard to the *SoSS Report*, participants reported a belief that collaborating to identify appropriate topics for, and define the scope and purpose of, the theme papers led to a greater degree of understanding between stakeholders of the issues and interests their respective sectors' interests. Participant D elaborated on this idea at length:

I think that anytime you bring together multi-stakeholders, around any kind of... some particular issue—and I've been involved with a few of these processes in my lifetime—you bring together a collectivity of people from different interests around a table, and talk to them about an issue that really pertains to their world, but it pertains to their world differently, and they have different interests around it, but they have an interest in it.

And so, when you do that, when you sit down and say “Okay, what are the issues, the emerging issues that are really coming at this piece of ocean space?” you're going to reach some consensus around that. And you will reach consensus across a range of people, and they will find things in common. Even though the oil and gas guys are out there, you know, to extract oil and gas from the sea floor, and in so doing they present risks to that ecosystem, and they damage the floor of the ocean, they eliminate habitat. They do all those things, but they...at the same time, these are natural resources, they are to be utilized within a context of sustainability.

On the other side, you've got people that are interested in a conservation and care deeply about the ocean for the fact that it is, and will be, the source of food, whether it be algae and fish or whatever into the future, as we basically run down our resources on land. And so people who care from that perspective come together with the people who want to do economic development, and there is—there are areas where there is some overlap.

And I think that in so doing, you build relationships around this.

While participants differed on the extent to which stakeholder engagement specifically related to the *SoSS Report* was responsible for these benefits between potentially opposed groups and sectors, all agreed that stakeholder engagement as practised in ESSIM increased understanding, trust, and cooperation between stakeholders, and between stakeholders and government.

An unexpected finding of the investigation of the stakeholder engagement practices of ESSIM was the conviction of multiple interview participants that the *SoSS Report*, though valuable in its current state, would have been much more valuable had the ESSIM plan for integrated management of the Scotian Shelf been implemented. In the view of many participants, an established integrated management program would increase use of the report, presumably by providing a clear forum in which stakeholders could air their concerns and interests and thus encouraging stakeholders to inform themselves in order to best advocate for their positions. From this perspective, the benefits of effective stakeholder engagement to awareness and use of SOEs extend far beyond the report's development phase. Rather, the benefits can accrue throughout the life of the document. Engaging stakeholders during the production phase raises awareness of the forthcoming report and ensures that it is tailored to the information needs of users. Engaging stakeholders in ecosystem management through an ICOM process after publication maintains awareness of the report and encourages stakeholders to use it in order to participate in decision-making. This finding suggests a feedback loop between promotion of an SOE and stakeholder engagement, implying that maximizing the awareness and use, and therefore the value, of an SOE is a result of continuous work by both SOE producers and coastal managers.

6.2 Recommendations

The final two research questions for this study concerned practical aspects of future SOE production by the DFO and other organizations, derived from the study's findings (see pp. 6-7).

6.2.1 Incorporate Evaluation Planning into Project Design for Future SOEs

Future attempts to evaluate the awareness and use of SOEs, whether as part of an internal program evaluation or an academic study of information use such as this one, will benefit greatly from developing a plan for evaluation simultaneously with the report itself, and tailoring the release and promotion of the report to support this evaluation. Each methodology employed by this study faced limitations that were highlighted by a disconnect between the promotion of the *SoSS Report* and the methods. Addressing these issues during the planning stage of future SOE projects will enhance efforts to evaluate the success of the documents themselves, and may potentially have beneficial effects for attendant promotional efforts.

Difficulties were most pronounced in the case of Google Analytics data for the COINAtlantic website hosting the *SoSS Report*. As discussed above, the landing pages for the *SoSS Report* were poorly optimized for the collection of quality Google Analytics data, beginning with the observation that there were multiple identical landing pages. The existence of two landing pages strictly limited the strength of the inferences that could be drawn from web traffic data, because certain essential statistics, such as bounce rates, exit rates, and unique visitors, cannot simply be added together to produce an accurate overall statistic. As such, it was only possible to produce a large range of possible numbers of unique visitors to the *SoSS Report* website, rather than an exact number. As early

promotional notices in *Coastal Update* linked users directly to the PDFs, rather than the landing pages, even this range may be understating the rates of access to the *SoSS Report's* landing pages. Furthermore, because Google Analytics does not track PDF downloads as a default, and attempts to implement PDF download tracking for the COINAtlantic site were unsuccessful, it was not possible to determine rates of access to the individual theme papers. Finally, efforts to evaluate the success of promotional notices in *Coastal Update* were hampered because Google Analytics' referral tracking system reports all referrals from links embedded in emails as “direct referrals,” a term that also encompasses instances where individuals accessed the page from a bookmark or by typing the URL directly into their browser's navigation bar. Coding can be embedded in email links in order to have Google Analytics record them discreetly, but this coding was not implemented for *Coastal Update* notices. Accordingly, it is not possible to determine the number of times that readers of *Coastal Update* followed the newsletter's notices to the *SoSS Report*. Had steps been taken in advance to address these issues and capture the best possible data, much stronger conclusions could have been drawn from the *SoSS Report's* web traffic statistics.

The value of citation searching in this study was primarily limited by time and promotion: the study was conducted only three years after the report's publication and the report was not aggressively promoted to academics and other front-line researchers, so it was unsurprising that few articles citing the report had made their way through the academic publishing system. However, even the few citations that were located revealed a challenge that would occur if the search was repeated after a length of time had passed. Writers citing the *SoSS Report* did not share a common method of referring to the report.

Citations differed in whether they cited the author of the individual theme paper, the editors of the individual theme paper, or individuals with responsibility for the entire *SoSS Report* project. They differed in whether they identified DFO, ACZISC, or COINAtlantic as the institution responsible for publishing the report. They also differed in whether they identified the theme paper cited by name or referred to the report as a whole. As the body of available citations grows, this confusion over forms of citation will pose difficulties to any effort to conduct a thorough citation search: citations may be missed due to the vagaries of different authors' chosen approach to citing the theme papers, resulting in an incomplete data set. This problem could be easily addressed by including preferred citation formats in several major scholarly styles within each document, in order to ensure uniformity of citations.

Qualitative data collection, in the form of online surveys and semi-structured interviews, met with far fewer challenges than the quantitative data collection phase of this study. However, higher response rates to survey and interview invitations would have been beneficial. Furthermore, the chosen survey group to represent the audience of the *SoSS Report*—subscribers to *Coastal Update*—includes large numbers of individuals who are unlikely to have an interest in the *SoSS Report*, making it difficult to determine a response rate that represents responses from the target audience. In the case of surveys, a potential approach to addressing these two concerns would be to solicit the email addresses of users accessing the *SoSS Report* on the COINAtlantic site via a text entry box, encouraging them to register to receive updates about the *SoSS Report* and the Scotian Shelf ecosystem. This would produce a survey audience with an established interest in the *SoSS Report*, hence allowing a survey to go into more depth regarding

users' impressions of the report. Similarly, higher response rates for invitations for either surveys or interviews directed to individuals who participated in SOE development could be achieved simply by securing a non-binding agreement from these individuals during the period of their participation, so that when the invitation eventually arrives, the individual is already partially committed to participation.

6.2.2 Expand and Sustain Promotional Efforts for SOEs to Increase Awareness and Use

In order to maximize awareness and use of SOEs, it is incumbent upon SOE producers to make sustained promotional efforts for these reports. It is not sufficient to simply promote them upon release. Several interview participants raised a simple idea that would directly address this goal: update the *SoSS Report* on a staggered schedule, where a few theme papers are updated each year and the entire report is updated on the planned five-year schedule. While this schedule would have the short-term result of updating certain theme papers only one or two years following publication, it would immediately increase opportunities for promotion without requiring a major change in promotional strategy. As promotional notices for the entire report could be issued with each new theme paper, promotion of the report would be inherently sustained to ensure the highest rates of awareness, access, and use.

In addition to the schedule of promotional notices, producers of SOEs should consider taking a multi-channel approach to the promotion of their products to maximize awareness in the relevant communities of practice. Interview participants and survey respondents largely agreed that expanding promotional efforts into venues other than the *Coastal Update* newsletter would be an appropriate approach, but differed in the

particular media they recommended. Some advocated various social media platforms, some advocated mainstream media venues, and some advocated direct promotion via the distribution of limited-run hard copies of the report. The diverse opinions point to the strength of multiple approaches. In today's digital society numerous methods are available to reach potential users, and not every user will be reached by every method. By maximizing the variety of methods used to promote the report, SOE producers can maximize their audience.

6.2.3 Expand Stakeholder Engagement Efforts in Production of SOEs

A major unexpected finding of this study was ESSIM SAC participants' belief that, however valuable the *SoSS Report* may be in its current form, it would have been significantly more valuable in the context of an active integrated management program of the sort proposed by the ESSIM Plan. The benefits of stakeholder engagement to the value of scientific information extend beyond the production process. By providing stakeholders from industry, government, and the public with a clear forum in which they can advocate for their interests and have input into the environmental management of the region, SOE producers provide strong incentives for stakeholders to maintain familiarity with the scientific status of the region. One interview participant noted that SOEs enable discussion between stakeholders because they provide a common baseline of accepted data regarding environmental conditions, ensuring that “everybody's working from the same song sheet” (Participant A). To extend this metaphor, an active ICOM program provides the choir with space to rehearse, thus enhancing the value of the common song sheet. Awareness and use of SOEs, and thus the ultimate impact of scientific information upon the development of policy and management plans, will be far greater if active efforts

are made to engage users in the application of SOEs to policy and management issues.

In the particular case of the *SoSS Report*, the ICOM ship has sailed, as the ESSIM Plan was ultimately not implemented by DFO. Though some participants expressed the view that an ICOM plan for the Scotian Shelf region will eventually come to pass in a different form, any present attempts to further engage stakeholders regarding the *SoSS Report* will need to take place outside the context of ESSIM. One approach would be to invite former members of the SAC to participate in the Steering Committee's updating process for the *SoSS Report*. If the earlier recommendation to update the report on a staggered basis was adopted, this re-engagement could take place on an annual basis and focus on those theme papers that were due to be updated; if the current five-year omnibus update schedule is followed, multiple meetings could be held in the fourth and fifth years of the cycle. In addition to complementing promotional efforts by maintaining awareness of the report amongst key stakeholders, this process would also benefit future editions of the report, as participants had suggestions for improving the content of the report, particularly by expanding its range of themes and its geographical scope.

6.2.4 Future Research

Future studies of awareness and use of SOEs should heed the above recommendations for incorporating evaluation planning into product development. In light of the wide range of potential uses identified for SOEs, future studies of SOE use should consider how to isolate and investigate specific types of SOE use, such as public education by NGOs or as decision-making support for industry. Further consideration may be given to how the indirect impact of the use of SOEs for public education and advocacy upon policy- and decision-making might be measured.

As lack of awareness and time constraints were identified as two major barriers to effective SOE use, future studies of the use of scientific information to support policy- and decision-making should investigate what changes could be made the formatting, presentation, and distribution of government-provided scientific information to encourage use. Moreover, this study's finding that effective integrated management initiatives would encourage stakeholders to increase their awareness and use of government-provided scientific information should be investigated in the context of active ICOM initiatives.

6.3 What is the Value of a State of the Environment Report?

State of the environment reports are often developed with an eye towards their application to policymaking and environmental management and accordingly, studies of their use, such as this one, have generally focused on their use as decision-making aids by policymakers and managers (e.g. Mitchell, Clark, & Cash, 2006; Soomai, Wells, & MacDonald, 2011) . However, while the application of scientific information to policy formation is undoubtedly a topic that demands further study, the findings of this study demonstrate that the value of SOEs extends well beyond their direct use in policy and decision-making. A major result was that SOE reports serve wide variety of uses for a wide variety of audiences. Interview Participant D noted that SOE reports contain scientific “information that people—the average person—can read, and after reading several similar things, get a general idea about the status of things” and went on to observe that that kind of information “not as common as you'd think.” The SOEs address a widely held demand for summary information not met by producers of primary literature or private sector organizations. The wide-ranging demand for salient, credible, and legitimate scientific information that is comprehensible to non-scientists is best

addressed by the sorts of governmental, non-governmental, and inter-governmental organizations that produce SOEs. As the results of this study show, users consider scientific information provided by the government to be inherently legitimate and credible, particularly if it is developed with the participation of regional stakeholders.

By providing this sort of scientific information to the public, SOE producers fulfill many roles that are secondary to the primary aim of supporting evidence-based policy- and decision-making. However, even these secondary purposes may ultimately contribute to the primary purpose, as the availability of scientific information that is comprehensible to non-scientists is a prerequisite for constructive engagement in the policy-making process by industry stakeholders, environmental advocates, and the interested public. An SOE cannot compel a citizen to attend public consultations regarding an environmental management plan, but a citizen who is able to educate him- or herself regarding the status of a local ecosystem is, as Participant D observed, more likely to contribute to such a consultation. Assigning an SOE as course material for a student in an environmental management program will not directly affect policy decisions, but that student, in a future career as an environmental manager, will be more familiar with the information resources available to support decision-making. Furthermore, as SOEs focus on particular ecosystems and address policy and management issues alongside scientific information, they are uniquely well-suited vehicles for building interest and awareness in affected communities. Ultimately, environmental management is supported by the availability of scientific information to any individual with a stake in the management of a given ecosystem and, thus, the effective production, publication, and promotion of SOEs is essential to the goal of sound, evidence-based policymaking.

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Appendix A: Social Sciences & Humanities Research Ethics Board Letter of Approval

February 25, 2014

Mr James Ross
Management\Information Management

Dear James,

REB #: 2014-3207

Project Title: Awareness and Use of State of the Environment Reports: A Case Study of the State of the Scotian Shelf Report

Effective Date: February 25, 2014

Expiry Date: February 25, 2015

The Social Sciences & Humanities Research Ethics Board has reviewed your application for research involving humans and found the proposed research to be in accordance with the Tri-Council Policy Statement on *Ethical Conduct for Research Involving Humans*. This approval will be in effect for 12 months as indicated above. This approval is subject to the conditions listed below which constitute your on-going responsibilities with respect to the ethical conduct of this research.

Sincerely,

Dr. Sophie Jacques, Chair

Appendix B: Online Survey for Subscribers to the Atlantic Coastal Zone Information Steering Committee's Coastal Update Newsletter

a) Involvement with ESSIM

1. As part of this study, a similar survey is being distributed to the former members of the Eastern Scotian Shelf Integrated Management Initiative (ESSIM) Stakeholder Advisory Committee. Were you involved with the ESSIM Stakeholder Advisory Committee?

Yes No

If respondent answers “Yes” to Question 1, a message within the online survey will advise them to be complete the survey distributed to ESSIM Stakeholder Advisory Committee members. The respondent will not complete this survey.

If respondent answers “No” to Question 1, they will proceed with the survey as follows:

b) Coastal Update Newsletter

2. How do you receive the Atlantic Coastal Zone Information Steering Committee (ACZISC) Coastal Update e-Newsletter?

- Directly, via email from the ACZISC Secretariat
- The newsletter email is forwarded to me (by someone other than the ACZISC Secretariat)
- I read it online (COINAtlantic.ca website)

3. How often do you read the ACZISC Coastal Update e-Newsletter?

- Monthly
- About every two months
- About every three months
- A few times a year
- I hardly ever read the newsletter

4. What type of information in the ACZISC Coastal Update e-Newsletter interests you the most? (Choose all that apply)

- Government Reports
- NGO Reports
- Videos/ Podcasts
- Webinars
- Databases/ Portals / Digital Atlases
- Other Newsletters
- 'Upcoming Conferences and Events' link to listing on the COINAtlantic website
- Deadlines
- Other. Please specify: _____

5. How many people (if any) you forward the Coastal Update Newsletter to? Please leave a response in the comment box if you can give more information regarding the types of individuals you send the newsletter to.

- 0
- 1-10
- 11-50
- 51-100
- >100

Comment: _____

b) Awareness of the *State of the Scotian Shelf Report*

6. The *State of the Scotian Shelf Report* is a State of the Environment Report, co-published by the Canada Department of Fisheries and Oceans and ACZISC and hosted on the ACZISC's COINAtlantic website. Are you aware of this report?

Yes No

If the respondent answers “Yes” to Question 6, they will proceed with the following branch of the survey:

7. How did you become aware of the *State of the Scotian Shelf Report*? (Check all that apply.)

ACZISC's Coastal Update Newsletter

COINAtlantic Website

Non-governmental Organization. Please specify: _____

Other Newsletter. Please specify: _____

Department of Fisheries and Oceans displays at events.

Department of Fisheries and Oceans postcards.

Other. Please elaborate: _____

8. Are there other methods of promotion that you believe would increase awareness of the *State of the Scotian Shelf Report*?

Yes. Please elaborate: _____

No, the current methods are sufficient.

9. The DFO and ACZISC are considering expanding the use of social media to promote awareness of the *State of the Scotian Shelf Report*. Which social media platforms do you consider suitable for such promotion? *Please check all that apply.*

Twitter

Facebook

LinkedIn

Yammer

Other. Please specify: _____

c) Format of the *State of the Scotian Shelf Report*

10. The *State of the Scotian Shelf Report* is published exclusively in a digital (PDF) format available via the ACZISC's COINAtlantic website. Is this method of access suitable for your uses?

Yes. No.

Please explain: _____

11. The *State of the Scotian Shelf Report* is presented in a modular format, as a series of issue-based theme papers (e.g., Trophic Structure). Is this format suitable for your uses?

___ Yes ___ No

Please explain: _____

d) Use of the *State of the Scotian Shelf Report*

12. Have you read, in whole or in part, one or more of the *State of the Scotian Shelf Report's* theme papers? (Check all that apply).

Theme Paper	Read Entirely	Read Sections	Skimmed Through	Was aware of but did not read	Was not aware of
Scotian Shelf in Context					
At Risk Species					
Marine Habitats and Communities					
Incidental Mortality					
Invasive Species					
Climate Change and its Effects on Ecosystems, Habitats, and Biota					
Ocean Acidification					
Primary and Secondary Producers					
Trophic Structure					
Fish Stock Status and Commercial Fisheries					
Water and Sediment Quality					
Ocean Noise					
Waste and Debris					
Emerging Issues					

If the respondent indicates having read, in part or in whole, one or more theme papers in Question 12, they will proceed with this branch of the survey:

13. Have you had the opportunity to use (e.g., as an educational or decision-making aid) one or more of the

theme papers? (Check all that apply).

Theme Paper	Yes	If so, how have you used it? (e.g., as background to address a problem or develop a policy position)
Scotian Shelf in Context		
At Risk Species		
Marine Habitats and Communities		
Incidental Mortality		
Invasive Species		
Climate Change and its Effects on Ecosystems, Habitats, and Biota		
Ocean Acidification		
Primary and Secondary Producers		
Trophic Structure		
Fish Stock Status and Commercial Fisheries		
Water and Sediment Quality		
Ocean Noise		
Waste and Debris		
Emerging Issues		

14. If you have read but not made further use of any of the theme papers, what are your primary reasons for not doing so?

15. Have you promoted awareness of the *State of the Scotian Shelf Report*?

Yes. No.

Please explain: _____

16. Are you aware of others who have used the *State of the Scotian Shelf Report*?

Yes. Please explain: _____

No.

17. How do you think the *State of the Scotian Shelf Report* could be used by others?

e) Demographics

18. What is your age?

under 20

- 21 – 30
- 31 – 40
- 41 – 50
- 51 – 60
- 61 or older

19. Where are you located?

- Nova Scotia
- New Brunswick
- Prince Edward Island
- Newfoundland & Labrador
- In Canada, but outside of Atlantic Canada. Please specify province: _____
- United States. Please specify state: _____
- Other. Please specify country: _____

20. Please select your primary affiliation:

- governmental body
- non-governmental environmental organization
- industry association
- community group
- academic institution
- public school system
- private sector
- other, please specify _____
- my interest in coastal and ocean issues is unrelated to any affiliation

21. What is your educational level?

- High School Diploma
- Some college or university
- College Diploma
- University Degree (Undergraduate)
- University Degree (Graduate)

If the respondent indicates that they have not read any of the theme papers in Question 12, they will proceed with this branch of the survey:

13. Are you aware of others who have used the *State of the Scotian Shelf Report*?

Yes. Please explain: _____

No.

14. How do you think the *State of the Scotian Shelf Report* could be used by others?

e) Demographics

15. What is your age?

under 20

21 – 30

31 – 40

41 – 50

51 – 60

61 or older

16. Where are you located?

Nova Scotia

New Brunswick

Prince Edward Island

Newfoundland & Labrador

In Canada, but outside of Atlantic Canada. Please specify province: _____

United States. Please specify state: _____

Other. Please specify country: _____

17. Please select your primary affiliation:

governmental body

non-governmental environmental organization

industry association

community group

academic institution

public school system

private sector

other, please specify _____

my interest in coastal and ocean issues is unrelated to any affiliation

18. What is your level of educational attainment?

High School Diploma

Some college or university

College Diploma

University Degree (Undergraduate)

University Degree (Graduate)

If the respondent answers “No” to Question 6, they will proceed with this branch of the survey:

7. The *State of the Scotian Shelf Report* is a State of the Environment Report presenting the range of scientific knowledge about the Scotian Shelf region. Would such a report be useful to you in your work?

Yes No

Please explain: _____

8. The *State of the Scotian Shelf Report* is primarily promoted in the ACZISC's Coastal Update e-Newsletter. What other methods would you recommend to promote awareness of State of the Environment reports such as the *State of the Scotian Shelf Report*?

E-mail distributed by DFO.

Postcards distributed by DFO.

Social media platforms. Please specify: _____

Promotional displays at conferences related to coastal and ocean management.

Media releases.

Other. Please specify: _____

c) Format of the *State of the Scotian Shelf Report*

9. The *State of the Scotian Shelf Report* is distributed exclusively in a digital format, as PDF files available via the ACZISC's COINAtlantic website. Do you consider this method of access suitable for you?

Yes. No.

Please explain: _____

10. The *State of the Scotian Shelf Report* is presented in a modular format, as a series of issue-based theme papers. Do you consider this format suitable for you?

Yes No

Please explain: _____

d) Demographic Information

11. What is your age?

under 20

21 – 30

31 – 40

41 – 50

51 – 60

61 or older

12. Where are you located?

Nova Scotia

New Brunswick

Prince Edward Island

Newfoundland & Labrador

In Canada, but outside of Atlantic Canada. Please specify province: _____

United States. Please specify state: _____

Other. Please specify country: _____

13. Please select your primary affiliation:

governmental body

non-governmental environmental organization

industry association

community group

academic institution

public school system

private sector

other, please specify _____

my interest in coastal and ocean issues is unrelated to any affiliation

14. What is your educational level?

High School Diploma

Some college or university

College Diploma

University Degree (Undergraduate)

University Degree (Graduate)

Appendix C: Online Survey for Former Members of the Eastern Scotian Shelf Integrated Management Initiative's Stakeholder Advisory Committee

a) Affiliation

1. What organization did you represent during your participation in the Eastern Scotian Shelf Integrated Management Initiative's (ESSIM) Stakeholder Advisory Committee?

b) Development of the *State of the Scotian Shelf Report*

2. Were you involved in the development of the *State of the Scotian Shelf Report*?

Yes No

If yes, please describe your involvement:

3. Who did you think was the intended audience for the *State of the Scotian Shelf Report*?

4. Do you believe that the participation of the Stakeholder Advisory Committee in the development of the *State of the Scotian Shelf Report* resulted in a document which reflects the information needs of stakeholders in the Scotian Shelf?

Yes No

Please explain: _____

5. A subcommittee of the Stakeholder Advisory Committee was involved in selecting the themes and topics for the *State of the Scotian Shelf Report*. Do you think the topics selected are appropriate?

Yes No

Please explain: _____

c) Use of the *State of the Scotian Shelf Report*

5. Have you read one or more of the *State of the Scotian Shelf Report's* theme papers? Please check all that apply:

Theme Paper	Read Entirely	Read Sections	Skimmed Through	Was aware of but did not read	Was not aware of
Scotian Shelf in Context					
At Risk Species					
Marine Habitats and Communities					
Incidental Mortality					
Invasive Species					
Climate Change and its Effects on Ecosystems, Habitats, and Biota					
Ocean Acidification					
Primary and Secondary Producers					
Trophic Structure					
Fish Stock Status and Commercial Fisheries					
Water and Sediment Quality					
Ocean Noise					
Waste and Debris					
Emerging Issues					

6. Have you had the opportunity to use one or more of the theme papers?

Theme Paper	Yes	If so, how have you used it? (e.g., as background to address a problem or develop a policy position)
Scotian Shelf in Context		
At Risk Species		
Marine Habitats and Communities		
Incidental Mortality		
Invasive Species		
Climate Change and its Effects on Ecosystems, Habitats, and Biota		
Ocean Acidification		
Primary and Secondary Producers		
Trophic Structure		
Fish Stock Status and Commercial Fisheries		
Water and Sediment Quality		
Ocean Noise		
Waste and Debris		
Emerging Issues		

7. Have you promoted awareness of the *State of the Scotian Shelf Report* (e.g., forwarded the link to a colleague)?

Yes. Please explain: _____

No.

8. Are you aware of others who have used the *State of the Scotian Shelf Report*?

Yes. Please explain: _____

No.

9. How do you think the *State of the Scotian Shelf Report* could be used?

10. If you have not read or made use of any of the theme papers, why not? *Please check all that apply.*

The topics were not of interest.

The papers seemed too technical.

The papers seemed too long.

The papers were not immediately applicable to my work.

I have changed careers/retired and no longer work in this field.

Other. Please specify: _____

N/A. I have read or used one or more of the theme papers.

d) The Atlantic Coastal Zone Information Steering Committee's Coastal Update Newsletter

11. The *State of the Scotian Shelf Report* is primarily promoted by the Atlantic Coastal Zone Information Steering Committee (ACZISC) Coastal Update e-Newsletter. Do you receive the Coastal Update Newsletter?

Yes

No

If respondents answer “No” to Question 11, the survey will conclude.

If respondents answer “Yes” to Question 11, they will proceed to the following branch of the survey:

12. How do you receive the Coastal Update Newsletter?

Directly, via email from the ACZISC Secretariat

The newsletter email is forwarded to me (by someone other than the ACZISC Secretariat)

I read it online (COINAtlantic.ca website)

13. How often do you read the ACZISC Coastal Update e-Newsletter?

Monthly

About every two months

About every three months

A few times a year

I hardly ever read the newsletter

14. What type of information in the ACZISC Coastal Update e-Newsletter interests you the most? (Choose all that apply)

Government Reports

NGO Reports

Videos/ Podcasts

Webinars

Databases/ Portals / Digital Atlases

Other Newsletters

'Upcoming Conferences and Events' link to listing on the COINAtlantic website

Deadlines

Other. Please specify: _____

15. How many people (if any) you forward the Coastal Update Newsletter to? Please leave a response in the comment box if you can give more information regarding the types of individuals you send the newsletter to.

0

1-10

11-50

51-100

>100

Comment: _____

Appendix D: Interview Protocol for Semi-Structured Interviews with Former Members of ESSIM Stakeholder Advisory Committee.

Interview Protocol for Selected Members of ESSIM Stakeholder Advisory Committee

a) Role with Stakeholder Advisory Committee

1. What organization or stakeholder group did you represent on the ESSIM Stakeholder Advisory Committee (SAC)?
2. As part of this study, an online survey was distributed to the former members of the ESSIM Stakeholder Advisory Committee. Did you complete this survey?

b) Role of the Stakeholder Advisory Committee

3. In your view, what was the mandate of the Stakeholder Advisory Committee?
4. In your view, what were the working processes of the Stakeholder Advisory Committee?
5. A subcommittee of SAC members was involved in selecting the themes and topics of the report: were you a member of this subcommittee?
6. Following the selection of theme paper topics, a steering committee for the report was set up. Were you involved in this steering committee?

Possible follow ups: If so, did you have editorial input? Did you perform peer review services? Did you have a vote on approval of the theme papers?

c) Development of the *State of the Scotian Shelf Report*

7. Who was the intended audience of the *State of the Scotian Shelf Report*?
8. a) Do you consider the final selection of themes to be comprehensive?
b) Do you think that other themes should have been included? Please give examples.
9. Besides the end product, are there any benefits that you know of resulting from the process of developing the *State of the Scotian Shelf Report*?
10. The *State of the Scotian Shelf Report* is published via the ACZISC's COINAtlantic website.
a) Do you consider the COINAtlantic site an appropriate venue for the report?
b) What other venues might be appropriate?
11. The *State of the Scotian Shelf Report* is published in a digital format, as downloadable PDF files. Do you think this digital-only approach is appropriate for the report?

Possible follow ups: Should the report also be distributed in hard copy? Should image-free PDF files with smaller file sizes be offered?

12. The *State of the Scotian Shelf Report* is published in a modular format, as a series of issue-based theme papers. Do you think the modular format is appropriate for a State of the Environment Report?

Possible follow ups: Would an omnibus report be preferable?

d) Use of the *State of the Scotian Shelf Report*

13. What did you think the information needs of users of the *State of the Scotian Shelf Report* would be? Do you believe these needs were adequately considered in the process of developing the report?
14. Do you believe that the participation of the Stakeholder Advisory Committee in the development of the *State of the Scotian Shelf Report* resulted in a document that reflects the information needs of stakeholders in the Scotian Shelf?
15. Have you had an opportunity to read any of the *State of the Scotian Shelf Report* theme papers? Which ones?
16. Have you had the opportunity to use the *State of the Scotian Shelf Report* theme papers? Which ones?
17. How did you make use of the theme papers (e.g., Background information to inform a policy decision)?
18. Are you aware of others who have made use of the theme papers? How did they use them?
19. If you have read any of the theme papers, but made no further use of them, why did you not find them useful?
20. How do you think the report could potentially be used?

e) State of the Environment Reporting Generally

21. In your work, how do you use State of the Environment Reports? What do you look for in a State of the Environment Report?

Possible follow ups: Do you read State of the Environment Reports for general knowledge? Do you cite State of the Environment reports in your work?

22. Who do you think are the primary audiences for State of the Environment reports?

Possible follow ups: Environmental managers? Academics? Educators? Students? Policymakers?

23. What are the primary uses of State of the Environment reports?

Possible follow ups: Educational tools? Decision-making aids? Synthesis of knowledge?

24. In order to remain current, how often do you feel a State of the Environment report should be revised?

Possible follow ups: Recently, some State of the Environment reports (e.g., *State of the Gulf of Maine*, *State of the Scotian Shelf*), have been produced in a modular format, as a series of issue-based theme papers. Do you think that this format facilitates timely updating?

Appendix E: Invitation to Former Members of ESSIM Stakeholder Advisory Committee to Participate in Semi-structured Interviews

Dear [Name of Participant]

My name is James Ross, and I am a student in the Master of Library and Information Studies (MLIS) Program at Dalhousie University, Halifax, Nova Scotia. You are invited to participate in my master's degree research project, *Awareness and Use of State of the Environment Reports: A Case Study of the State of the Scotian Shelf Report*, which is being conducted within the Environmental Information: Use and Influence (EIUI) research initiative based in the School of Information Management, Faculty of Management, Dalhousie University (www.eiui.ca). The research is supervised by Dr. Bertrum MacDonald, Professor of Information Management, Dalhousie University.

To develop an understanding of the information needs of users of State of the Environment Reports, I am conducting a case study of the awareness and use of the *State of the Scotian Shelf Report*, a State of the Environment report co-published by the Department of Fisheries and Oceans (DFO) and the Atlantic Coastal Zone Information Steering Committee (ACZISC). The DFO and ACZISC are also supporting this research through a formal partnership with the EIUI research initiative. My data collection is facilitated by these organizations helping me reach the target audience of the *State of the Scotian Shelf Report*.

You have been invited to participate in this study because of your role in the Eastern Scotian Shelf Integrated Management (ESSIM) Initiative's Stakeholder Advisory Committee. If you agree to participate, you will be interviewed by the principal researcher, James Ross, via telephone or in person at a time convenient to you. The interview will last for approximately 45 minutes. You will be asked questions about the ESSIM Stakeholder Advisory Committee's role in identifying the themes and establishing the scope of the *State of the Scotian Shelf Report*, your subsequent awareness and use of the report, and your views on State of the Environment reporting generally.

Participation in this study should be of minimal risk to you. Participation in the study is also voluntary and you may withdraw at any time. With your permission, your responses to questions may be included in reports and publications arising from this research. All efforts will be made to maintain your anonymity. Any direct quotations used from your responses will be attributed to your role as scientists or policy-maker not you personally.

Attached is an Informed Consent Form with details on the study and two signature pages. If you wish to participate in the study, please reply to this email and complete Consent Form 1 (email: rossjd@dal.ca). If you wish to obtain further information about the research initiative, I will be happy to respond to your questions.

James Ross
Faculty of Graduate Studies
Dalhousie University, Halifax,
Nova Scotia, Canada

Appendix F: Consent Forms for Participation in Semi-structured Interviews

INTRODUCTION

You are invited to participate in a research project being conducted by James Ross, a master's student in the Library and Information Studies (MLIS) Program at Dalhousie University, Halifax, Nova Scotia. The master's degree research project, *Awareness and Use of State of the Environment Report: A Case Study of the State of the Scotian Shelf Report*, is being conducted within the Environmental Information: Use and Influence (EIUI) research initiative based in the School of Information Management, Faculty of Management, Dalhousie University (www.eiui.ca). This research is supervised by Dr. Bertrum MacDonald, Professor of Information Management, Dalhousie University.

PURPOSE OF THE STUDY

The principal research question for the master's research is: What do end users want from a State of the Environment Report? This question will be approached by investigating the awareness and use of the *State of the Scotian Shelf Report*, co-published by the Department of Fisheries and Oceans (DFO) and the Atlantic Coastal Zone Information Steering Committee (ACZISC). "State of the Environment Report" refers to publications that collect the range of current scientific knowledge about a particular ecosystem. The main objective of the research is to develop recommendations for future updates to the *State of the Scotian Shelf Report*, as well as future State of the Environment reporting efforts by the DFO or other organizations.

STUDY DESIGN

To develop an understanding of the awareness and use of State of the Environment Reports, a case study utilizing surveys, interviews, citation analysis, and web traffic statistic analysis will be conducted. Data collection will be completed during the Spring of 2014.

The ACZISC and DFO are supporting this research through formal partnership with the EIUI research initiative in studies about the awareness, use, and influence of their publications.

PARTICIPATION IN THE STUDY

You have been invited to participate in this study because of your role in the ESSIM Initiative's Stakeholder Advisory Committee. If you agree to participate, you will be interviewed by the principal researcher, James Ross, via telephone or in person at a time convenient to you.

The interview will last for approximately 45 minutes. You will be asked questions about the ESSIM Stakeholder Advisory Committee's role in identifying the themes and establishing the scope of the *State of the Scotian Shelf Report*, your subsequent awareness and use of the report, and your views on State of the Environment reporting generally. With your permission, the interview will be audio recorded. When a transcription of your interview has been completed, the audio recording will be erased. Should you prefer that the interview not be audio recorded, the interviewer will make notes of your responses during the interview. Following the interview, you will be sent a copy of the transcript of the recording or notes to verify your responses.

POSSIBLE RISKS

Participation in this study should be of minimal risk to you. The probability of any harm occurring because of disclosing information regarding your role in the ESSIM Initiative is very low. Participation in the study is voluntary and you can withdraw at any time.

BENEFITS

It is anticipated that there will be benefits to the case study organizations as the research will generate substantial new data and information to advance understanding of the awareness and use of State of the Environment reports.

CONFIDENTIALITY AND ANONYMITY

With your permission, your responses to questions may be included in reports and publications arising from this research. To ensure anonymity, with your permission, any responses that may be included in reports and publications arising from this research will not be attributed to you but will be designated to your role as a scientist or policy-maker. An alpha-numeric code rather than your name will be assigned to the transcript and notes from this interview. All transcripts and notes from this research will only be accessible to the principal investigator and his supervisor and will be retained in secured cabinets and on password-protected computers at Dalhousie University for five years after which they will be destroyed.

QUESTIONS

If you wish to obtain further information about this research, email the principal investigator, James Ross (e-mail: rossjd@dal.ca).

If you have any difficulties with, or wish to voice concern about, any aspect of your participation in this study you may contact my supervisor, Professor Bertrum MacDonald at 494-2472, bertrum.macdonald@dal.ca. If your concerns are of an ethical nature, please contact Catherine Connors, Director, Research Ethics, at (902) 494-1462, catherine.connors@dal.ca.

If you choose to participate, the attached consent form 1 will be used as a record of your participation in the study. If you wish to participate in the study, please complete and email a

copy of consent form 1 to the principal investigator (rossjd@dal.ca). You will be asked to complete consent form 2 after you complete an interview.

James Ross
Faculty of Graduate Studies
Dalhousie University, Halifax,
Nova Scotia, Canada
Email: rossjd@dal.ca

CONSENT FORM (1)



Awareness and Use of State of the Environment Reports: A Case Study of the State of the Scotian Shelf Report.

I have read the explanation about this study. I have been given the opportunity to discuss it and my questions have been answered to my satisfaction. I hereby consent to take part in this study. However, I realize that my participation is voluntary and that I am free to withdraw from the study at any time.

Please indicate whether you agree to audio recording of the interview (as applicable):

- I agree to audio recording of the interview.
- I do not agree to audio recording of the interview.

Signature of Participant

Signature of Researcher

Date

CONSENT FORM (2)



Awareness and Use of State of the Environment Reports: A Case Study of the State of the Scotian Shelf Report

Having now completed the interview, I hereby consent to the conditions regarding quotations from my interview outlined below.

Please check each of the conditions (as applicable):

I agree to use of substantial direct quotations from my interview in reports and publications arising from this research.

I agree that only my stakeholder role (e.g., scientist or policy-maker) will be identified as author of substantial direct quotations from my interview used in reports and publications arising from this research.

Signature of Participant

Signature of Researcher

Date

Appendix G: Text of Consent to Participate in Surveys

The following text will appear on the first screen of the online survey distributed to subscribers of the ACZISC's Coastal Update Survey:

This survey is part of a research study on the awareness and use of the *State of the Scotian Shelf Report*. The study is being conducted by James Ross, a Master's student in the Environmental Information: Use and Influence research initiative, led by Dr. Bertrum MacDonald (School of Information Management) at Dalhousie University.

You are invited to participate in this survey because, as a subscriber to the Atlantic Coastal Zone Information Steering Committee's (ACZISC) Coastal Update Newsletter, you are a recipient of promotional efforts for the *State of the Scotian Shelf Report* to date. Completion of this survey is voluntary, and all responses will be treated as anonymous and confidential. Completion of this survey will be considered an indication of consent to participate in this study via your anonymous, confidential answers. So that the identity of individuals will not be revealed, only aggregate data will be reported in publications arising from this research. A report of the summary findings and the recommendations will be given to the Canada Department of Fisheries and Oceans.

The survey is open for completion until [Date]. The survey will take about 15 minutes to complete and will aid in building understanding about the awareness and use of the *State of the Scotian Shelf Report*, and State of the Environment reports generally. If you have questions about the study, please contact Dr. MacDonald (bertrum.macdonald@dal.ca; 902-494-2472). If you have ethical concerns about the study, please contact Catherine Connors, Director, Research Ethics (catherine.connors@dal.ca; (902) 494-1462). Further information about the research initiative can be found at www.eiui.ca.

The following text will appear on the first screen of the online survey distributed to the former members of the ESSIM Stakeholder Advisory Committee

This survey is part of a research study on the awareness and use of the *State of the Scotian Shelf Report*. The study is being conducted by James Ross, a Master's student in the Environmental Information: Use and Influence research initiative, led by Dr. Bertrum MacDonald (School of Information Management) and Dr. Peter Wells (School for Resource and Environmental Studies and Marine Affairs Program) at Dalhousie University.

You are invited to participate in this survey because of your participation in the former Eastern Scotian Shelf Integrated Management Initiative's Stakeholder Advisory Committee. Completion of this survey is voluntary, and all responses will be treated as anonymous and confidential. Completion of this survey will be considered an indication of consent to participate in this study via your anonymous, confidential answers. So that the identity of individuals will not be revealed, only aggregate data will be reported in publications arising from this research. A report of the summary findings and the recommendations will be given to the Canada Department of Fisheries and Oceans.

The survey is open for completion until [Date]. The survey will take about 15 minutes to complete and will aid in building understanding about the awareness and use of the *State of the Scotian Shelf Report*, and State of the Environment reports generally. If you have questions about the study, please contact Dr. MacDonald (bertrum.macdonald@dal.ca; 902-494-2472). If you have ethical concerns about the study, please contact Catherine Connors, Director, Research Ethics (catherine.connors@dal.ca; (902) 494-1462). Further information about the research initiative can be found at www.eiui.ca