Recommendations for a Communication Strategy for Northumberland Strait Property Owners on Coastal Erosion

This project has been funded by Nova Scotia Environment under the Climate Change Adaptation Fund

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Disclaimer

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Part 1 Introduction

This project was designed to increase Nova Scotia's capacity to adapt to climate change by developing a communication plan to modify coastal property owners' attitudes and behaviour toward coastal erosion.

The bulk of the project assesses the information and education needs of Northumberland Strait property owners in dealing with coastal erosion. The needs assessment is presented in Part 3 of this report. It is based on interviews with coastal property owners and key informants, along with a focus group discussion and a short literature review. The data is presented and analyzed in Part 4 of this report.

The output of this project are recommendations toward a communication strategy. This includes defining the main messages, proposed targets and approaches for a five-year communication strategy.

This report is divided into four parts:

Part 1: Introduction, Background, and Methodology
Part 2: Recommendations toward a Communication Strategy
Part 3: Needs Assessment
Part 4: Results and Analysis

This research was carried out by the Ecology Action Centre with funding from the Nova Scotia Environment Climate Change Directorate though its Climate Change Adaptation Fund.

1.1 Background

Coastal erosion is a natural process through which land and geological features are built up (accretion), removed (erosion), and frequently transported and reformed elsewhere (deposition)(GSC, 2011). Many coasts and coastal features (beaches, dunes, cliffs) are particularly dynamic features that can erode and change dramatically over decades, seasons, or even from a single storm. From the perspective of geologists and those who study shoreline change, erosion is only a problem when there are houses, roads, and other human infrastructure that can be damaged or lost due to erosion (GSC, 2011).

Many people who own coastal property do not share this perspective. There is certainly a strong public sentiment that the loss of land to erosion is something to be dreaded and fought against. In recent decades, as more and more people buy homes or cottages along the coast, there is an ongoing "battle against the sea" in order to reduce property loss through erosion (Beaton, 2008). Generally, this takes the form of installing seawalls or other structures to reduce the impact of waves and storm surges on the shore, and thus trying to stop or slow erosion. The phenomenon of replacing natural shoreline features with seawalls is known as shoreline hardening (Taylor, 2008).

Unfortunately, people's efforts to protect property and infrastructure from erosion often lead to unpredicted effects. Coastal features like beaches rely on a steady supply of sediment to rebuild and renew themselves. The sediment needs to come from somewhere, and efforts to prevent erosion on one part of the coast often lead to increased erosion and loss of sand on other parts of the shore because of changes to sediment transport patterns (Dugan et al., 2008). Hard shoreline structures also tend to deflect wave energy and cause even more erosion on neighbouring properties. The construction of sea walls to protect individual property creates a conflict between individuals' rights to protect their property and the collective or public right to healthy beaches and the benefits of natural shoreline processes. However, many people are unaware of the role that erosion plays in building and maintaining beaches and other coastal features, so there is rarely any consideration of the consequences of extensive shoreline hardening.

The effects of climate change, particularly higher sea levels, more intense storms, and reduced winter ice cover due to warmer ocean temperatures, are expected to lead to accelerated rates of erosion on many of the world's coasts. Rising sea levels will cause the shoreline to recede at an even faster pace, making it harder for beaches to replenish themselves (NRCAN, 2007).

The impacts of climate change are forcing government, communities and individual property owners to rethink their relationship with the coast. As sea levels rise and storms become more intense, beaches, dunes, and other coastal features become our first line of defense serving to slow and break wave energy (EAC, 2009). Many climate change adaptation experts, including within the American insurance industry, consider maintaining and restoring natural shorelines as the cheapest, most cost-effective way to protect climate change impacts (Mills, 2009). The hard structures like breakwaters, seawaters, and rock walls that are supposed to protect property may be increasing the rate of loss since they are preventing beaches from migrating and rebuilding themselves further inland or further along the coast.

Nonetheless, the pressures on the coast for transportation, work, play, and home construction are huge. Given the popularity of coastal living, it will be extremely difficult to maintain and restore natural shorelines, and stop the proliferation of shoreline protection structures. A fundamental shift in attitude and practices will be necessary to convince any coastal property owner to reconsider how they deal with erosion.

1.2 What other jurisdictions are doing to manage erosion

This research is not intended as a comprehensive overview of how other jurisdictions deal with coastal erosion, climate change adaptation, or communications about coastal erosion. In an unpublished master's degree project, Burbidge (2008) examined how several coastal jurisdictions in the United States and Maritime Canada applied regulatory tools such as coastal hazard zones, coastal setbacks and restrictions on the use of shoreline protection structures to protect the public from climate change-associated coastal geohazards. Beaton (2008) also reviewed legislated tools for beach management, with a particular emphasis on managing beach erosion.

A review of Burbrige (2008) and Beaton (2008) highlights the following approaches to managing coastal erosion in other jurisdictions.

(1) **Prevention/risk avoidance**: Prevention or risk avoidance approaches to managing erosion usually involve zoning areas of the coast or certain coastal features as geohazards and creating development setbacks to prevent new homes or structures in those areas. New Brunswick's Coastal Area Protection Policy or the Prince Edward Island Planning Act are described in Burbidge (2008), and are example of policies or legislative tools to prevent development in areas prone to erosion. Other Canadian examples are discussed in Beaton (2008) and ECELAW (2010). Burbidge also covers American beach and coastal setback legislation such as the Maine Coastal Act and North Carolina's Coastal Management Act. Other American coastal legislation is reviewed by NOAA's Ocean and Coastal Management Office (2011).

(2) **Restrict erosion control structures:** In recognition of the fact that erosion control structures harm the coast and actually increase the damage associated with erosion, some American jurisdictions have actually prohibited or severely restricted their use. Both Rhode Island and North Carolina have prohibited coastal property owners from installing or repairing erosion control structures (Burbidge, 2008; NOOA, 2011), while states such as Washington, Rhode Island and Massachusetts require the property owner to first demonstrate an existing structure is threatened by erosion and that, subsequently, soft or hybrid approaches would not be effective erosion control methods before a structural stabilization method is permitted (NOOA, 2011).

(3) **Regulate the type of erosion control structures allowed:** Many American states such as Pennsylvania, California and Florida do permit coastal property owners to install and repair erosion control structures, but regulate the kind, height, and location of these structures in order to minimize damage to adjacent properties and the coastal ecosystem. The Pennsylvania Coastal Management Program has developed a document for the placement and design of these structures called *Criteria and Methodology for the Proper and Consistent Placement of Shoreline Stabilization Structures along Pennsylvania's Lake Erie Shoreline*.

(4) **Educate about the implications of coastal erosion structures:** Most Canadian jurisdictions do not yet restrict the use of coastal erosion structures. However, some provinces do require people to obtain a permit before installing an erosion control structures and use this as an opportunity to provide educational material about coastal erosion and the consequences of different approaches to dealing with coastal erosion. The province of New Brunswick provides a booklet to property owners considering building a shoreline wall or otherwise armouring the coast. The booklet explains coastal erosion, and how boulders or rock walls can disrupt natural sediment transport along the coast. It also summarizes the

advantages and disadvantages of different ways of dealing with coastal erosion. Finally it provides standards and guidelines for installing rock walls properly to minimize the damage associated with these structures (Rob Capozi, personal communication, March 25, 2011) In British Columbia, the provincial and federal government as well as several municipalities and BC Hydro have invested heavily in a program called Green Shores. (http://www.greenshores.ca) Green Shores is attempting to promote coastal development that maintains and restores natural shoreline processes and habitat values. Green Shores has produced a range of different educational materials for developers and private homeowners about natural or hybrid approaches to reducing coastal erosion impacts. Most U.S. coastal states produce fact sheets and resource guides to help property owners understand their options for managing erosion. The National Office of Coastal Zone Management lists the resources by state as well as by topic (i.e. climate change, coastal erosion, bank stabilization, shoreline stewardship). The U.S. Environmental Protection Agency also hosts a Climate Ready Estuaries program featuring a range of education resources about coastal erosion. (http://www.epa.gov/climatereadyestuaries/toolkit.html)

1.3 Coastal erosion communication

Many coastal jurisdictions in Europe and North America are treating coastal erosion as a serious and growing concern. As shown in the preceding section, many of these jurisdictions are actively seeking to discourage property owners from building erosion control structures. However, there does not seem to be much evidence that most jurisdictions develop a clear communications strategy toward achieving this goal. Although many jurisdictions are producing information geared for property owners. Rather, communication about coastal erosion seems to happen in the following ways.

(1) Pre-permitting: The is an opportunity to provide information to the public about seawalls and shoreline protection structures if they are required to contact a provincial government department in order to obtain a permit. For example, properties owners in New Brunswick installing shoreline protection must go through New Brunswick's Department of Environment which gives them an information booklet that explains the best way to manage erosions. A similar example is the Municipality of Kings County in Nova Scotia where the municipal office gives out brochures titled *Developing Near a Lake: Guidelines for New Development* to everyone applying for a building permit for a lakeside house or cottage.

(2) Explaining/demystifying coastal laws, policies, and regulations: New coastal regulations can cause confusion and resentment, especially when they affect current landowner practices. The State of Massachusetts Office of Coastal Management has produced a series of fact sheets to explain the legal, ecological, and economic context for coastal zone management. (http://www.mass.gov/czm.org) The sheets use case studies and examples to outline what coastal property owners can and cannot do on their coastal property.

They also refer property owners to guides on how to flood proof their property and reduce the risk of erosion. The New Brunswick Department of Environment has a series of presentations that explains exactly what is permitted and not permitted under existing its province's laws and policies for the coasts, wetlands, and other water courses. They are available online as well as through staff presentations.

(3) Public information: Many jurisdictions choose to communicate about coastal erosion within the broader context of education and awareness raising about coastal management and climate change adaptation. In the United States, the Sea Grant program has supported the development of educational materials, curriculum, fact sheets, videos, and other resources about the coast. These are usually delivered through state offices of Ocean and Coastal Management or universities, often online. Most of the communication material about erosion focuses on three aspects: explaining erosion and coastal change; talking about the negative impacts of sea walls and other engineered solutions; and tips for property owners on how to reduce erosion on their property. The state of Maine offers information to the public on coastal erosion and coastal management through the Maine Sea Grant office, the Office of Coastal and Ocean Management, and the Maine Geological Services. While these are separate sites, they refer and link to each other and cross reference key resources and public education material. (http://www.seagrant.umaine.edu/book/export/html/335) In the Canadian context, New Brunswick, Quebec, and British Columbia seem to have the most coastal information online that specifically mentions erosion and directs property owners to useful resource material. The government of Prince Edward Island also provides education material that explains erosion, seeks to discourage the use of shoreline walls, and provides construction standards when shoreline walls are constructed. (http://www.gov.pe.ca/photos/original/eff_shorerosion.pdf) In the Caribbean, a number of islands have worked through UNESCO to develop and implement a Sandwatch program which educates youth and teachers about coastal erosion and engages them in shoreline monitoring. Sandwatch is delivered in a large number of schools and communities in various Caribbean countries. (Sandwatch, 2011)

(4) Information targeted to developers, contractors: Changing attitudes and practices around managing coastal erosion can succeed or fail based on the availability of trained professionals to work with coastal property owners and identify erosion management options. Prince Edward Island has started a Contractor licensing program to certify contractors who can work in wetlands, watercourses or coastal buffer zones. The contractors can ensure all laws and regulations are followed and that shoreline protection infrastructure is built according to provincial standards. In British Columbia, various levels of government have supported the Green Shores program to develop a *Developers Guide to Coastal Planning and Stewardship*, which talks about site selection, the placement of structure, and various hard, soft, and hybrid approaches to shoreline stabilization. In the U.K. some districts have developed documents to provide

guidance to developers and those determining planning applications on appropriate develop within erosion constraint areas. One such example can be found at http://www.northnorfolk.org/planning/5031.asp.

(5) NGO or community group driven: In many jurisdictions, NGOs or community groups are behind efforts to communicate about coastal erosion – often with support of government. The Chaleur Bay Watershed Association produced a *New Brunswick Shorefront Property Guide* which was funded and distributed by the New Brunswick Department of Environment. The societe des estuaries et du littorale, a group based in the Miscou Peninsula of New Brunswick, does a range of activities to raise public interest and awareness of erosion issues. For a few years, they drove a truck with slogans like "erosion its now or never" and parked it in various communities to spark question and conversation. In 2011, they will be travelling along the coast in a catamaran to talk to people who live or own cottages along the coast about changes in the coast, impacts of climate change, and how to prepare adaptation plans. In Ontario, the Lake Huron Centre for Coastal Conservation produce fact sheets, information material, resource guides, videos on beach management and erosion on beaches and bluffs. They also organize and host community meetings to develop management plans and create new land use bylaws.

1.4 Climate change communication

The focus of this research is communicating about coastal erosion specifically rather than the broader theme of communicating about the coast or about climate change. However, throughout this research, I have found it difficult to discuss communicating about coastal erosion outside of the context of climate change adaptation. As noted in the previous section, many jurisdictions present information about climate change in the context of other coastal issues like coastal development or coastal flooding. Most provincial and U.S. state websites that offer information about coastal erosion also talk about sea level rise, storm surges and the need to adapt to changes in our climate. This is because for individual property owners, coastal erosion and increased risks of storm damage are a very real and tangible climate change impact that is already being felt (Broccoli, 2010).

Due to the close relationship between climate change communication and coastal erosion communication (as well as a dearth of specific information on best practices on communication about coastal erosion) this research draws on some of the lessons learned in the field of climate change communication. The focus of climate change communication has to date been on mitigation – changing people's attitudes and behaviour to reduce the production of greenhouse gases (George Mason Centre for Climate Change Communication, 2010).

However, communicating about adaptation to encourage preparation and action to deal with the realities of a changing world is of growing importance in climate change communication. Broccoli (2010) feels that many of the barriers to communicating about climate change mitigation are also constraints in communicating about adaptation.

***Top**: An example of bank stabilization using boulders, in Malagash. **Bottom**: Bank stabilization using vegetation and ground cover, in Amherst Shore. A mix of trees, shrubs and grassed has been planted and maintained. (Photos courtesy of Ashley Sprague)*

A major challenge in communication about climate change is the "abstraction" barrier (Rebeik, 2010). Climate change may be a real threat, but ordinary citizens see its implications as distant, abstract, and not directly related to their lives. Perhaps because of this, people's concerns don't match their behaviour. Studies in the United States show there is a distinct divide between Americans who are aware of and concerned about climate change, and those who are dismissive of the science. Nonetheless, when it comes to identifying actions they are taking to reduce greenhouse gas emissions and reduce emissions, their behaviours are remarkably similar. Those who are concerned about climate change are not necessarily more likely to drive their cars less, or make other efforts to conserve energy (Leiserowitz et al., 2010). The threat of future climate change impacts does not seem to induce clear direct action from the general public.

Another barrier in climate change communication is the great fragmentation found in the American public around climate change. Seminal research by the Yale Climate Communication project and the George Mason Centre for Climate Communication reveal the existence of "Six Americans" or six clearly distinguishable categories of people into which random samples of the American public fall. These categories range from people who are actively concerned about climate change and see it as a great threat to the American economy to those who are dismissive and do not expect to feel any impacts. These perspectives are sharply polarized, and the American research has gone so far as to identify which messages will be effective for which audiences (Leiserowitz et al., 2010). For example, trying to talk about declining polar bear populations with those who care about fuel prices and domestic oil security will likely create hostility and be counter-productive.

There have been no similar wide-ranging studies in Canada that classify Canadians according to typologies of climate change belief. Nonetheless, national surveys suggest a higher level of acceptance that climate change is real in Canada than in the United States, as well as greater support for mitigation efforts (PPF/SP, 2011).

Morrison and Walmsley (2009) provide an interesting analysis on whether climate change law and policy are effective public education and communication tools about climate change. They conclude that a comprehensive legal framework with clear unambiguous regulatory requirements is potentially a very effective way to deliver climate change information to the public. However, policy tools are only effective as communication mechanisms when they are accompanied by other mechanisms such as public education campaigns and locally applicable information.

1.5 Best practices in climate change communication

A few ideas have emerged from American research about best practices in climate change communication (Nisbet, 2010). Climate change is an abstract topic. Communication is most effective when it is about very concrete local examples to which people can directly relate. For example, the disappearance of pond ice due to warmer weather trends is something people can see and remember from year to year (Broccoli, 2010). Therefore, the most effective climate change communications use local examples

that are easily observable to help concretize more abstract concepts such as the melting of polar ice caps or gradual warming of surface sea temperature.

It is also important to present information that people value. The most valuable information is personally relevant to the audience (Nisbet, 2010). In many cases, this is information that explains a phenomenon or provides specific information that will solve a problem or save money. Given that coastal property owners are keenly interested in coastal erosion, they will likely value communication that provides useful information on managing coastal erosion. This was similar to Department of Environment, Food and Rural Affairs research in the U.K. that found flood risk communication was much more effective when accompanied by maps showing flood risk and clearly explaining flood risk return periods (DEFRA, 2003).

Repetition is important in getting a message to the public, especially when consistent messages are received from different sources. A good example of consistency is when municipal, provincial and federal government departments are providing similar information about coastal erosion management Consistency and repetition does not mean the language or options have to be identical, but the messages should be consistent. People become unresponsive and paralyzed in the face of contradictory information and messages. For example, communication is confusing and ineffective when a coastal property owner trying to cope with erosion receives information from the municipality telling people they should not build too close to the coast, while, at the same time, the province gives out information on how to build a seawall and an environmental group hands out pamphlets advocating the use of vegetation as the best method to manage erosion.

While consistency of messages is important, there is no such thing as "one size fits all" communication. The hook that will engage one type of person (i.e. environment, community, risk reduction) will not work or may even backfire with someone else. In 2003, the British Department of Environment, Food and Rural Affairs commissioned a report to evaluate the effectiveness of its efforts to communicate about flood risk to the general public. The report made a number of recommendations to improve communication, including developing different communication plans for different typologies of flooders. For example, different types of information are relevant and important to the group they referred to as "experienced flooders" who have developed some experience and expertise in preparing with and dealing with the aftermaths of a flood, and the "first time flooders" who have never been through a flood before (DEFRA, 2003).

Communication is most effective when the information comes from a trusted sources that people perceive to be independent and neutral. In the United States, the George Mason Centre for Climate Communication is exploring how to help TV weathermen provide more information on climate change, since research shows they are the most trusted sources of information on climate for a high percentage of the public. O. Choinard (2008), a researcher at the Universite of Moncton, has worked with clusters of neighbours within communities in northeast New Brunswick on a participatory action research

project on coastal erosion and climate change communication. His research demonstrates that communities where neighbours can work together to educate themselves about coastal erosion and develop local adaptation plans, they are more willing to consider adaptation options such as land use planning and buffer zones than those where top-down policies are instituted by government (Choinard and LaPlante, 2008).

One of the most useful tools for communication climate change is " framing." Frames are a linked series of concepts and ideas that contain more meaning than the ideas presented separately (Nisbet, 2009). A solid frame that connects individual experience and values to wider social issues and potential actions by which they can be addressed is the basis of an effective climate change communication strategy.

It is critical that communication about climate change and public risk strike a balance between serving as a clear reminder about potential danger and causing so much alarm that the public feels powerless. Pace et al. (2010) suggest that scientists have an important role in helping the public understand the distinction between the risk associated with a particular event and the probability of it actually occurring. O'Neil and Nicholson-Cole (2009) mention the importance of using positive imagery from everyday life to engage the public in motivating individuals and communities to take action on climate change.

Some key recommendations in the Department of Environment, Food and Rural Affairs study include finding key local contacts or volunteers who can act as liaisons between communities and government agencies; involving local volunteer groups in the development of pamphlets and other education material; and developing messages about flood risks that encourage self help and collective efforts to reduce risks and cope during an emergency (DEFRA, 2003).

Morrison and Walmsley (2009) found that a comprehensive policy and regulatory framework can enable education and public education efforts as they support interagency coordination and the development of consistent messages.

1.6 Rationale for this study

This research focuses on a small study area; the Amherst Shore to Malagash portion of the Northumberland Strait in Nova Scotia. The purpose of the research is to explore how to communicate most effectively about coastal erosion with coastal property owners in Nova Scotia.

The Northumberland Strait area was chosen as a pilot for this research because of its popularity with cottage owners and the area's susceptibility to shoreline erosion. Due to the relatively low-lying, highly erodible sandstone features along most of the Northumberland Strait, coastal communities and properties in the area will be increasingly vulnerable to damage from erosion and storm surges (NRCAN, 2007).
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The most common method to control coastal erosion along the Northumberland Strait are boulders and seawalls - methods that are considered "hard" forms of shoreline protection. Research carried out by the Geological Survey of Canada shows their use has increased dramatically along the Northumberland Strait over the last 30 years (Taylor, 2008).

There are many government departments and civil society organization with a direct or indirect role in communicating with the public about coastal erosion and other issues, however, the province does not have a specific erosion strategy or much information to provide to the public to give guidance and direction on dealing with coastal erosion. It is increasingly vital that the province of Nova Scotia develop a clear communication strategy to talk to coastal property owners around the Northumberland Strait about coastal erosion, and natural and climate change-induced coastal change. Clear, consistent messages are important, so that those communicating regularly with the public (local officials, contractors, neighbours, local organizations) are saying the same things and providing similar information.

The research on building a communications strategy stresses that effective communication starts with an understanding of the audience's current knowledge, motivation, behaviors and core values.

There have been no previous studies in Nova Scotia to date that identify the needs and opportunities for delivering information about coastal erosion and climate change adaptation to shoreline property owners, although Silver and Conrad published a paper in the June 2010 online edition of *Meteorological Applications* on the public perception of climate change and extreme weather warnings in Nova Scotia. Their research suggests a lack of awareness of the existence and extent of public vulnerability in Nova Scotia and recommends the development of a comprehensive climate change education campaign. They do not make specific recommendation on how messaging should be delivered.

This research assumes that improved understanding of coastal property owners' current practices and information needs will be the basis for developing a communication strategy. It produces recommendations on how Nova Scotia's provincial and municipal government, and environmental organizations, can frame and deliver effective climate change adaptation communications.

The beneficiaries of this research will be those provincial and municipal government departments, and community and environmental organizations with a direct or indirect role in communicating about the coast and climate change to the public. Various provincial government departments (Fisheries and Aquaculture, Department of Natural Resources, Nova Scotia Environment, Emergency Measures, Transportation and Infrastructure Renewal, and Service Nova Scotia and Municipal Relations) have a direct or indirect role in communicating with the public about coastal issues. Either the public contacts them directly (usually after citizens have sustained property damage) or they are referred by other departments.

The municipalities along the Northumberland Strait (Colchester, Cumberland, Pictou, and Antigonish) are largely coastal rural municipalities. They are communicating with coastal property owners when they issue or refuse building permits and through their municipal planning strategies and bylaws.

The public also occasionally attempts to locate information about coastal erosion and other coastal matters from federal government agencies such the Geological Survey of Canada and the Department of Fisheries and Oceans.

Finally, provincial organizations like Clean Nova Scotia and the Ecology Action Centre have public outreach and education projects on climate change adaptation, while the Southern Gulf of Saint Lawrence Coalition on Sustainability has a coastal erosion education and monitoring program. Local groups such as the Friends of the Pugwash Estuary and the Antigonish Harbour Watershed Association also regularly host education activities around the specific characteristics and threats facing local coastal areas and watersheds.

These institutions are engaged in public education and communication but most do not have education material about erosion or the coast that they regularly distribute or direct people towards. Either the material is difficult to find, not particularly suited to local conditions, or fails to offer practical information that coastal property owners could use. Conversely, government agencies like the Geological Service of Canada have web-based and printed information about Nova Scotia's coasts that is underutilized. These agencies are often unable to distribute this information effectively.

1.7 Research methodology

This research was carried out between October 2010 and March 2011. The survey design, interviews, and transcription and report writing was done by the EAC's Coastal Coordinator, Jennifer Graham.

There were four main sources of data for this project:

Background research: The researcher reviewed climate change communication literature through online searches and also searched for examples of existing erosion education material in print and online that was produced locally or regionally.

Survey of coastal property owners: The researcher developed a survey for coastal property owners along the Northumberland Strait. The survey was designed to get information on property owners' perception of erosion; what actions they are currently taking to deal with erosion; where they got information; what motivates their choices; their perception of climate change impacts in their area; their core values and beliefs about their coastal properties; and their information needs around coastal erosion and climate change adaptation.

Susan Glynn Morris and Karen Potter of Environment Canada's Community Action program provided advice on survey design for needs assessment. They also reviewed and provided feedback on an early draft of the survey. The survey was tested on four coastal property owners from the study area. Their feedback led to further revisions for clarity. The survey was finalized in December 2010. A final version of the survey is included in Appendix A.

Thirty (30) coastal property owners from the Northumberland Strait were interviewed for this project. With one exception, the interviews were conducted over the telephone. They lasted between 30 to 60 minutes. The researcher typed answers into the forms as the interview unfolded.

The survey was followed for the closed questions; however, additional data was collected through further probing on open-ended questions.

The respondents were located through existing local contacts in the study area who were asked to participate in the study. They were also asked for names of coastal property owners, who in turn made further suggestions. To protect the privacy of potential respondents, existing contacts contacted potential interviewees to seek their permission before providing the researcher with their contact information. Interview subjects were solicited through the EAC e-newsletter and by contacting people who advertised cottages for rent in the study area.

Contacts were sought in the Amherst Shore, Heather Beach, and Pugwsah area, and they form the bulk of the interviews. However, respondents were also accepted who contacted the Coastal Coordinator from anywhere in the Northumberland Strait area, including one respondent with a cottage in New Brunswick.

All respondents were read information about the confidentiality of their information before the interview began, and they were all asked formally for their consent.

The interview data is stored in a secure location where it is to be kept for the next 10 years. The interview code allowing property owners to be identified is kept in a separate locked location, and will be destroyed once the study is completed.

Key informant interviews: Twenty-two (22) key informant interviews were done with provincial and municipal government departments involved in coastal erosion or climate change adaptation communication. Provincial and local NGOs and community groups were also interviewed. These interviews were done either by phone or in person depending on the location of the interview subject. The full list of key information interviews is included in Appendix B.

Focus group discussion: A focus group discussion to review and rate coastal erosion education material was held on February 25, 2011 at the Northumberland Curling Club in Pugwash. The focus group was attended by eight participants ranging from the local Emergency Measures Coordinator to a coastal realtor. The event featured stations at

which 12 different coastal erosion education materials (listed on pages 74-76) were reviewed and rated, followed by an open-end discussion on gaps and needs.

The primary data from the property owner interviews was analyzed to identify common themes, trends, and concerns. The data was also grouped according to respondents' support for various erosion management options, and to identify priorities for information needs, and best ways of communication with property owners.

The key informant interviews were reviewed to identify commonalities and differences between the respondents for the interview questions. They made recommendations on what works, and what is not working in terms of current communication around coastal erosion. The key informants' recommendations on main messages to communicate about coastal erosion were also summarized and synthesized.

The coastal property owner surveys and the key informant interviews are the data source for completing a needs assessment (Part 3 of this report) on coastal erosion communication for coastal property owners. The needs assessment helped clarify the existing resources, information gaps, and key audiences of a potential communications strategy (Part 2).

The recommendations for a communications strategy in Part 2 also refer to the review and assessment of existing coastal erosion communication material, so that any new material complements existing resources. The recommendations for a communication strategy also draw on best practices as identified in the literature review on climate change communication, as well as existing practices in other jurisdictions.

Limitations of this research

This research was carried out over a very short time frame, and attempted to generate a lot of new information. Of necessity, the sample size of interviewees is small, and patchy. There are some communities where five or six people were interviewed and others where only one resident took part.

The original intent of this research was to conduct 35 interviews, but this was not possible because of time constraints caused by increasing the number of key informant interviews from eight to 22 because there were so many different stakeholders with some role in the process.

Despite conducting 22 stakeholder interviews, there are still some gaps in coverage. Due to time constraints, the coordinator was unable to contact anyone from DFO involved in permitting for shoreline structures. Nor was it possible to interview more than one representative from a contracting company, one landscaper, and one real estate agent. It is risky to draw conclusions from such a small sample size about the needs and realities of industry.

Finally, a limitation of this research is associated with the communications strategy itself. Although termed a strategy in this report, it is more accurately a collection of recommendations on communicating with coastal property owners around coastal erosion rather than a complete strategy. This research was conducted by an NGO attempting to determine how best many different stakeholders, including government, should communicate about coastal erosion. One key recommendation is the need to develop some coordinated and consistent messages about coastal erosion to the public. In this context, the specific elements of a communication strategy come after a concerted effort to develop some messages to communicate.

Many cottages along the Northumberland Strait, such as these in Tidnish, are constructed in small lots and clustered in rows. Their owners have no place to place to relocate in the face of erosion. (Photo courtesy of Valerie Mansour)

Part 2 Recommendations for a communications strategy

The recommendations for a communication strategy are based on the completion of a needs assessment (Part 3) and an analysis of the results and data from this study (Part 4). The recommendations in this section also draw on best practices from the literature on climate change communication to make recommendations on a suitable communication strategy for reaching coastal property owners along the Northumberland Strait about coastal erosion.

The recommendations are focused on the Northumberland Strait, especially Cumberland County where most of this research took place. However, the recommendations and approach will be generally applicable elsewhere in the province or for other climate change issues.

Evidently, a solid communications strategy requires a dedicated budget and dedicated staff time for full implementation. The focus of this report are the targets, messages, and format for a successful communication campaign.

This report envisions the communication strategy as taking place over the next five years, simply because public education and outreach around coastal erosion would strengthen ongoing initiatives such as the Atlantic Climate Adaptation Solutions, the implementation of the provincial Coastal Strategy, and the Municipal Integrated Community Sustainability Plans.

2.1 Overall strategy

Main goals

This research suggests that the following main goals are important and attainable for a communication strategy on coastal erosion.

- The provincial government departments working on coastal and climate change issues develop clear, consistent messages for the public about managing coastal erosion.
- Coastal property owners on the Northumberland Strait increase their understanding of: natural coastal processes, and the costs, benefits and consequences of various erosion control options and the potential impacts of climate change in their area.
- The public can access relevant and usable information about how to deal with coastal erosion, and begin to use this material to guide their decisions about erosion management.
- Coastal property owners have the willingness, confidence, information and support to shift to alternative methods to slow coastal erosion, including “softer” erosion management approaches.
- In coastal municipalities, fewer new home or cottages are constructed in areas at risk of accelerated coastal erosion or storm surge damage.

The targets (Who do we want to reach?)

This research has found that the following stakeholders are priorities for receiving information about coastal erosion:

- Provincial and municipal staff with direct or indirect roles in communicating with municipalities, other departments or the public about coastal erosion
- People who are considering buying waterfront coastal property
- Coastal property owners who are presently making decisions about how to deal with erosion on their property
- Coastal property owners who will be making decisions about, or repairs to, coastal erosion infrastructure over the next five years

The audience (Who are the people who influence the target?)

The research suggests that given the importance of relationships and information communication in current decisions about how to manage erosion, the following people are likely to influence the target audience:

- Contractors who install bank stabilization and other coastal erosion infrastructure
- Neighbours and other influential people in each community or cottage community
- Real estate agents who specialize in selling waterfront coastal property

The following stakeholders are important but currently less directly influential to coastal property owners:

- Municipal government, particularly planners, and development officers
- Provincial government departments that communicate with municipalities, other provincial departments, and the public about coastal erosion

2.2 The frame

A frame links a series of concepts so that the audience begins to see the relationship between previously unrelated ideas or concepts. The frame created by the campaign - consisting of a series of linked ideas - becomes the theme or message of the campaign.

I outlined the frame through a series of questions listed by *What does a good communications strategy look like?* (CharityComms, 2011)

The frame itself is based on the values and needs identified in Part 3 and 4 of this paper.

What are the real issues? (What is this story really about?)

This issue is about Nova Scotia's relationship with the coast. Many people enjoy "living by the coast" without really understanding the natural forces that create and shape the coast that they love.

Coastal settlement and land use in Nova Scotia have developed with little guidance or direction from the province or municipalities. These practices put people and property at risk from erosion, while also altering natural shoreline processes and harming wildlife habitat. Climate change, especially sea level rise, diminishing sea ice, and more intense storms will increase the pressure on the coast and the risk from erosion and storm damage.

Who are the protagonists? (Who are the people most affected by coastal erosion?)

The people who are most affected own cottages and homes less than 100 feet from the Northumberland Shore. Most of these dwellings are located on small lots that feature clay banks which are already actively eroding. Many of these properties have been in the family for generations and their owners are extremely attached to the property, the view, and the natural setting.

Another grouping is the potential buyers who want to buy a cottage or retirement home on the Northumberland Strait so they too can enjoy a coastal lifestyle.

The main protagonists are middle class Nova Scotians who have invested their limited resources into their cottages or retirement homes on the Northumberland Strait. They work hard throughout the year (or have worked hard until retirement) so they can relax at their cottage every summer.

Northumberland Strait property owners value their neighbours and their community. They believe it is important to work together to manage erosion. They do not feel they have the time or expertise to do a lot of independent research on the best ways to manage coastal erosion. Consequently, they receive information and make most of their decisions by talking to people they trust, such as their neighbours or local contractors. Most would like to do the right thing in terms of not harming the environment while they protect their property. However, the solution to erosion to them cannot require too much time, money, or result in excessive loss of land.

The December 2010 storms caused a lot of property damage. Northumberland Strait property owners are scrambling to repair or reinforce existing shoreline protection. They are keenly aware of changes in weather and are concerned about climate change. They are not sure about what time frame climate change impacts will happen, and they are unsure of how to prepare. Many coastal property owners feel frustrated when trying to get information from municipal or provincial government about coastal erosion. They also feel abandoned after they have sustained weather-related damage.

What images communicate this? (What pictures tell this story?)

- Neighbours enjoying a barbeque while children play on the beach
- A sunset over Northumberland Strait with herons feeding in shallow waters
- Storm waves battering a cluster of relatively modest cottages located very close to the water
- The aftermath: Washed up lawns, displaced and destroyed coastal erosion infrastructure, battered stairs and decks, storm debris

With which organizations do you want to be associated? (Who or what should your campaign be associated with?)

- Cottage-owner and residents associations
- Insurance Bureau of Canada and municipal/provincial emergency measures coordinators
- Local businesses and business associations
- "Friends of" local organizations or environmental groups
- Municipal governments
- Provincial government departments

With which people do you want to be associated?

- The "Mr. Fix It": The neighbour who helps everyone repair things around the cottage, knows how to find the best contractors and workers, and gives advice on how to deal with any issue including erosion
- The "Social Bee": The community leader who organizes the association meetings and social events
- The "Local Contact": The year-round resident who runs the hardware store or other key business and keeps the summer people in the loop about local events and resources
- The "Bridge Builder": The leader of a local environmental group that has the ear and respect of summer people and full-time residents, naturalists, business people, and government officials
- The "First Responder": The first person to talk to a property owner after they have experienced erosion related damage - often the local emergency measures coordinator or a local contractor

What political position? (How should this issue be positioned?)

This communication strategy straddles a delicate line between two sometimes opposing political positions. The first perspective is that coastal property owners have the right to enjoy their land and do whatever they want to continue to enjoy and protect it.

The second perspective is that times are changing, and we need to accept the new reality. The provincial and municipal government have to ensure people, property, and the environment are protected from the impacts of extreme weather and storm surges. This will require changing where we live on the coast and the methods we use to deal with erosion.

An effective communication strategy will link these concepts by building on the values of individual property owners that support collective action and approaches.

The values to build on include:

- appreciation of the natural setting;
- personal observation of changes to the property and weather;
- connection to and love of place;
- a feeling of "we're all in this together;"
- growing concern with impacts of extreme weather;
- a desire to learn alternatives for dealing with erosion;
- and the importance of neighbours and community.

The political position is in support of neighbours and community working together to protect a special place during difficult times.

2.3 The approach

This campaign should have both a grassroots community-driven component, as well as a more traditional government communication element. Both are important since communities and government must work together in order to meet the stated goals of this campaign.

Grassroots strategy

The grassroots and community-based aspects of the communications strategy can be built on the values of neighbours and community and a shared love of place and desire to protect property. This communication strategy will be most effective at a community level rather than as a top-down communication from the provincial and municipal government.

This research has shown that coastal property owners get information about coastal erosion from each other rather than from government agencies. Therefore, new information about erosion will be more effectively distributed and be considered more trustworthy if it comes from the community rather than a government agency.

The heart of the communication strategy rests in empowering coastal property owners and communities to educate themselves and each other, make decisions about how to manage erosion in their communities, and implement their plans.

Local groups and cottage-owners associations are logical leads to organize community meetings about coastal erosion. With funding and technical support, they can develop brochures or other information materials relevant to their communities. Most importantly, they can talk to their neighbours about their worries and plans and lead by example in developing potential alternatives to managing erosion. Or, when there are no remaining options to stem the erosion, they can start the difficult conversations about what happens next.

NGOs or government can assist these efforts by supporting the development of appropriate resources for community groups to start this process. This includes the suite of desired communication materials coastal properties have already said they want (see Part 4). This includes basic brochures about erosion, "how-to" guides, and lists of local contacts and resources.

Government strategy

A grassroots, community-driven strategy does not mean that government should not be involved in communications about coastal erosion. On the contrary, government needs to play a significant role in making sure that the right information is available to community groups and coastal property owners so they can educate themselves, identify options, and make decisions.

Furthermore, provincial and municipal governments need to clarify their messages around coastal erosion in the context of climate change adaptation so that there is a common frame within which everyone is trying to communicate about and manage erosion. This will likely require regular communication and perhaps a coastal erosion communication working group involving government departments and other NGO and institutional partners.

In addition, government is likely the only credible lead to develop standards and training certification for contractors, and communication material for real estate agents and landscapers - although NGOs can likely also play a role in developing materials.

Lastly, the various government departments responsible for communicating about erosion also need access to information about emerging approaches to dealing with erosion in other parts of the world. Ideally, Department of Natural Resources staff would have access to training and studies, and visit other places to learn firsthand about shoreline restoration, living shorelines and coastal realignment. A more cost effective solution might be a local or regional coastal erosion symposium to increase knowledge, awareness, and collaboration.

2.4 The messages

This research used data from coastal property owner and key informant interviews to determine information needs and current gaps in coastal erosion communication. The following main messages are important in any coastal erosion communication strategy.

There is no "one size fits all" format in communicating effectively about coastal erosion. Different formats and different level of details will be required for different audiences. However, there needs to be consistent key messages and a clear place to go for further information.

The material should be well designed, use clear, non-technical language, feature locally relevant images and examples, and direct people to additional web or print-based information or local expertise.

The following are the key messages that should be emphasized:

About the coast

- Coastal change is an ongoing natural process. You've seen it all your life, as have your parents and grandparents.
- The beaches and mudflats you love (name specific local beaches) are created and maintained by erosion and the transport and deposition of sand along the coast.
- A lot of our infrastructure (like the causeway at Pictou Harbour or breakwater at Pugwash Harbour) traps sands and stops its natural movement along the coast. This can lead to faster build-up of sand in some places, while other places are sand starved and erode even more quickly.
- The major storm on December 9, 2010 led to storm surge that reached places that have not been flooded in 80 years. The winter of 2009 was the first time in 50 years there was no winter ice in the Northumberland Strait. Scientists expect these trends will continue into the next 100 years.
- The Northumberland Strait is particularly vulnerable to these impacts because it has so many clay and sandstone banks, and low-lying areas like Tidnish, Heather Beach, and the Amherst shore.

About living on the coast

- Coastal property owners have watched, cared for, and enjoyed their coastal properties for many years. They see the changes that happen over the course of a year, and for many years, and after a sudden dramatic storm.
- As long-time cottage owners/residents, you know the joys of living by the coast are tempered by certain risks and costs. These include property loss, sand damage from erosion, storm surges, flooding, and storms. Changes in our weather are increasing these risks every year.
- Considering spending your hard-earned money on a coastal property? Here is what you need to consider before you buy.
    - The municipality and province are not responsible if your property is damaged by coastal erosion or a storm.
    - Not all insurance policies or disaster relief funds apply to cottages (secondary homes) damaged by erosion or storm surges.

- It is cheaper and safer to reduce the risks by building new homes a safe distance from the sea so you can enjoy your property longer without expensive maintenance and repair costs.

Living with erosion

- Trying to stop erosion is futile; the best you can hope for is to slow it down.
- Boulders and seawalls will reduce short-term property loss, but they have not actually stopped erosion. The same forces are redirected elsewhere, causing loss of material on your neighbour's property; your own beach; or elsewhere.
- Even the most extensively armoured shoreline may not protect your property from storm surges or extreme weather
- There are various ways to slow erosion or reduce its impact
- There are costs and benefits to each approach of managing erosion (list briefly)
- For more information contact

The "how-tos" (What should be in a guide for property owners?)

Hard shoreline protection:

- The main types
- Things to keep in mind
- How much it will cost
- Dos and don'ts
- Trained expertise in your area
- You can still incorporate natural shoreline features

Soft shoreline protection:

- Main kinds
- Principles
- Things to keep in mind
- What to expect
- Dos and don'ts
- Trained expertise and resources in your area
- Hybrids
- Living shorelines
- Coastal realignment

A guide to using vegetation to slow erosion on the Northumberland Strait:

- Basic principles
- What vegetation can and cannot do
- Best plants for your shore
- How and when to plant
- Dos and don'ts of using vegetation
- Where to get plants
- For additional information

2.5 Suggested Priorities

YEAR 1

Government

(1) Coastal Erosion Symposium: A coastal erosion symposium is a workshop that will bring together key government, academic, scientific, and community stakeholders to share information and experiences, and develop priorities for research, monitoring, communication, and implementing erosion management options. The symposium should feature presentations from other places with experience in alternative forms of managing erosion. This workshop would involve coastal property owners but not target them directly. However, bringing stakeholders together is essential to developing the consistent messages and expertise to deliver effective communication.

(2) Website: Any community brochure (see community strategy) should feature a link to a website that has some important information about coastal erosion. In the first stage of the website's development, it could host links to useful existing material on other websites. The website does not need to be a new site, but could be a section on an existing government site chosen to be the one-stop shopping location for information on the coast or climate change adaptation. Possible hosts include Nova Scotia Fisheries and Aquaculture, Service Nova Scotia and Municipal Relations , or the Nova Scotia Environment Climate Directorate.

Community

(3) Printed brochure: A very simple plain-language brochure should include key messages about erosion, changing climate, and the impacts of various ways of dealing with erosion. This should be available in public places (perhaps as a placemat), municipal offices, and distributed to contractors and real estate agents. With additional resources, a summer student could distribute the brochure to every cottage in the study area. I would wait until the website described below is ready before distributing to each household.

(4) Community meetings: Identify relevant local and provincial expertise. Offer local associations an opportunity to have a meeting to learn more about erosion and ways to manage it. Partner with local associations to spread the word. The first round of meetings will provide information about erosion rather than trying to push a particular course of action. It will likely reach the keenest community and environmentally-minded citizens rather than the general public. Advertize the meeting in local papers and bulletins boards. Use photos of storm damage to get people's attention.

YEAR 2

Government

(1) Increase web content: Add resource lists, additional Northumberland Strait information, fact sheets and "how-to" guides on appropriate vegetation to slow erosion. Use local networks, stories in local paper, mail-outs with the tax bill, and the general brochure to promote existance of website.

(2) Start to develop contractor training: Spread knowledge about best practices in erosion management and working with the coast and living shorelines.

Community

(3) Local expertise and resources: Start preparing lists of local expertise and resources for website.

(4) Start demonstration project: Locate project on DNR and private land to show use of alternative methods of erosion management and monitoring. Use signage.

YEAR 3

Government

(1) "How-to" material: Support NGO or other institutions to develop specific downloadable material on how to manage erosion.

(2) Living by the coast information packs: Include all important coastal information geared for potential new homebuyers, and those considering erosion control options.

Community

(3) Community meetings: Targeted to encourage planning and action, as well as provide information. Link with broader climate change adaptation project.

(4) Demonstration projects: Ongoing and additional. Restoration projects?

YEARS 4 and 5

Government and Community

(1) Ongoing material distribution, meetings, updating web resources.

(2) Use website to highlight successes: Case studies, local stories, photos and video from demonstration site.

***Top**: A clay bank with wooden access stairs, seen in Amherst Shore. These stairs were constructed in segments that can be readjusted as bank beneath shifts. The bottom portion of the stairs sustained damage in the December 2010 storms. **Bottom left**: A sign advertising bank stabilization services, near Tatamagouche. **Bottom right**: Damaged shoreline protection structure and access stairs, in Tidnish. (Bottom-right photo courtesy of Valerie Mansour. Others by Ashley Sprague.)*

Part 3 Needs assessment

A needs assessment is a process to determine the gaps between current conditions and desired conditions. It is generally used to develop goals, objectives, and strategies for new projects or initiatives (Environment Canada, 2000). This research project involved a needs assessment to determine how best to communicate about coastal erosion with coastal property owners along the Northumberland Strait. The needs assessment was used to develop the recommendations presented in Part 2 - the recommendations for a communication strategy for Northumberland Strait property owners.

The publication *From Needs Assessment to Evaluation: A Manual for Community Projects* (Environment Canada, 2000) suggests answering a series of 15 questions as part of the needs assessment process. This section of the report answers these questions based on the data collected through coastal property owner interviews, key informant interviews, and the focus group discussion. The complete data is presented in the Results and Data Analysis chapter (Part 4).

3.1 Needs assessment questions and answers

1. What are the problems?

- Most Northumberland Strait coastal property owners are losing property because of erosion. They are experiencing cumulative incremental loss of land as well as more dramatic property loss due to storms and extreme weather.
- Many waterfront lots are quite small. Coastal land is increasingly expensive and cottages are often two or three layers deep. Very few people have purchased lots or built their cottages with present and future rates of erosion in mind. This means most property owners have "no place to go" when faced with accelerated coastal erosion.
- The most common way of dealing with shoreline erosion is by using boulders and seawalls – effectively hardening the shoreline and reducing the coast's capacity to migrate inland in the face of rising sea levels.
- While most property owners are able to describe the erosion happening on their property in great detail and with reasonable accuracy, they do not know enough about shoreline processes and sediment transport to evaluate the impacts of shoreline structures on beaches or the coastal environment.
- Boulders and seawalls (especially those structures which are dug in and/or reinforced) are considered very effective at protecting properties from erosion. Softer methods, like vegetation, are not considered very effective.
- Many people are generally aware of climate change, and its potential impact on erosion, but are not yet doing anything to prepare for these impacts.
- Most people receive information about coastal erosion from their neighbours or contractors. They are not receiving or seeking information from municipal planners, or provincial or federal departments.

- Most coastal property owners only contact government departments or municipal offices when they are already experiencing severe damage from erosion. They are looking for a quick fix.
- Most of the existing communication and education information about dealing with coastal erosion is overly general, and does not deal specifically with the unique conditions experienced along the Northumberland Strait.
- There is a shortage of information and resources about local, salt tolerant vegetation effective in bank stabilization and slowing down erosion.
- There is very little information available locally about alternative means of protecting coasts from erosion and other climate change impact (i.e. living shorelines, habitat restoration, shoreline realignment, and hybrid forms of shoreline protection.)

2. Why do we know this is a problem?

- The scientific consensus in North America and Europe is that hard shoreline protection such as boulders and seawalls interfere with natural shoreline processes and sediment transport. They usually result in even more erosion on adjacent property and beaches, while also disrupting fish and wildlife habitat.
- Climate change will put even more pressure on coastal communities and coastal ecosystems along the Northumberland Strait. Rising sea levels, more frequent and intense storms, and reduced winter ice cover are predicted to increase the pace of change and coastal erosion.
- Coastal property owners are increasingly frustrated, worried, and confused about what to expect around changes in climate and coastal erosion. They would like to be sure they have the right information to make good decisions without having to spend hours on the phone or internet looking for information.
- There is no specific training required for contractors who install coastal erosion structures. Contractors vary in their level of skills, experience, and knowledge of different options for managing erosion. Even those most knowledgeable about best practices in installing erosion control systems have limited understanding of soft methods of erosion control, or natural shoreline processes.

3. What has caused the problem?

- Many people have strong expectations that they can continue to enjoy their coastal properties “in their current condition” indefinitely.
- There is no one “go to” department or lead agency on coastal issues in Nova Scotia. Consequently, there is no clear place for people to get information about shoreline processes, coastal change, coastal erosion, and various options for living with erosion.
- There is no clear overarching provincial message or direction on dealing with coastal erosion. Consequently, no agency or department feels they have the mandate, responsibility, or authority to give the public information or advice, let alone regulations and requirements about what they should and should not do when dealing with erosion.

- The lack of clear policy direction means property owners, contractors, and other members of the public receive mixed and contradictory messages and information from different government departments if and when they ask for information.
- Most municipalities do not have appropriate land use zoning or bylaws to deal with rapidly changing conditions along the coast.
- Municipalities are scrambling to assemble accurate information about coastal erosion and climate change impacts because comprehensive shoreline monitoring and mapping is not widely available.
- Most coastal property owners are not asking government agencies or NGOs about how to deal with coastal erosion. It is easier and more convenient for people to get information about dealing with erosion from neighbours or contractors outside of regular business hours.
- Contractors can generally only tell property owners how to stop erosion through the use of shoreline armouring and bank stabilization. Property owners are not receiving information about the potential consequences of shoreline hardening or any alternative ways of dealing with erosion.

4. What are possible solutions?

(1) Establish key messages about coastal erosion, living on the coast, and climate change and incorporate this information into government and other communication material.
(2) Develop a variety of relevant information material about coastal erosion in a format people will access and use.
(3) Use existing communication networks to deliver the information or to let people know what is available and how to get it.
(4) Convene a coastal erosion forum or symposium with relevant experts and stakeholders from Nova Scotia and elsewhere. The event should develop provincial priorities and solutions, and gain familiarity with emerging approaches in other jurisdictions.
(5) Ensure appropriate information and resources are available to help implement alternative approaches to managing erosion.

5. How to implement potential solutions?

Potential solution	**Implementation**
Appropriate material	Provincial: Form a Coastal Education Working Group Local: Support NGO or community group to work with local DNR, NSE, municipal officials to produce locally relevant information about coastal erosion
Use existing communication networks	Develop list of media contacts. Develop list of local contractors and their certifications. Develop list of local groups, associations, NGOs and contact people. Develop list of local meeting spaces and community halls.

	Develop list of grocery stores and markets with bulletin boards or display space. Identify coastal property owners on municipal tax records. Rely on these local networks to distribute information material and organize meetings.
Incorporate clear overall message about erosion and coastal change	Provincial Coastal Education Working Group Local advisory groups.
Coastal erosion symposium	NGO, in partnership with government departments and academic institutions.
Ensure appropriate expertise and resources are available	Contractor training and education. Education materials for real estate. Develop information about alternative erosion control methods. Develop "how-to" manuals about managing erosion through vegetation. Demonstration projects.

6. Who should be involved? What role(s) should they play?

Provincial level

- The "coastal" and "climate change" focused government departments need to develop and articulate clear, consistent direction and messages about coastal erosion and climate change. This will include most of departments already involved in the development of a provincial coastal strategy through the Provincial Oceans Network and the Interdepartmental Climate Change Adaptation Working Group.
- These same "coastal" and "climate change" related departments could partner with and support municipalities, NGOs, and industry (contractors, tourism) to develop education material that is specific to the Northumberland Strait and its unique geological characteristics. Technical expertise could be tapped from DNR, Nova Scotia Environment, and federal departments such as DFO and the Geological Service of Canada.
- The province could provide financial support for an NGO willing to take the lead in organizing a coastal erosion symposium to share information and resources, learn about alternative approaches, and develop common strategies and priorities.
- The province should initiate and implement more extensive and consistent training for contractors and the real estate industry. It should also provide resource material that contractors can provide to their clients
- The province could provide information and support for municipalities about reducing future risks of coastal erosion and climate change through land use planning. This may occur through the Integrated Community Sustainability Plans being developed by all municipalities, with templates being provided by Service Nova Scotia and Municipal Relations.

- Demonstration sites. DNR has provincial beach parks or picnic sites along the shore. These sites face the same erosion issues as adjacent private property sites, which are keenly observed by neighbours and visitors. These sites could be demonstration sites for alternative erosion management methods or locations where nature can take its course. Either way, the sites should include interpretative material to educate and inform the public.

Municipalities

- Municipalities could develop land use standards that reduce current and future risks associated with climate change and coastal erosion. Many, such as Cumberland County, are currently in the process of doing so.
- Municipalities could use their existing communication and outreach tools (website, tax bill mail-outs, municipal buildings) to display, distribute, and make people aware of relevant information about coastal erosion in their communities.
- Municipalities could ensure that local contractors, real estate agents, community groups and NGOs are well informed about municipal interests, expectations, and new initiatives dealing with coastal land use, managing erosion, and climate change.

Local groups and NGOs

- People do matter. Local residents or cottage owners associations can organize community meetings and bring in provincial and municipal expertise.
- Local groups can help distribute information and also make people aware it exists.
- Local groups work with various technical experts and government departments to develop displays and presentations.
- Local groups and associations can initiate pilot or demonstration projects to highlight various options of dealing with coastal erosion.
- NGOs can sit on provincial working groups to develop consistent messaging around coastal erosion and help implement demonstration projects.
- An NGO could (with support from the province and other sources) organize a coastal erosion symposium to bring together resources and expertise and develop common strategies and approaches.

7. What is the situation before and after? What are you trying to change?

Before

The current situation is that waterfront property owners are dealing with coastal erosion in a reactive matter without fully understanding the potential consequences of their actions. Their main focus is on saving their own property. Although property owners usually work with their neighbours to install coastal erosion protection, they are generally focused on maintaining their own property rather than looking at long-term changes and health of beaches and coast. Coastal property owners are getting their information from their neighbours or contractors, with no information from municipal or provincial government about

coastal erosion, coastal issues or climate change. Very few people are purchasing property or constructing their houses in such a way as to minimize the risk of damage or exposure. Relatively few people are using vegetation to manage erosion. There is little knowledge among property owners about other approaches to managing erosion such as living shorelines or coastal realignment.

After
In the next five years, there will be a shift in how coastal property owners perceive coastal erosion and climate change. Coastal property owners will better understand the natural forces at work and how climate change will accelerate these changes. People will continue to enjoy their coastal properties while reducing their impact on the coast and its natural processes. Coastal property owners will accept that erosion might be slowed but not completely stopped, and that hard methods of shoreline protection may have negative consequences.

The province of Nova Scotia will develop an education and training program for contractors who install shoreline protection. DNR will issue shoreline alteration permits only to contractors who are certified. Real estate agents and contractors will give clients information about living by the coast, including factual information about erosion. The municipality, province, local groups and contractors will give consistent, accurate, and helpful information about coastal erosion to the public. General information about erosion will be readily available in public places, municipal websites, and in locally appropriate brochures. Information about alternatives, costs and benefits of various approaches, as well as "how-to" brochures, will be easily located and available for download or through community groups, NGOs, or government. More people will choose to live further from the coast and use softer methods of slowing erosion. The province and municipalities will provide direction, resources, support, and will be in more frequent and consistent communication with coastal property owners. There will be regular community meetings and forums to discuss erosion and climate change adaptation.

8. What existing environmental information is available?

- There is a lot of general information to explain coastal erosion, and explain the disadvantages of using shoreline walls and the advantages of preserving a more natural shoreline. This information is available on the websites of many government agencies and NGOs in coastal U.S. states and some Canadian provinces.
- There is general information about sea level rise and climate change impacts in Nova Scotia. Under the auspices of ACAS (Atlantic Canada Adaptation Solutions), coastal and flood risk mapping is being undertaken for much of the Cumberland isthmus, the land between New Brunswick and Nova Scotia separating the Bay of Fundy from the Northumberland Strait. The municipality of the County of Antigonish has up-to-date geohazard mapping through DNR.

9. What are the barriers to implementation?

- There is no provincial department with a mandate and lead role in delivering information about erosion.
- People do not receive their information about erosion from government.
- There are very limited financial resources at provincial and municipal levels for education and outreach.
- There is not much expertise or experience on alternative ways of dealing with coastal erosion. The expertise that exists is not necessarily housed in the departments that people talk to about their erosion problems. For example, botanists and landscapers know about salt tolerant plants, but permitting for shoreline work is done through DNR regional offices.
- Different people have conflicting ideas about what should be done about coastal properties facing coastal erosion. Some ideas like armouring the entire shoreline are unrealistic and unfeasible.

10. Who and what is being affected?

- Beaches and coastal ecosystems are being negatively impacted by hard methods of shoreline protection, while wildlife habitat is being lost or disturbed.
- Coastal property owners are paying a lot of money to protect and repair coastal property, and unwittingly bearing the negative consequences (beach narrowing, loss of sand) of their efforts to prevent erosion.
- At the community level, there are growing tensions over loss of coastal access and differing ideas about how to manage erosion.
- At a provincial level, Nova Scotia's ability to adapt to climate change depends on maintaining healthy and resilient coasts that can migrate and change in response to rising sea levels. Shoreline hardening reduces the adaptive capacity of our coasts.

11. What are other sources of information?

- The Municipality of Cumberland County is standardizing their coastal mapping, and revising all their environmental regulations, including coastal setbacks.
- The Municipality of the County of Antigonish has extensive information about coastal geohazards through a partnership with DNR.
- The template for developing new Integrated Community Sustainability Plans will contain some guidelines for land use in highly erodable areas.
- The Southern Gulf Coalition on Sustainability has developed presentations and a brochure about coastal erosion in the Gulf of Saint Lawrence. They are working with community groups in each province to monitor shoreline change at four pilot sites.
- The Emergency Measures Office website contains information for property owners about what is covered and not covered by emergency disaster relief funds.

12. What are the consequences if we don't do anything about the issue?

- People who unwittingly build in zones of high erosion will have increased risk of property damage or destruction.
- Furthermore, coastal property owners will buy expensive shoreline protection infrastructure that may be ineffective or have unintended negative consequences.
- Beaches and coastal ecosystems will become less resilient and limit the province's adaptation capacity and options.
- All of the above will become more serious because of climate change.

13. Who are the best groups to be involved?

- The Southern Gulf of Saint Lawrence Coalition on Sustainability is already doing erosion education and has a Coastal Erosion Working Group.
- Heather Beach Cottage Owners Association, Antigonish Harbour Watershed Association, Friends of the Pugwash Estuary, Tidnish Community Development Association, Brule Shore Cottage Owners Association, Sunrise Trail Coooperative and other local associations.
- DNR and Nova Scotia Environment to offer training and technical expertise with cooperation from DFO and Geological Service of Canada.
- Provincial Ocean Network and Nova Scotia Environment for overall messages about coasts and climate change.
- Municipalities in setting land use standards and distributing information.
- Contractors, real estate agents, local businesses for distributing information about meetings, events, and resources.
- Saint Mary's University and Landscape Nova Scotia for developing information on suitable plants and "how-to" guides for soft erosion management.
- Provincial NGOs like the Ecology Action Centre and Clean Nova Scotia to develop education material and organize demonstration projects, workshops, and information sessions.

14. What are existing resources?

- Various information materials and websites about coastal erosion.
- Keen municipal planners and local EMO already showing leadership
- Provincial Ocean Network
- Coastal property owners with strong attachments to their homes and cottages, and accustomed to cooperating with their neighbours on managing erosion.
- Active local groups and cottage owner associations

15. What are the information gaps?

- There is little information material specifically for dealing with the taller cliffs and slumping banks common along the Northumberland Strait.
- There is little information about impacts of erosion causes by land-based runoff over banks.

- Most information about alternative approaches to coastal erosion is very general. It explains the problem and sets out general principles for managing erosion rather than providing any specific "how-to" or technical information.
- There is no material that helps people weigh their choices. How do you weigh the costs, benefits and consequences of different methods, or even the full implications of coastal living?
- There is no registry of contractors and their training and expertise.

December 2010 storm waves in Amherst Shore. (Photo courtesy of Lisa Emery)

Part 4 Results and Data Analysis

This section highlights research findings from this study, including the results grouped in the following sections:

4.1 Coastal property owner surveys
4.2 Key informant interviews
4.3 Focus group rating of communication materials

The results are organized so that the tables and other data reflect the key findings for each part of the research. The order and numbering of the tables do not necessarily reflect the same order as the survey questions as presented in Appendix A.

A brief analysis of the results is included in each section. The implications of this information have already been discussed in Part 2 (Communication strategy) and Part 3 (Needs assessment).

4.1 Coastal property owner surveys

4.1.1 General property information

This heading summarizes general information about the properties included in the study. Although 30 interviews were conducted, some of the respondents own more than one property, and some properties have multiple buildings. Consequently, throughout this section, the results seldom total exactly thirty.

Table 1: Location of Coastal Properties

Municipality	**Community**	**Number**
Cumberland, NS	West Pugwash	1
	Pugwash	4
	Malagash	3
	Gulf Shore	5
	Heather Beach	2
	Amherst Shore	7
	Tidnish	1
	Port Howe	2
	Tatamagouche	1
Colchester, NS	Brule	1
Pictou, NS	Melverney Beach	1
	Caribou	3
	Pictou	1
Antigonish, NS	Antigonish Harbour	1
Port Elgin, NB	Port Elgin (Baie Verte)	1
	Total # of properties	35

Figure 1: Type of Buildings

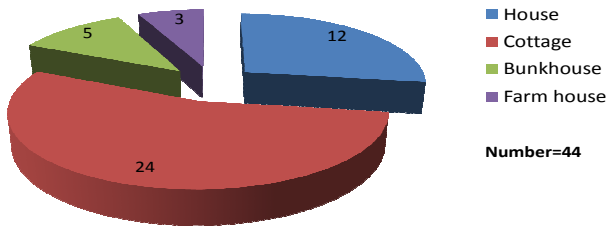


Figure 2: Type of Ownership

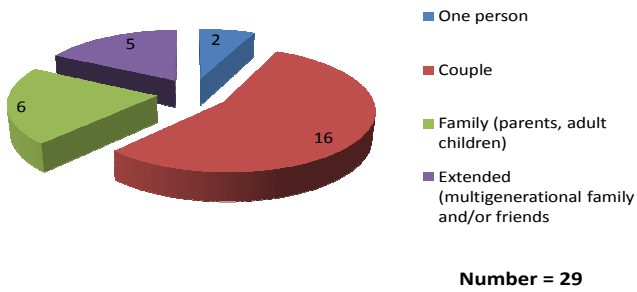


Figure 3: Length of Ownership

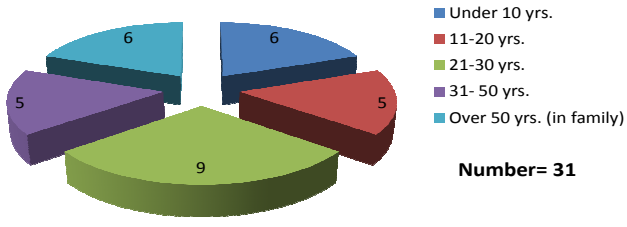


Figure 4: Occupancy

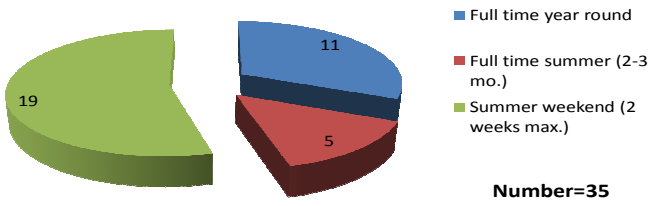


Figure 5: Shore-line Type

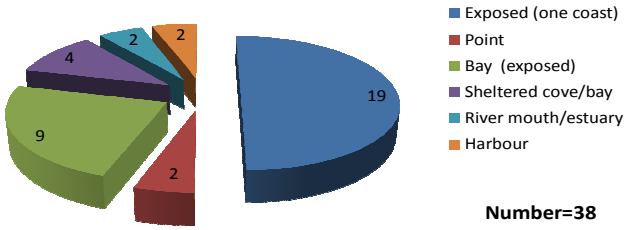


Figure 6: Distance from Edge of Water

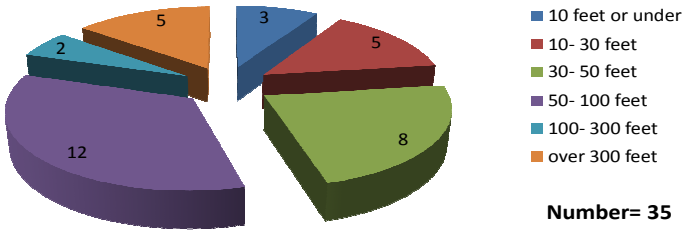
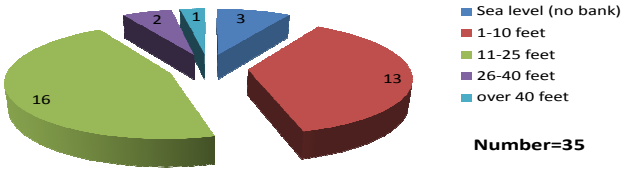


Figure 7: Height Above Sea Level



Analysis: General property

The data suggests that while most respondents own cottages as secondary residences or income properties, there are significant numbers of full-time year-round residents as well. Furthermore, five (5) respondents indicated they had recently retired to the area and two (2) said they planned to retire to their properties on the Northumberland Strait. While overall census data for Nova Scotia indicates that the population of rural coastal Nova Scotia is in decline, it is important to note that in some coastal communities people are moving to these communities for retirement. This has implications for land use planning, servicing, and coastal erosion communication and outreach.

Most people own their coastal property, and say they make decisions about it, as a couple. However, those who own the property with extended family or friends say they have to take into account a variety of opinions on how to manage the property. Five (5) of the respondents who owned property with family or extended family said they had disagreed with their co-owners about how to deal with erosion on the property, and ended up agreeing to installing shoreline protection structures they were not entirely convinced they wanted.

There is a wide range in the length of time respondents have owned their coastal properties. The number of years of ownership may not accurately reflect the length of time the respondent had spent observing changes at their cottage. Some respondents had legally owned the property for less than 10 years, but reported it had been in their family for far longer. Those who own multiple properties and/or income cottages may have purchased their cottages at different times. Therefore, Table 6 gives an overview of ownership trends rather than definitive data on how long people have owned their waterfront property.

It is clear, however, that with twenty (20) people owning their coastal property for over twenty years and six (6) people saying the cottage had been in the family for over 60 years, there is a lot of attachment and strong sense of connection to these waterfront properties. A sentiment one respondent summed up by saying “Our cottage is my favorite place on earth.” (INT1)

Despite the attachment, most people interviewed (19 respondents) are at the cottage only part-time during the summer months. This tendency has implications for communication about coastal erosion. First of all, these owners are not around to see the shoreline changes year-round and differentiate between the impacts of summer and winter weather.

Secondly, it is difficult for neighbours to consult with one another and also to organize community meetings when the majority of cottage owners are not there full-time and may not overlap with one another.

One of the factors making erosion a big issue for Northumberland Strait property owners is the number of houses and cottages located on shorelines or bays they describe as exposed or open rather than in more sheltered coves or harbours. Twenty-six (26) respondents said their properties were exposed, either located on an open coast or bay.

Another reason why erosion is a significant issue in the study area is proximity to the water. The largest number of respondents, twelve (12), said that they have residences located between 50 and 100 feet from the edge of the water. However, sixteen (16) respondents say their residences or cottages are less than 50 feet from the edge of the water at high tide.

It is worth noting that this data reflects perceptions of distance. Respondents were asked how far their residence is from the edge of the ocean during an ordinary high tide, rather than a precise distance measurement. Most people gave their answer in terms of distance from the edge of the bank, rather than the water itself.

The geology of the study area, especially for the banks, is critical. Most of the waterfront properties are above sea level located on a low or medium bank rather than a beach or dune system. The local geology affects: the type of erosion being experienced; the available options for managing erosion; and the types of information property owners want and need.

The characteristics of the local shoreline also have implications for access. Twenty (20) respondents depend on either private or shared steps to access the water.

4.1.2 Perceptions of erosion

This section summarizes how coastal property owners perceive erosion, its causes and its impact on their properties. Erosion is clearly a significant issue for waterfront property owners along the Northumberland Strait. Of thirty (30) people interviewed, only two (2) people said erosion was not affecting their property. Of these two, one (1) respondent felt that their coastal access has been affected by erosion on a property abutting their own property. The other owns a home on a sheltered cove not subject to erosion, but was still concerned with overall erosion trends in the community.

The following information about erosion is subjective and highly personal. Taken altogether, these remarks provide useful insights on how waterfront property owners experience erosion.

Seasonality

The respondents all agree that erosion does not usually happen in the summer. Twenty-three (23) respondents identify fall storms as being especially prone to causing erosion. This is generally attributed to stronger winds and waves with no winter ice to mitigate their impacts.

Responses are mixed about the significance of winter storms. Twelve (12) respondents said that winter storms cause less severe erosion because, historically, sea ice has protected the shore from erosion. Five (5) said that they think ice gouges the coast and actually increases erosion in the winter.

Twenty-four (24) respondents said that spring is when most property is lost to erosion. They associate the spring erosion with water running off of the thawing soil down the edges of banks. The overland flow turns the banks into "a soupy chocolate pudding" which slides off the bank causing it to collapse from the top up.

Drivers of erosion

Twelve (12) respondents mention wind as a cause of erosion since it drives the direction and force of waves hitting the shore. Storms with a strong prevalent northeast wind are likely to cause more erosion than those from other directions. Twenty (20) people said erosion is caused by waves. Fourteen (14) people mentioned storm surges and storm events as the major source of erosion, and five (5) people said ice causes erosion. Four (4) people said the currents carry sand and deposit it elsewhere along the shore.

Patterns

The common perception is that erosion on the Northumberland Strait is ongoing but that its impacts are variable on different properties and in different years.

Twenty (20) respondents mentioned what they consider the typical pattern of erosion for their area. In the fall, storm waves are higher and hit the bottom of the cliff causing it to overhang and become more unstable. In the spring, when the ground unfreezes, it becomes very slick and muddy. The rain causes the soil to slide down the banks taking the unstable "overhanging lip" with it.

After a year of heavy fall storms, the spring bank collapse is more dramatic until the bank re-stabilizes itself and erosion slows.

In addition to the pattern described above, fourteen (14) people spoke about dramatic "one-off" erosion caused by storms and storm surges such as that which occurred in

December 2010. In these cases, large waves washed over the tops of banks and led to dramatic sudden loss of bank and adjacent property.

Erosion rate

As discussed in the next section, most of the respondents are currently protecting their property through shoreline structures. Thus, most of them say that they generally are not losing property at the current time. However, despite having shoreline protection in place, ten (10) people lost boulders, property, lawn, or steps during the storm surges in December 2010. Another four (4) people with shoreline protection in place experienced dramatic erosion and property damage during Hurricane Juan in 2003. Three (3) respondents said they lost ten to fifteen feet or property during the storm surge in December 2010.

Those without shoreline walls or boulders said the rate of erosion on their property ranges from a few inches to a foot a year. This is the range that six (6) people said that they experienced before installing shoreline protection.

Ten (10) people said that erosion can be gradual for a few years and then suddenly one year, "you can lose four or five feet at one go, for no reason that you can tell" (INT5).

Beach replenishment

Some respondents were asked additional questions about the source of sand on their beaches. Five (5) people said it washed in and out from offshore where it is always floating. Two (2) people said the sand comes in from offshore sandbars. Three (3) people felt the sand on the beaches comes from bank erosion. One person said sand is carried along the coast by long-shore currents. Four (4) people said they did not know or had never thought about it before.

Analysis: Perceptions of erosion

Most respondents are very concerned about erosion on their properties and feel it is or has affected their land. Most people are able to identify and differentiate between the different types of erosion affecting their property throughout the year. Relatively few people seem to perceive erosion as part of a cycle of natural shoreline change, in which material is taken from one location and deposited elsewhere. Erosion was usually discussed purely as something impacting their individual property or that of their immediate neighbours.

Most respondents said that one of the major drivers of erosion in their area is the spring freeze and thaw cycle causing water to flow overland off the bank.

As will be discussed in the next section, many respondents also felt that the height, steepness, and exposure of the banks make it difficult to establish vegetation thus limiting the options for softer methods of managing erosion.

The local cycle and timing of erosion and deposition has implications for appropriate communication material about erosion. As will be discussed in the section on information needs, many respondents felt that information about coastal erosion and "how-to" guides had to be specific to their local area and take into account its geology and characteristics. The spring runoff and overland flow are felt to be responsible for much of the bank erosion happening in the area. It is therefore important that any communicaton material about erosion refer to overland flow and not just erosion caused by storms or wave action.

4.1.3 Managing erosion

This section provides a summary about how coastal property owners are managing erosion, in particular the types of methods they are using and why they selected that particular method.

Twenty-seven (27) respondents said they are carrying out activities to manage erosion on their property. Only three (3) people said they are doing nothing. Of those, one could not do anything since the problem was on a neighbor's property. The other two (2) said they were not trying to control the erosion and instead letting nature take its course. Nonetheless, one (1) of these respondents is using vegetation to slow erosion.

Table 1: Common methods of managing erosion

System	**Method**	**Number of respondents**
Hard	Dumping Boulders	12
	Boulders dug and placed	5
	Armouring	7
	Seawall ties/wood	2
Soft	Boulders plus vegetation	7
	Planting vegetation; no boulders	5
	Vegetated buffer zone	5
Other	Setback from water	3
	Restricting access	8
	French Drains	2
	Brush and clippings over bank	5
	Total responses	61

Table 2: Specific examples of managing erosion

Type of vegetation used to manage erosion	Methods of restricting access	Shoreline engineering
Lupins Wild Roses Spruce Dune grass Dogwood Gout Weed Alder Seeded grass Sea oats Bay berry	-Not letting children play on edge of bluff - Blocking access to roads - Not building stairs - Sharing stairs or paths - Never climbing down the bank	- Rebar - Bolted telephone poles - Interlocking concrete blocks - Armour rock - Geotextile fabrics - Bank grading - Concrete overlips at the top of bank

Goals of erosion control efforts

Overwhelmingly, the twenty-seven (27) people who are actively trying to manage erosion said their main goal is to prevent the loss of property. Eight (8) people also said they wanted to protect their cottages or houses. Two (2) people said that "you can't stop erosion - our efforts will only slow it down." Two (2) respondents said they are trying to improve fish habitat through bank stabilization since they think the sediment flowing off the land will smother marine creatures. Two (2) respondents also said they thought that a well-maintained shoreline wall made the property more attractive.

Figure 9: Learning about Erosion Control Options

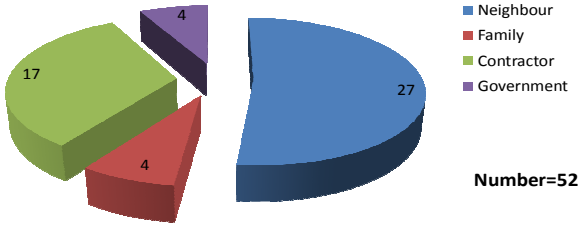


Figure 10: Considerations in Managing Erosion

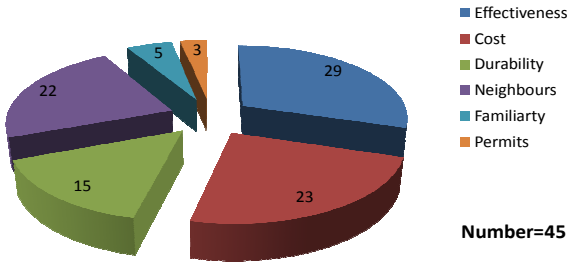
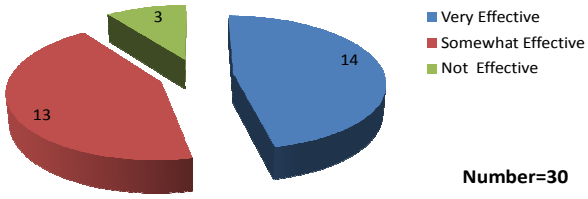


Figure 11: Effectiveness of Erosion Control



Climate change

Twenty-two (22) respondents thought that climate change is happening and will increase erosion rates along their shore. Five (5) people said they do not think climate change is happening, although they do note more extreme weather in recent years. Four (4) people said they do not know.

Respondents were most concerned about the impacts of more frequent and intense storms (20 people); the diminishing sea ice (12 people); and the rising sea levels (10 people) when asked how climate change will affect erosion rates.

Twenty (20) respondents said they are doing nothing to prepare themselves for climate change. Four (4) people said they are monitoring their shoreline more carefully and repairing damaged shoreline infrastructure more promptly. Three (3) people said they will reinforce their shoreline infrastructure. One (1) person said they pay more attention to weather reports and remove lose objects from the property whenever they leave, even for a short while.

Future plans for dealing with erosion

Twenty-two (22) people said they will continue doing what they are currently doing to manage erosion. Four (4) people said they would like to plant roses or other vegetation. One (1) respondent plans to sell the property before things get too bad. One person plans to stop fighting the sea and not replace the seawall which was destroyed in the last storm. Two (2) people plan to not replant lost lawn and instead put a concrete lip over the top of the bank to stop property loss if waves go over the top of their bank again. Two (2) respondents would like to organize a meeting of the residents' association to talk about long-term erosion management strategies in their community.

Analysis: Managing erosion

The most common way to manage erosion is through hard forms of shoreline protection. Twenty seven (27) respondents are using boulders or seawalls to control erosion on their property. Of these, seven (7) are also using vegetation as part of their erosion control efforts. Only five people are relying exclusively on vegetation to manage erosion on their property.

Twelve (12) respondents installed boulders by having them dumped over the side of the bank. Five (5) respondents had a contractor dig the boulders in so water would not flow under or through the rocks and had the boulders placed to make the structure more durable. Another seven (7) respondents did what they consider "top notch" erosion control which usually includes a combination of buried and bolted logs or poles; layers of rocks; geo-textile material to reduce infiltration; and extending the shoreline protection all the way to the top of the bank. Some respondents have even graded the bank to make a more stable rock wall and have extended concrete lips over the top of the bank so that the receding waves or overland flow does not cause property loss.

Trying to minimize bank destabilization by restricting access and redirecting traffic onto stairs or less unstable portions of the property are additional erosion management approaches done by eight (8) people.

Most respondents are receiving information about coastal erosion from their neighbours (27 respondents) or from contractors (17 respondents). It should be noted that of the four (4) people who learned about erosion management options from a government department, three (3) said these were informal consultations with contacts who happened to work as hydrologists, engineers, or home inspectors.

The fact that most communication about erosion is happening between neighbours and via contractors is important for planning a communication strategy around coastal erosion. On the positive side, it means that information and new ideas about how to manage erosion will spread easily between neighbours during the summer months. However, at the moment, there is no regular communication between coastal property

owners and government agencies, so establishing some communication links is also important in effective coastal erosion communication.

Twenty-four (24) respondents are implementing an erosion control strategy in cooperation with their neighbours. For example, they are: designing and building the structure together; sharing the costs of the work; or linking a wall of boulders across three of four properties.

Most respondents had the work done by a contractor. Those using vegetation did it themselves. There are a few people who did quite extensive shoreline alteration projects through their own efforts. For example, two respondents designed a very elaborate erosion control structure themselves and installed reinforced poles, rebar, and geo-textile by themselves, using a contractor only to move large boulders.

The costs of erosion control efforts are difficult to measure as the prices cited vary from the price of a one-time installation to the amount spent over a few decades. It is obviously cheaper to use only vegetation, as most people using this method said they spent less than a thousand dollars for soil, sod, seeds, or plants. The median cost for boulders is about $10,000 and it varies depending on length of coastline and height of bank to be protected. The more expensive installations, with boulders dug in and placed, graded lots and geo-textile fabrics, can cost from $20,000 to $40,000.

The respondents using only vegetation said it is “not very effective” at managing erosion. However, two (2) of those using only vegetation specified they are not trying to stop the erosion completely, but merely slow it down.

The seven (7) people who have done extensive shoreline modification including armouring and grading think their approach is “very effective.” They are pleased that they “could afford to do it right. … We paid for the armour rock and spared no expense. It’s working well for us” (INT23).

However, seven (7) respondents did say their efforts were very successful until the December 2010 storms, recognizing that even the most extensive efforts cannot hold up against a full storm surge event. This suggests that many property owners recognize that while they can reduce normal seasonal erosion on their property, there is little they can do to protect themselves against extreme weather events.

The respondents who relied mostly on boulders dumped off the edge of the bank generally felt their efforts were “somewhat effective.” They said they had to replace them more frequently than expected as boulders shifted or were washed away. They also mentioned that dumped boulders cannot prevent erosion caused by overland runoff in the spring.

Along the Northumberland Strait, one of the biggest factors influencing erosion is that water and soil run off the bank in the spring. This shifts the angle of the bank and puts water and material behind the boulders and forces them outward. Consequently, even

with large boulders at the base of their banks, many people continue to observe changes in their property over time.

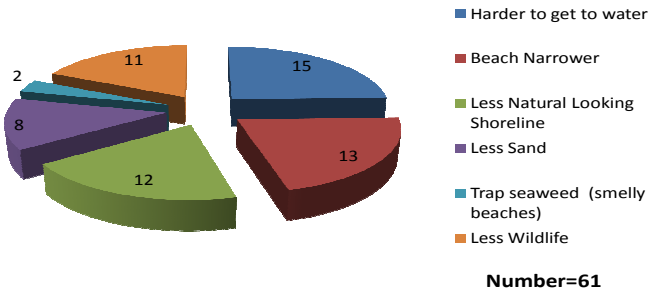
Many respondents said that boulders on their property frequently shift, mainly because water is still coming in underneath. The storm surges last December 2010 went over many rock walls and banks, and caused extensive damage to lawns. In some cases, the boulders (particularly those dug into bolted and reinforced beams) did not move but the lawn behind them was removed.

Many people are clearly aware of climate change and expect it will affect their property. However, most plan to continue dealing with erosion in the same way they currently are, since they do not know about or have not seriously considered any other alternative. One (1) respondent plans to sell his property within the next few years because he feels "its time is limited."

4.1.4 Impacts of shoreline structures

This section provides a summary of responses to a series of questions on the perceived impacts of shoreline erosion structures. Respondents were asked about changes they observed on their own properties, as well as on the beaches and shoreline in the area.

Figure 12: Perceived Impacts



Analysis: Perceived impacts

It is much easier for respondents to speak with certainty about the impact of erosion on their own property than it is about the impacts of shoreline protection structures on the nearby beaches and coastline. Fifteen (15) respondents associated shoreline walls with less natural shoreline and changes in access. The impacts on access include it being more difficult to reach the beach because of bigger and more extensive boulders, but also with problems walking along the beach because boulders extend to the water's edge or beyond.

It is clear that many respondents think shoreline walls also lead to a less natural looking shoreline, as twelve (12) respondents stated.

Thirteen (13) people said the beach is getting narrower, and eight (8) said there is less sand on their beach. There seems to be a trend toward beach narrowing. It is difficult to get a sense of whether people believe the shoreline walls are causing the beaches to narrow. Five (5) respondents said beach changes are natural - and that both width and sand fluctuate seasonally and depend on storms that particular year.

Six (6) respondents said they saw narrowing beaches as signs of the very erosion they are trying to protect their property from (i.e. beach narrowing is caused by erosion.) Five (5) people did say they see boulders and armour rock are causing changes in beach width and sand. Three (3) people said they can observe this in front of rows of cottages that were armoured and now have no beach, while their properties which do not use boulders still have wide beaches.

Three (3) people used boulders to protect their property and attribute this to the gradual disappearance of the beaches in front of the boulders they installed. Six (6) people say they do not think shoreline structures have any impacts on beaches.

It is also not entirely clear whether respondents believe shoreline walls have any impact on wildlife since their comments were mixed. The most common beach species mentioned by respondents are bank swallows; many people said bank swallows were more abundant in the past. Five (5) people said that boulders at or up to the top of cliffs make it difficult for bank swallows to find habitat. Six (6) people thought the erosion itself caused habitat loss and has led to their decline. Two (2) people think that erosion is very bad for fish because the sediment smothers their habitat.

4.1.5 Values and alternatives

This section of the survey contained questions to get a sense of what is most important to coastal property owners about their property. The results are summarized in the table below.

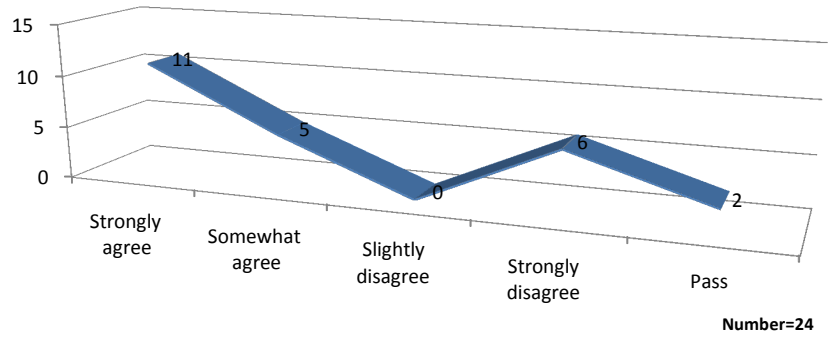
Table 3: Most important value of coastal property

Valued aspect	**Number of respondents**
Natural setting	19
View	15
Access to beach and water	10
Wildlife and shorebirds	9
Out-of-town get away	9
Neighbours and community	9
Place for family to be together	7
Income	4
Spirituality	3

This section also included a series of questions where respondents were asked their opinion from "strongly agree" to "strongly disagree" on a range of potential erosion management options. The statements the interviewees were asked are presented in italics followed by a table summarizing the responses. Respondents were then asked for further comments which are the source of the quotations presented in the text box after each question.

Figure 13: Relocation

"If my residence is physically threatened by erosion, I would consider relocating it elsewhere on the property if I thought it would extend the length of time I could continue to enjoy it"



Interesting quotations on relocation

"I don't have that much land to begin with. Where would I go?" (INT 20)

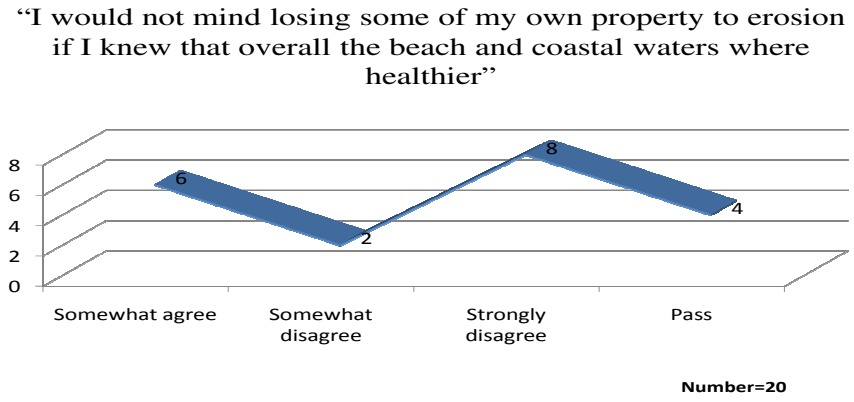
"When I bought this property, I bought a double lot so I could move when I lost the seaward side of the property. I'll miss the view and the sound of the waves, but I'll still have access to the water." (INT 26)

"I guess I could consider moving if it came down to that. I just put in a foundation, so I'm not sure how that would be possible, but I would definitely consider it." (INT 14)

"I will never move. I'd rather battle the sea. That's why I chose to armour the shoreline. I paid the price of all of that so I didn't have to move." (INT 18)

"My house was a substantial investment. I'd rather move it than lose it completely." (INT 17)

Figure 14: Property Loss



Interesting quotations on property loss

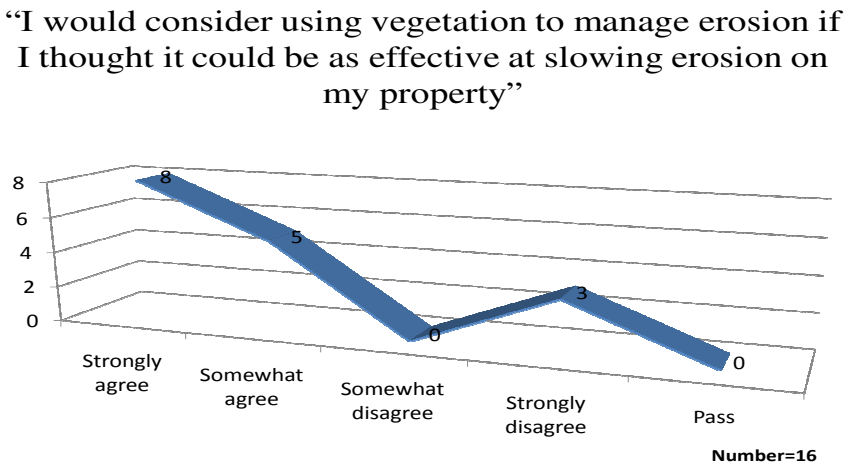
"I can't imagine how it would help the beaches, if I lost some of my land." (INT 23)

"I could lose some land, but not too much. I can't afford to lose too much." (INT 14)

"I'd be willing to consider it. I'd need more information about how it would benefit the coast and how much land I might lose, but I'd definitely consider it." (INT 6)

"Absolutely. No question about it. We all have to make sacrifices, and I'm willing to make mine." (INT 22)

Figure 15: Vegetation



Interesting quotations on vegetation

"I don't think vegetation can survive the salt spray. There is more vegetation on the points of land – trees and shrubs – but it doesn't seem to be very effective. When the bank goes, the trees topple over, they hang perpendicular for a while and then fall. The freeze-thaw cycle is not kind to vegetation." (INT 20)

"There is no one-size-fits-all approach. It could depend on the soil whether vegetation will even grow. A gravelly soil may not hold the vegetation but further down the shore, banks are less steep and can grow some species." (INT 23)

"I'd really like to know what to plant and how to plant it. It's really difficult to find information about what plants will survive in the salt spray." (INT 14)

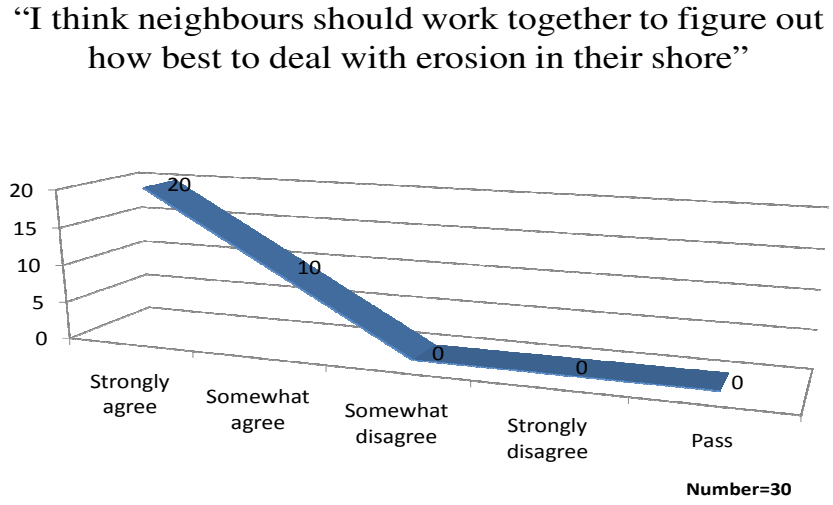
"My property is the opposite of landscaped. It looks wild. From the water you could not tell there is a cottage back there." (INT 23)

"I put down sod and then transplanted grass and shrubs. I kept a really close watch on everything while it is getting established. You can't leave it to chance." (INT 12)

"Trees won't work. They get tossed around in storms and take up the whole bank." (INT 28)

"I kind of did the opposite. I used to plant roses and lupins and lost them all when the bank collapsed. Now I don't have any vegetation – just rocks. The vegetation won't take with the geo-textile fabric anyway." (INT 24)

Figure 16: Neighbours



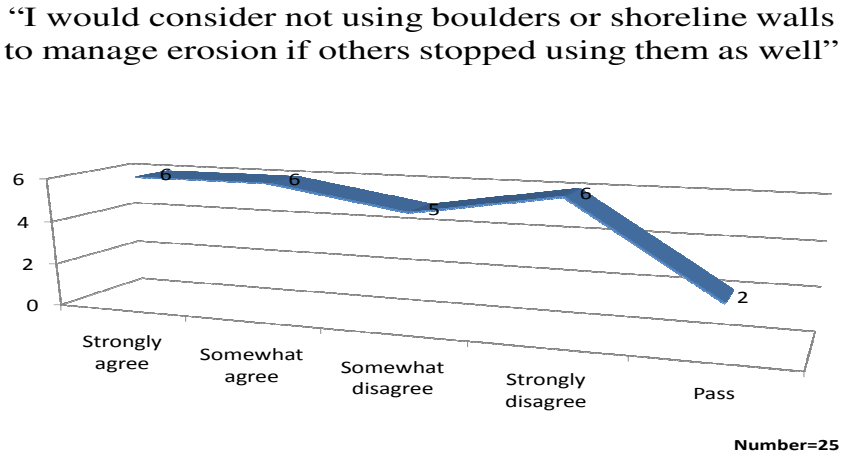
Interesting quotations related to neighbours

"One of my neighbours is the Department of Transportation and Public Works. All they are doing is dumping a few rocks on their property. They are not keeping up their property and it's causing a lot of problems." (INT 22)

"It's hard to get neighbours together and some of them do not have any money to do things right." (INT 10)

"Neighbours have to work in lockstep; otherwise, you're wasting your money. It's like the weakest link." (INT 21)

Figure 17: Boulders



Interesting quotations related to boulders

"I think protecting the land from erosion is a way to protect the water. A lot of creatures are displaced by erosion. Fish are displaced. Birds are displaced. By protecting the shore, I am protecting their habitat. Rocks are natural." (INT 7)

"Boulders are inevitably ineffective anyway. It's a short-term approach." (INT 10)

"If I thought I was doing something wrong, I'd stop doing it, I could lose a bit of land, but a lot would be a disaster." (INT 13)

"Most people will fight tooth and nail to save their cottage. We appreciate the whole concept of the beach and its changes. Not everyone feels the same. We have to be realistic about what we are asking people to do." (INT 14)

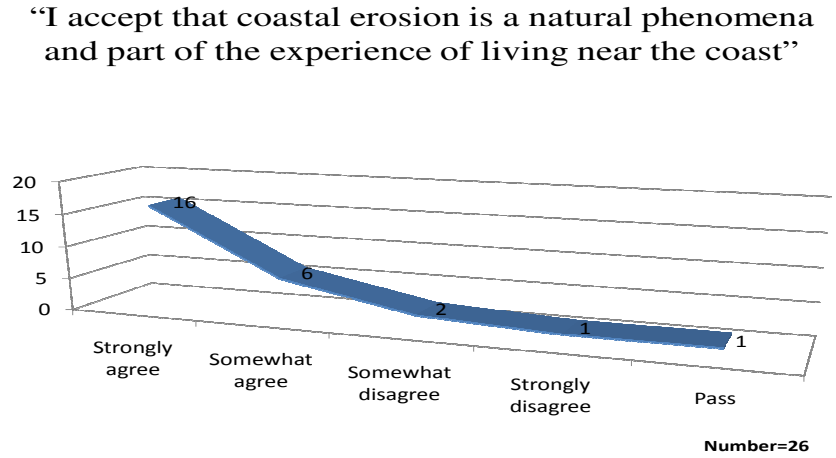
"Boulders will not stop the sea. Erosion is an ongoing phenomena. You'd have to be pretty disconnected not to know that." (INT 20)

"It has to be everyone's own call, but people should know the harm they cause – and that whatever they do won't last forever or even that long. I am being seriously affected by erosion, but I can't say that doing nothing to stop it was a mistake." (INT 17)

"I can't do that. I plan to keep fighting." (INT 8)

"I can't answer that. I'd really have to know the alternatives." (INT 1)

Figure 18: Whether or not erosion is natural

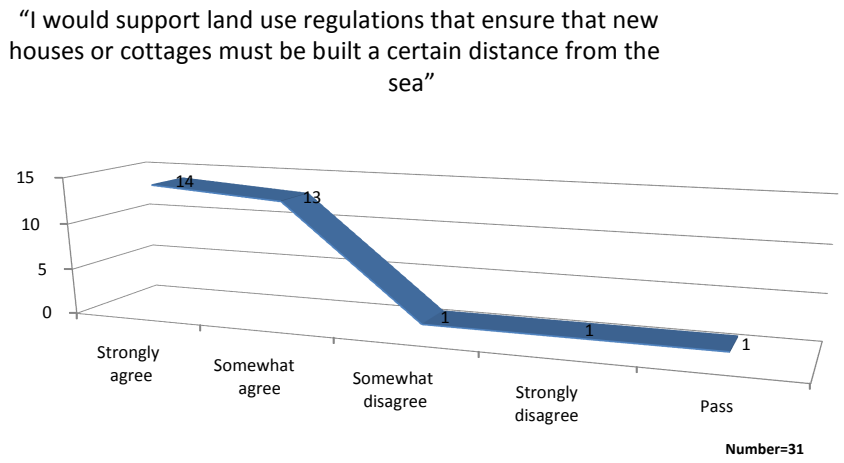


Interesting quotations on whether erosion is natural

"You can't stop the sea. You can only slow it down. It's a battle like in Holland. To live here, you are going to have to face constant repairs, and it will cost you." (INT 14)

"You can't fight mother nature." (INT 7)

Figure 19: Land Use



Interesting quotations related to land use

"It has to be specific to each location. We need to decide on a case by case basis. We have to use common sense." (INT 4)

"It could be a visual clue about where it is unsafe to build. We may need this because people are stupid." (INT 6)

"We need this now because things have changed so much." (INT 18)

"I think we need to seriously consider this in light of the current situation." (INT 15)

"Times are changing. The change is happening at an alarming rate" (INT 19)

"Land use has to be flexible. Not all areas are equally vulnerable" (INT 23)

"Municipalities have to make sure people don't locate in areas where storm surge is an issue" (INT 25)

"You have to be careful. Sometimes you can have unexpected consequences from new regulations. And they have to be applied consistently so it's fair" (INT 1)

Analysis of values and alternatives

For many property owners (19 people) they value the natural setting of their coastal property very highly. Respondents also place a lot of value on the view, followed by their access to the water. After that, other values including wildlife, neighbours, and out-of-town getaway that were ranked were equally important. It was clear from the interviews that coastal properties are very special places for those who live or vacation

there. As one respondent said, “We live for the cottage. That is our life. Everything else – like jobs or town – that’s just marking time until we can get to our cottage. That’s our real home” (INT6).

Given the importance of these properties, it is not surprising that many respondents would be willing to relocate their cottages to extend the length of time they could enjoy them. However, in many cases this is not a realistic possibility for many coastal property owners. Either they have invested in foundations or other underground infrastructure, or more likely their lots are too small and they have no place to go. From the point of view of developing appropriate communication materials, it makes sense to ask questions such as “Can you move it back?” rather than directives like “You must relocate.”

The majority of property owners are open to the use of vegetation to manage erosion – while being quite skeptical about its effectiveness. While some respondents rely exclusively on vegetation to slow erosion, most respondents have planted vegetation on their banks to supplement the boulders at the base. Whether as one part of their erosion management efforts or on its own, a significant number of respondents are interested in learning more about how to use vegetation. They want to know about what species work best, how and when to plant, and where to obtain the plants. Four (4) people volunteered that they have been frustrated trying to locate this information for their area.

Coastal property owners feel ambivalent about any strategy that involves voluntarily losing any part of their property. Most strongly disagreed with any suggestion they might lose some land in exchange for a healthier coast. However, a smaller but still significant group said they would be willing to sacrifice some land for a healthier coast. From a communications perspective, this speaks to the need for information material that will help people weigh the costs and benefits of different approaches so they can make more informed decisions. The feelings about giving up boulders altogether were even more ambivalent, with many feeling strongly that this was not an option, while only slightly fewer people thought they might do so if others did as well. Their comments indicate that many respondents realize that ultimately boulders would not stop erosion.

This research indicates that almost all respondents consider working with neighbours to be an important strategy in managing erosion. And in many cases, neighbours are already working together to address erosion. This is encouraging since any new approaches to dealing with erosion will have to come from working collectively rather than individual action.

The majority of respondents do recognize erosion as a natural phenomenon. This understanding can be built on to explain the dynamics from a shoreline change perspective rather than merely individual property perspective.

Finally, there is strong agreement (14 people) and some agreement (13 people) that there should be land use measures that prevent new cottages from being built in areas prone to erosion and storm surge damage. A communication strategy built on the idea that “You

know times are changing. You see it yourselves" might help build support for municipal and or provincial land use standards such as setbacks.

4.1.6 Information needs

This section of the survey focused on the current access to information about coastal erosion and what kinds of information people would be interested in receiving about coastal erosion. The questions also covered the best format for coastal erosion information and how people thought information should be distributed and delivered.

Current sources of information

Twenty-eight (28) people said they had never received any information about coastal erosion from a government agency, municipal office or non-governmental organization. The two (2) respondents who said they had received some information about coastal erosion said it came unofficially through a neighbour or as part of information they received in their own workplace. Three (3) people said they had looked for information about coastal erosion on the internet or by seeking information from government or resource people. Six (6) people said they tried to find information specifically about what plant species would work in their area to manage erosion. Only one (1) who accessed information from a relative on the West Coast was able to access specific, applicable, information about the "dos" and "don'ts" of using vegetation to manage erosion.

Desired topics

Table 3: Desired information about coastal erosion

Type of information	Number of respondents
General erosion material	13
Alternative erosion control	17
"How-to" guides	22
Resources and contacts	23
Climate change adaptation	13
None	2

In addition to noting their interest in the topics above, a few respondents specified that they would also appreciate the following: a source of plants suitable for bank stabilization (4 people); videos about coastal erosion (2 people); information about French drains (2 people).

Reaching people

The respondents were also asked how they thought information about erosion could be effectively distributed in their communities. The participants felt that different types of information could be distributed using different methods.

Table 4: Preferred formats for erosion information

Information	**Number of Respondents**
Newspaper	**16**
Radio	3
Mailing information (tax bill)	6
Brochure to households	**19**
Community meeting	**20**
Website	15
Displays in public places	12
Presentations	6
Private consultations	11

Table 5: Best way to deliver different types of information

Info.	How-to guides	News-paper	Brochure	Comm. meeting	Contact list	Internet	Private consult.	Public ads or display	Local orgs.
General erosion info		26**	19					12	12
Erosion options	31*			20	20	15 web	11		
Comm. meetings and resources		5				9 email		13 post office; grocery stores	

* 16 suggested they be made available in public places and 15 that they be downloadable
** 16 suggested provincial newspaper and 10 suggested local

Community meetings

Sixteen (16) respondents said they would attend a community meeting about erosion. Ten (10) people said "maybe" when asked if they would attend a community meeting. Five (5) people said they would not attend a community meeting about coastal erosion.

Eleven (11) people specified a community meeting should be in the summer between June and August to reach the summer residents. Four (4) people said community meetings should be on a Sunday afternoon to get people just before they head back to the city. Four (4) people said most of the cottage communities have cottage owners associations that organize social events and organize collectively for road grading and other improvements. They suggested that attending and working through

these associations would be a good way to reach many summer residents. Seven (7) people said meetings about erosion should start with the permanent residents who are there all year and should take place in the winter months.

Twelve (12) people said they would be interested in a private consultation on their property. Three (3) people said that since it's such a collective problem, the consultation should be by neighbourhood rather than individually.

Six (6) people said the community meetings or consultations should be to provide information about options for managing erosion and not to try to push a particular approach. The speakers should be credible and neutral and not try to sell any particular product.

Analysis of information needs

The majority of people are not actively seeking information about erosion or how to manage it. Therefore, they are generally relying on contractors or their neighbours to decide how to manage erosion on their property. This limits the amount of information they are receiving about the natural processes that cause erosion, and the consequences of various approaches.

Twenty-two (22) people said they are interested in receiving specific "how-to" information about ways of dealing with erosion. They are particularly interested in what plant species would work, and how, when to plant them, and where they can purchase or obtain the right kind of vegetation. Sixteen (16) people would like to know about various options for dealing with erosion and the advantages and disadvantages of each method. The most requested type of information is a list of contacts and resources in the area, which twenty-three (23) people said they want.

Fewer respondents expressed an interest in more general information about erosion (13 people) or climate change (13 people). Material that focuses only on those two topics may not be considered as useful or desirable for coastal property owners.

Table 18 shows that respondents distinguish between the most appropriate ways to disseminate different types of information. There is a need for basic information about how to deal with erosion and what options and resources are available. This information can be put into brochures that are delivered household to household and be made available in public places. Local newspapers can also be used to convey general information about managing coastal erosion.

However, there is also a strong desire for more specific information about how to implement various method of dealing with erosion, and the implications of various choices. Respondents felt that the best way to deliver more specialized information is: community meetings (16 people), internet or printed "how-to" guides (22 people); or private consultations (12 people).

Community meetings can be used as a place to bring information about erosion, as well as to make decisions about various options. Respondents suggested using local groups or associations to organize and spread the word about community meetings.

The fact that so many coastal property owners are only there in the summer months make it difficult to effectively share information and bring people together. For this reason, meetings on summer weekends are suggested by eleven (11) people as the best way to reach people. This is also a sound time to deliver brochures cottage to cottage. There may always be challenges in reaching full-time residents and cottage owners using the same communication channels. Seven (7) respondents suggested going directly to the full-time residents through meetings in the fall or spring when the more permanent population is present.

Most respondents also reiterated the importance of public spaces such as grocery stores or community halls that everyone uses to post meeting notices and distribute information. Cottage owners are far more likely to go to a local restaurant or convenience store than a government office.

4.2 Key informant interviews

For this research, the key informants are defined as stakeholders who have a professional role or responsibility to communicate directly or indirectly with the public about coastal erosion and/or climate change. Key informants included representatives of federal government agencies, such as Geological Survey of Canada; provincial government departments; as well as environmental organizations like Clean Nova Scotia, and the Southern Gulf of St. Lawrence Coalition on Sustainability. Other key informants included industry representatives such as a contractor, real estate agent, and landscaper.

Twenty-two key (22) informants were interviewed for this study between December 2010 and February 2011. Most of these interviews were done in person; however, a few key informants were contacted by telephone. A full list of key informants and their affiliation can be found in Appendix B of this report.

The key informant interviews did not rely on a specific questionnaire for the key information interviews. However, when interviewing representatives of government departments, a series of guide questions were used which are included in Appendix D of this report.

The following sub-sections present key informant responses that have been grouped by best fit with a particular guide question. Each subsection heading reflects the theme of the question asked. The responses are not direct quotes; nonetheless they reflect the ideas and themes that emerged during that portion of the interview.

4.2.1 What is your department's role in communicating with the public about erosion?

This question captured thoughts about how, when, and on what topics the public communicates with the public on coastal erosion issues.

The two provincial government departments that have a direct role in talking to the public about coastal erosion are Fisheries and Aquaculture, through the Provincial Oceans Network (PON), and the Department of Natural Resources (DNR).

PON staff are in contact with the public about coastal matters, including erosion. They also get emails or calls forwarded from other departments. PON does not have any information specifically about coastal erosion, but can refer people to a fact sheet, which includes topics such as sensitive coastal ecosystems and habitats, and sea level rise and climate change impacts. (www.gov.ns.ca/coast)

Department of Natural Resources regional offices issue permits for shoreline alteration, including construction of sea walls or placing of boulders. A permit is required if the construction or alteration is below the ordinary high water mark. A permit is also required if an excavator or other heavy equipment needs to cross the beach in order to do the work. Most of the time, contractors contact the DNR office directly since they own and operate the vehicles that require permits. The regional offices do not have any information about erosion to distribute to the public or contractors, although there is a link on the DNR website to a document entitled *Before You Build A Wharf Or Do Other Work On The Shores of Your Coastal Waterfront Property*. http://www.gov.ns.ca/natr/land/policybeforeyoubuild.htm. This link explains how to apply for a permit for bank stabilization work in Nova Scotia.

The Mineral Services Branch at DNR delivers presentations on coastal geohazards at public events and meetings when invited to do so. They have a PowerPoint presentation, which includes explanations of many geological phenomena including coastal erosion.

This division is also responsible for mapping coastal erosion and coastal change in Nova Scotia. The extent of shoreline mapping in Nova Scotia has greatly increased in recent years, including large portions of Antigonish and Cumberland counties. However, the first step in coastal mapping is developing accurate baseline maps. Only then can trends in shoreline change, including coastal erosion rates, be also accurately mapped. Therefore, there is generally not any available information for the public about rates of coastal change on their property or community.

Some government departments, including municipal and provincial Emergency Measures Organizations, and Transportation and Infrastructure Renewal say they occasionally hear from members of the public who have experienced property loss or damage and are looking for assistance in repairing the damage. The provincial Emergency Measures Organization's website has information about what kind of damage is eligible for federal disaster relief funds, which in some cases can include damage from storm surges.

The Geological Survey of Canada has online information on shoreline erosion and a downloadable PDF computer file called "Understanding Shoreline Change" which is also available in hard copy. They feel that, in the past, making sure information is distributed effectively has been a problem, since many publications remain unused or unread in government offices.

Generally, provincial government staff feel they only hear from the public after they have experienced loss or damage related to erosion. It is rare they are contacted by anyone wanting to know how to prevent or minimize damage. The communication is usually reactive, since the departments do not have a clear communication strategy or much information material to deliver to the public about coastal erosion. It should be noted that both Nova Scotia Environment, through its Climate Change Action Plan, and Fisheries and Aquaculture, through its Coastal Management Framework, have goals related to increasing public understanding about coastal issues and climate change.

There is a general consensus that it is difficult and frustrating for the public to locate information about coastal erosion from the province of Nova Scotia, as well as any advice on how to manage erosion. Most of the time, the public has had to search diligently to find the appropriate person or department and are then told there is little information or resources available.

4.2.2 How does your municipality communicate about coastal erosion?

This question refers both to how municipalities communicate with the public about erosion, as well as how municipalities receive information about coastal erosion.

Many of the coastal property owners currently affected by erosion are summer cottage owners. Summer cottagers are difficult to reach with information and challenging to engage. They are not generally at their cottages during the week during business hours. Many pay property taxes via the mail and do not visit municipal offices, which are generally not located in cottage communities.

Municipalities do not regulate the construction of shoreline erosion control structures, although they can control land use and development. Municipal staff feel that coastal property owners act as though it is better to ask forgiveness than permission since government officials are usually informed after the fact about activities like moving a cottage away from an eroding shore, which technically requires a municipal permit.

The municipalities along the Northumberland Strait do not provide any information for potential homebuyers or home builders about coastal erosion or general tips for living by the coast.

Most municipal staff have little access to information about best practices for living in coastal areas and managing erosion. Planners receive professional development and training from workshops or meetings organized by the Atlantic Institute of Planners.

Climate change is a growing theme at these sessions, but specific information on dealing with erosion is scarce to date.

Elected officials receive information through events organized by the Union of Nova Scotia Municipalities during its AGM or other meetings. The UNSM receives general direction on important topics from its members on topics that might merit an information session from its membership. The UNSM staff can only introduce potential new topics at the request of membership, and so far coastal erosion has not merited a special session (although climate change is increasingly an important topic).

Service Nova Scotia and Municipal Relations is preparing templates and resource packages to help municipalities prepare Integrated Community Sustainability Plans. The next round of Integrated Community Sustainability Plans is focused on climate change adaptation and will be completed by 2014. Coastal erosion is a topic covered in the background information section as a climate change impact that municipalities should take into account. The background information will provide some information about coastal erosion monitoring, and the types of measures including land use practices that can reduce risks of erosion. The ICSP kits will be distributed to all municipalities in the spring of 2011.

The Atlantic Climate Adaptation Solutions project is a federally funded multi-partner collaboration to develop model adaptation policies in selected Atlantic Canada communities. Each pilot site involves one or more municipal partners that receive access to research generated as part of this collaborative project. In some sites along the Northumberland Strait, such as the Cumberland isthmus which separates the Northumberland Strait and the Bay of Fundy, shoreline change data is being collected and mapped. The municipalities of Cumberland County and Colchester County are partners in this project which will provide essential information about areas most at risk from coastal erosion or storm surge damage.

4.2.3 How does industry communicate about coastal erosion?

This section groups together observations from the real estate industry, contractors, and landscapers about how their industries communicate about coastal erosion.

A clear theme from these interviews is that real estate agents buying and selling coastal property, and contractors who design and build erosion control structures, are key sources of information for the public.

Real estate agents are by default the go-to people for newcomers and potential homebuyers. They answer questions about the area, promote the attractions of owning a coastal home or property, and provide advice to potential homeowners. Real estate agents also refer new homebuyers to other professional service in the area including lawyers, insurance, and contractors. Local real estate agents are very aware of the condition of properties and buildings as well as market trends.

There are a number of general contractors in the study area, since this term can refer to almost everyone with a license to operate a piece of heavy equipment. Although a number of operators can and will dump rocks or fill in front of a bank, there are only a handful of businesses specializing in bank stabilization or erosion control. These businesses provide advice to coastal property owners on the options for designing and building bank stabilization structures suitable for their own properties. These firms can also install the structures, including drains, reinforcing walls, and regrading and replanting a bank.

Generally, most contractors or contracting firms say they get most of their calls or drop-in visits on summer weekends – usually on a Friday or Sunday evening when out-of-town cottage owners are travelling to or from their cottage. Contractors are the people providing information about coastal regulations and permitting, erosion rates, storms and extreme weather, and how best to prevent property loss. Contractors have people visit their place of business. They also do site visits before and while installing erosion control structures, and can mail out invoices and receipts to their clients.

Most people getting permits for coastal erosion do not talk to DNR directly. The contractors apply for permits since it will be their trucks or vehicles driving on the beach. The contractors do occasionally need permits from DFO when their structures go below the ordinary high water mark.

The training, knowledge, and experience of contractors doing coastal erosion work vary enormously. There is no standard certification course to become a contractor – anyone with the equipment can put up a sign and say they are in business. There are training programs to become eligible for certain types of work. For example, anyone working for the provincial Transportation and Infrastructure Renewal department needs to have taken a certification course. There is also training related to working with wetlands or watercourse alterations. These training sessions are jointly organized by DFO, DNR, and Nova Scotia Environment.

However, there is no training specifically for working in coastal ecosystems or on the subject of best practices related to managing coastal erosion. Nova Scotia does not have a contractors association that provides professional development or information exchanges for those working in the area.

The landscape industry is equally varied. There is a national professional certification program for landscapers, with courses and accreditation. There are a growing number of professionals who can do ecological restoration or use native vegetation suitable for local growing conditions. A few of the larger firms have specialists in landscape engineering who can combine shoreline retaining walls with vegetation – mostly for aesthetic purposes rather than as an alternative form of managing erosion.

However, most property owners who employ people to do “landscaping” are hiring labourers rather than accredited landscapers. These employees generally have no formal training and are actually mostly doing yard maintenance rather than designing vegetated

buffer zones or other ways to minimize shoreline erosion. It is unlikely that most summer cottage owners hire anyone to do yard work, since most lots consist of lawns and shrubs on a very small lawn.

Representatives in the landscape industry do feel that they could benefit from more information on the types of plants they could recommend or use to minimize coastal erosion. They also say that finding sources of native plants is difficult in Nova Scotia; there are few nurseries specializing in native plants, and their supplies are limited and not always available for larger projects or without a special order, which of course increases costs.

The real estate industry has more standardized certification and training for its agents. Most real estate companies in the province are members of the Nova Scotia Association of Realtors. This organization has regular communication with all members on emerging trends in the industry. Realtors are required to take professional development credits every year. Currently, a course on the environmental issues is optional, however, there is ongoing work to update the curriculum and there will be a required course on environmental dimensions of real estate that will count toward full accreditation for realtors. In the past, NSAR has worked with Nova Scotia Environment on courses related to well and septic systems and oil tanks. They are currently negotiating a number of potential trainings including coastal issues.

4.2.4 How do environmental organizations communicate about coastal erosion?

This section encompasses questions about the public communication that environmental organizations are doing about coastal erosion and climate change adaptation.

Nova Scotia Environment supports Clean Nova Scotia's Climate Change Centre as an important vehicle for public awareness and education. There is one staff member at Clean Nova Scotia who focuses on climate change adaptation, and CNS has developed and delivered presentations and other resource materials about climate change adaptation. They have been able to deliver these presentations to local groups in different parts of the province.

Coastal erosion is definitely mentioned in the presentations as one of the impacts associated with climate change. There is no direct information provided about how best to deal with or minimize the impacts of erosion. The staff member said there are many questions about coastal erosion during public presentations and Clean Nova Scotia would appreciate more information about how to address erosion issues.

The Ecology Action Centre similarly does presentations around the province on climate change adaptation in which coastal erosion is frequently mentioned as a climate change impact. The EAC promotes a Coastal Act and strong coastal regulations as well as land use planning as the best strategy for preventing erosion damage. The EAC has two key publications about Nova Scotian beaches: *True Grit: Towards Beach Management in Nova Scotia* and *On the Front Lines: New Strategies for Beach Management in Nova*

Scotia, which talk about policy and land use approaches to managing erosion. (http://www.ecologyaction.ca/content/coastal-issues)

The Southern Gulf of St. Lawrence Coalition on Sustainability is the non-profit organization with the clearest focus on coastal erosion. The SGSCS includes coastal erosion as one of its program areas, and undertakes both coastal erosion monitoring projects as well as education initiatives. The SCGCS is made up of member organizations, such as community and environmental groups as well as research institutions and government departments. Currently, the SGSCS has developed a bilingual brochure about coastal erosion which is available on its website and will be distributed through member groups. The SGSCS also has a PowerPoint presentation specifically on coastal erosion, which explains shoreline change, coastal erosion, climate change, and the impacts of various hard and soft methods of managing erosion.

The SGSCS entered into a contractual relationship with its members, in which community groups will get paid a small amount to organize a community meeting and deliver the erosion presentation in their area. They can choose to deliver a more general presentation or target local decision-makers.

The SGSCS also hosts a Coastal Erosion Working Group. This working group includes community groups from around the region, as well as government and university researchers. The working group exchanges news about erosion related activities including education and outreach activities. There is a link to the working group and some education information about erosion on the SGSGS website.

Many local groups such as the Antigonish Harbour Stewardship Association or Friends of the Pugwash Estuary are concerned about coastal erosion and the proliferation of rock walls and shoreline protection. While they do not generally produce material specifically about coastal erosion, these groups frequently develop brochures or interpretative signage about local coastal ecosystems and watersheds, and organize public events like speakers or panels on topics such as climate change adaptation or watershed management.

4.2.5 Barriers and issues

The key informants were all asked about what they think are the main barriers related to communicating about coastal erosion. The following themes emerged from the discussions.

1. *"Not my mandate"*

The limitation of their mandates was identified by government respondents as an important barrier in delivering information to the public about coastal erosion. All government agencies have a mandate usually driven by a particular Act or business plan. In the case of an association, like the Union of Nova Scotia Municipalities, priorities are governed by the membership. It is extremely difficult for staff of government agencies to get support or approval or resources for anything that is not specifically within their

mandate. As it stands, coastal erosion in general, and communication about coastal erosion in particular is not in any department's mandate.

In Nova Scotia, Fisheries and Aquaculture is the lead department coordinating coastal initiatives. The department hosts the Provincial Oceans Network (PON), which is leading the development of a Sustainable Coastal Development Strategy.
PON is also responsible for achieving objectives within the Coastal Management Framework, which include broad goals of increasing public understanding and stewardship of the coast.

However, while PON (and thus Fisheries and Aquaculture) have a clear coastal mandate, they are not directly issuing permits for any coastal-related activities except for aquaculture, and they do not have direct responsibility for delivering any information or set direction around coastal erosion.

There are no other departments with a mandate that includes either managing or educating about coastal erosion. A few respondents stated that they felt that DNR, which administers Crown Lands, owns coastal properties, has responsibility for coastal mapping, and issues permits for shoreline alteration, might have the clearest mandate for coastal erosion education.

There is a little less ambiguity around communication around climate change adaptation, since Nova Scotia Environment is the lead department on climate change adaptation. This department does have some staff and other education resources for water and solid waste issues. However, most of the resources for adaptation education are directed to Clean Nova Scotia through the Climate Change Centre.

NGOs have more mandate flexibility than government, but they are often limited by funding constraints and limited resources. So while they can freely develop new programs on a small scale they cannot always sustain them or deliver them effectively to a wider audience.

Coastal erosion is a complex topic and one which is potentially controversial. Therefore without a clear mandate to develop and distribute information material about coastal erosion it is unlikely any one department will feel able to step up and take this on.

2. *Coastal erosion: What are we trying to achieve?*

Another key barrier identified by key informants around coastal erosion issues is uncertainty about what message they should be delivering about dealing with erosion to coastal property owners.

The government of Nova Scotia does not have any clear policy direction on whether or not shoreline walls should be encouraged. Nor is it provincial policy that new homes should be build a certain distance from the water's edge. There is not a clear provincial

policy on coastal development or erosion management. This makes it difficult for staff in government departments to provide clear messages to the public on this issue.

This is also a sensitive issue because advising people how to handle erosion touches directly on their private property. People who phone government or NGOs asking questions about erosion want to know how to stop it so they do not lose any more property. In the absence of a government policy framework supporting this position, they are not likely to be receptive to suggestions that trying to stop the erosion is not necessarily the best approach. This is especially true when they routinely see government departments use boulders or other shoreline protection structures to slow erosion on government property.

Since there is no clear policy around managing erosion, government departments are only conveying information about what is permitted and what is not permitted. As long as existing regulations are followed, the installation of shoreline walls is perfectly legal, so municipal and provincial staff do not feel they are able to advise against it.

Furthermore, many people are stuck in situations where there is no other viable option, and the province (and society in general) is not yet ready to accept that some properties cannot be saved.

The private sectors (contractors and realtors) see the situation differently, as they earn their living helping people who live on the coast. They would like the province and municipalities to be clearer about where people can and cannot build, and to have more realistic expectations about what living by the coast is like. Rather than discouraging coastal seawalls, they prefer better information about how to build seawalls properly so they last longer and work more effectively, while also minimizing negative impacts associated with these structures.

3. *Communication gaps*

Many key respondents felt that communication gaps are also a barrier to effective communication about coastal erosion. The different departments and agencies talking to the public about the coast are not speaking to each other very often at the field or local level – nor are they speaking much with private sector representatives. Coastal communication is improving at the provincial level through cooperation between departments working on the Sustainable Coastal Development Strategy and the Atlantic Climate Change Solutions project. All government key informants report that this is leading to much more information sharing between provincial government departments, and with municipalities involved in the ACAS project.

Communication is still irregular at the field level between departments and municipal offices issuing permits for coastal activities, including shoreline walls. It is widely perceived that the interpretation of regulations varies between regional field offices.

Communication is further challenged because people contact government when they already have experienced storm damage. Most agencies can only deal with problems that have already happened: repair roads, help access disaster relief. This makes it challenging to reduce damage or discourage certain types of coastal activities.

The larger, well-established contractors who install shoreline structures on beaches are often in touch with DNR or DFO about permits. They are not receiving any training or information about best practices in managing erosion from the province or from the municipality. The individual operators who dump boulders off banks and onto the beaches do not have regular communication with government departments or municipal government. The onus is on contractors to find training themselves.

4. *Locally relevant communication materials*

Most of the key informants represent institutions that are not developing their own communications materials about coastal erosion. If they are referring people to information material about erosion, they rely on internet resources from other jurisdictions. It is pretty difficult to locate relevant information about coastal erosion that can be applicable to the Northumberland Strait. The existing material is of limited local applicability and too general. There is very little that is specific either to the region or on how to implement some of the recommended approaches. Property owners want to know about the benefits and drawbacks of different methods, and also how to do the work. Key informants feel the information out there is piecemeal and varies enormously. They would like to be able to direct people to a one-stop shopping website or information package that covers all the relevant information, not only about erosion about other coastal issues.

5. *What are the options?*

Part of the reason the communication material about erosion is very general is that there is little knowledge about erosion management options. The default approach is using boulders and rock walls. The only other approaches that most key informants spontaneously mention are vegetation or doing nothing. Only one key informant spoke about other approaches such as living shorelines or offshore bars that are being implemented in other places.

Many key information consider vegetation on its own to be of limited use for managing erosion in the Northumberland Strait. They think that it is difficult to encourage vegetation growth on actively eroding steep banks. They also point out that the natural vegetation has been so altered that most property owners are trying to establish bushes and shrubs that do not naturally grow in this region.

A few key informants had spent time in the United States or Europe where they have observed other strategies for managing erosion. In the United States, offshore bars which might slow wave energy are frequently used as part of erosion management efforts. These types of projects as with other shoreline realignment and habitat restoration

projects are used increasingly in Europe and the United States. Generally, they are not carried out by individual property owners, but part of larger collective approaches to managing erosion.

In Nova Scotia, there are currently no demonstration projects on living shorelines, green shores or other hybrids of hard and soft methods. So no one has any real alternatives on which to base education and awareness campaigns.

6. *People are really attached to their properties*

A shift away from traditional forms of shoreline protection towards alternative methods is a real shift in attitude and practice. Many Northumberland Strait cottages have been in the family for generations and no one wants to lose a cherished place. The fear of losing property is a big motivation in the proliferation of boulders and seawalls. There is little information about other ways of doing things, and cottage owners who only visit their property for a few weeks of the year do not always have the time, knowledge or interest to invest in experimenting with vegetation and other ways to manage erosion..

4.2.6 What works

In this section, key respondents were asked to identify past or current communication strategies that had worked for their department or industry.

- Right after a disaster, people are listening. The images and damage are fresh in their minds. This is the time to give them information that might reduce the risk from erosion or storms in the future. People forget quickly. It makes sense to have material ready to be distributed in the media and online immediately after a major storm.

- Linking planning with emergency preparedness. Documenting and mapping damage so that people get a visual reminder of what happened during a storm. This creates more openness to land use planning bylaws and emergency management plans that might prevent similar disasters in the future.

- Bringing people together through meetings and forums to build local capacity and foster relationships. Communication and education works best when there is a personal relationship. Attending or organizing meetings is more effective than sending out reports or materials.

- Getting the right information into local hands so they can make good decisions. There are various local forums in which decisions can be made or plans implemented. It is usually most effective to make sure these groups have access to maps, information, and technical support so they can develop locally appropriate initiatives.

- Erosion is very real and very visible. Photos of erosion and videos about storm surges can be used as an entry point for talking about climate change adaptation.

- Using existing communications networks such as email lists, e-newsletters, workshops and forums. It is more effective to strengthen existing networks or connect groups to one another than to build a new communication network around a particular topic.

- Giving people really specific information. The dos and the don'ts they can apply immediately.

- Being definitive about what is allowed and not allowed. Many people are relieved when they finally get an answer even if it is not the answer they are hoping for.

- Getting all the information in one place. The current system requires people to call five or six different departments to get information about the coast. A more centralized system works more effectively.

- On-site education and demonstration projects. Nova Scotia could have a number of sites that people can visit to learn about living shoreline and natural coastal processes.

- Making connections to existing local practices. Community support can be built by likening adapting to climate change to existing ways the community works together. One example is when neighbours organize together to plow local roads.

- Making sure local groups have correct information and resources so they can communicate effectively. Providing groups with financial resources to deliver education programs.

- It works to work with keeners – people and municipalities. It does not work to force those who are not ready to try to take action. It's a waste of time and resources.

- People love photos of their local areas and places to which they can relate.

- Displays at local events – markets and fall fairs work really well

4.2.7 What does not work

In this section, key respondents were asked to reflect on past or ongoing communication efforts by their departments or institutions that did not work well. The following points summarize their lessons learned.

- It does not work to produce lots of material with no distribution plan. There has to be a way to make sure it reaches the right people. This does not happen automatically.

- A website or social media presence when there is no capacity to keep it updated regularly. A website can be a great resource for storing a lot of information, but is not particularly engaging if not regularly updated.

- It is difficult to make material equally suitable for a variety of audiences and languages. It's not one size fits all.

- Trying to get people to do the right thing just for environmental reasons. That can be part of it, but it will never be completely convincing.

- People can't find information on government websites. Additionally, government websites have to highlight different topics regularly. A public institution or other group can host a more user friendly accessible website.

- Very technical or academic information does not work. The language needs to be clear and relevant to the audience.

4.2.8 Main messages about coastal erosion.

In this section, key informants were asked what they thought should be the main messages in a coastal erosion communication strategy. Many key informants, whether from government or the private sector, had similar responses.

- Buyer beware! Living too close to the coast might cost you a lot of money. Is your property insurable? Are you eligible for federal emergency relief? Might you not be protected from storm damage? What is your municipality doing on coastal planning? Is it enough?

- There are no guarantees that your bank protection will last. Mother nature is very powerful.

- Erosion is a fact of coastal living. We have to get used to it and other changes. We need to prepare ourselves and our communities to adapt.

- Take the time to explain the processes. Show how a beach becomes a beach, and how it changes naturally over time.

- Provide buyers with the factors to consider when choosing an erosion management strategy.

- We have to let people know about coastal living. They need to become more realistic.

- The need to move away from individual approaches towards collective efforts.
- There should be a buyer's checklist to identify and rate risks.
- The value of natural habitat as a natural buffer.

4.3 Focus group rating of communication material

This section is the result of a focus group discussion held on February 25, 2011 at the Cumberland Curling Club. The focus group was attended by eight key informants representing real estate, contractors, Department of Natural Resources, municipal government and a local stewardship group.

4.3.1 Summary notes

There was agreement on the need for a guide for landowners that is specific to the Northumberland Strait. None of the materials reviewed dealt with erosion of cliffs and high banks where people felt that planting vegetation was not an option.

4.3.2 General concerns

- Every storm is different so what works one time, may not work the next time.
- Peter: "There is no room to migrate, we need to halt erosion with walls." Wants to learn more about impacts of hard structures. Hasn't seen any negative impacts from the wall in Pugwash. Also thinks floating wharfs and structures to slow wave action are very useful.
- Information is out there, but not getting into the right hands. How to get the right info to the people who need it?
- Municipal office gets most of its calls on weekends from temporary residents. How to get the right info to non-permanent landowners?
- Contractors need training. Good to have a list of trained contracts who can do the job right.
- Right now, contractors truck in rock and dump it on the beach in the winter when the ground is frozen. Then, in the spring, they come back to spread the rock (if it hasn't been lost during the winter). This is very expensive ($10,000) and doesn't always work.
- Private landowners don't need permits to alter their land above high water mark. This is a problem because high water mark changes over time.
- Existing landowners are biggest problem. New regulations exist to ensure larger lot sizes now.

4.3.3 General ideas for information material

- Placemats in restaurants with general erosion information.

- Information needs to be reliable (from government). Should be able to get all info from municipal office.
- Sometimes people you get directed to don't have all the right information.
- Need info for sewage and septic systems.
- Good to present both the dos and the don'ts.
- Need to know how different options will impact my land and my neighbours' land.
- Need to be directed to right place, know who to call.
- Provide options for different systems (low banks, high cliffs).
- Info on impacts of options – "If I do this, this will happen."
- Hard to deal with lots that are passed down to family members. Don't have money to make improvements. May not be a priority.
- People want solutions to protect themselves and their valuable land, but there is no guarantee that anything will work. "No guarantee with mother nature."

4.3.4 Individual suggestions for what type of material is needed

- Peter: "How to protect land and maintain it in the state when they bought it."
- Handbook or information package.
- Penny: Info for current landowners and land purchasers to avoid the "Ooops, what did I get myself into" situation. Needs to be sent out as a flyer to every landowner. (general agreement)
- Alice: Content should be easy to read and understand. Point form. Dos and don'ts. Resource list can point you to more in-depth information.
- Chris: Need basic understanding of ecology. Ways to engineer with knowledge forces of nature.
- Mike: Info needs to show that one landowner will impact the others. Regulations should be explained.
- Carol: Seasons are important. What can be done at different times of year?
- Deider: Shoreline is very valuable to people. There are no one-time solutions. It takes a lot of money to maintain.

4.3.5 Material evaluation (ranked)

1. Guide for New Brunswick Waterfront Property Owners (Chaleur Bay Watershed Association)

Average score: 83
Comments: Nice booklet, great-could be made for NS – give out at home shows, great info for current buyer or owner, covers all rules and regulations, variety of issues addressed – could be a series of pamphlets, general – not too specific to erosion, too much covered – somewhat confusing.

2. Southern Gulf of St Lawrence Coalition on Sustainability, PowerPoint presentation

Average score: 82
Comments: Very well put together, easy to deliver, great, relevant pictures, most would understand it.

3. Understanding Nova Scotia's Coastlines (Natural Resources Canada)
   http://gsc.nrcan.gc.ca/org/atlantic/pdf/nscoast_e.pdf

Average score: 81
Comments: Basic, very general, good for basic info on "what to look for" but no solutions for landowners, would love to have to attach when sending permits to landowners.

4. Healthy Beaches and Dunes: A Stewardship Guide for Nova Scotia Landowners (Bird Studies Canada)
   http://www.birdscanada.org/volunteer/nsplover/NSHealthyBeaches.pdf

Average Score: 80
Comments: Good general resource, dealt with single issue, good message, do not agree with all content (i.e. Soft shorelines and no building of docks) – but otherwise very well presented, applies to Nova Scotia.

5. Marine Guide to Preventing Shoreline Erosion (Department of Fisheries and Oceans)
   http://www.ecelaw.ca/information-library/marine-freshwater-and-coastal-areas/publications/735-fact-sheet-marine-guide-to-preventing-shoreline-erosion/view-details.html

Average score: 75
Comments: Small print.

6. What To Look For When Investing In Coastal Land Or Property (UNESCO)
   http://www.unesco.org/csi/pub/source/ero12.htm

Average Score: 72
Comments: Clear, liked the charts, very detailed for the average person, good material that could be adapted to our area, good info for buyer.

7. Coastal Erosion: People living on the Edge (Lake Huron Centre for Coastal Conservation)
   http://lakehuron.ca/index.php?page=coastal-erosion-people-living-on-the-edge

Average Score: 70
Comments: Site specific, just general information.

8. Coastal Erosion Impacts (SGSLCS)

Average Score: 68

Comments: Light reading, concise, bilingual is great, good placemat at local eatery, quick and easy, one sheet.

9. Landscaping a Coastal Bank (Massachusetts Office of Coastal Zone Management)
   http://www.mass.gov/czm/coastal_landscaping/bank.htm#exposedbank

Average Score: 67.5
Comments: Great for small banks but not good for steeper banks, not ideal solution unless everyone is doing the same, limited, basic info – have to search for more info.

10. Common Misconceptions about Beaches (Lake Huron Centre for Coastal Conservation)
    http://lakehuron.ca/uploads/pdf/Beach_conservation_-_common_misconceptions.pdf

Average Score: 66
Comments: Good info, would be more effective to have sources Nos. 8 and 9 (see above) together.

11. Bluff Conservation (Lake Huron Centre for Coastal Conservation)
    http://lakehuron.ca/uploads/pdf/Bluff.conservation-erosion.process.pdf

Average score: 65
Comments: More for lakeshore – but still very good info.

12. Geo-textiles and Fibre Rolls (Environmental Protection Agency)
    http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=45&minmeasure=4

Average Score: 64
Comments: Interesting options, industry focus, doesn't appear to be useful for active coastline with ice and significant wave action – too short-term of a solution, banks too steep and would be hard to hold in place.

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A cottage property that lost four or five feet of land during the December 2010 storms. (Photo courtesy of Marnie Simmons.)

Appendix A: Property owner survey

To say to all participants:

- My name is Jennifer Graham and I work at the Ecology Action Centre. I am conducting research about how property owners are dealing with coastal erosion along the Northumberland Strait.
- This research is funded by the Nova Scotia Environment's Climate Change Directorate through the Climate Change Adaptation Fund.
- This project is a needs assessment to develop information materials and other resources for coastal property owners about coastal erosion.
- The Nova Scotia Department of Environment will receive the final report, and use it to develop new communication materials and resources for climate change adaptation It will also be shared with other provincial government departments, municipalities, and other environmental groups.
- I obtained your name and number from (either property online or contact, or internet searches of coastal properties) while looking for property owners in and around Amherst Shore, (or Heather Beach, Tignish, or Pugwash area), who could potentially contribute to this research.
- I hope you might agree to a telephone interview with questions about changes you are observing along your shoreline and how you are managing coastal erosion, and what information you might want about living with erosion.
- The interview will take approximately 30 minutes. If you consent to this interview, I will make an appointment to interview you at a time that is convenient to you.

Before you agree to participate in the research, I am required to provide you with the following information:

- The survey is completely anonymous. I will not record your name, address, telephone number or any information that could be used to identify you or your household without your consent.
- You can refuse to answer certain questions or stop the interview at any time.
- The completed surveys will be stored for 10 years in a secure location according to federal regulations governing storage of potentially sensitive information. The surveys will be coded in such a way that they cannot be used to identify the respondents.
- A final report will be prepared based on these interviews and other research. The report will be distributed to Nova Scotia Environment and other institutions concerned with coastal erosion and climate change communications. It will also be publicly available, most likely through the Nova Scotia Environment and Ecology Action Centre websites. If you would like to receive a copy of the final report, I will record your contact information to send you a copy.
- If you have any questions or concerns about the research, you may contact Aimee Standon, Privacy Officer at Nova Scotia Environment or Will Green, Climate Change Adaptation Specialist.

Do you give your consent to be interviewed on this study of coastal erosion practices in Northumberland Strait?

Needs assessment survey
Questions for coastal property owners

Section One: General Property Questions

(1) Are you the owner of a coastal property?
(2) In what community and municipality is your property located?
(3) Is your property located on a (Check all that apply)
Bay
Open Shore
Estuary/River mouth
Other

(4) Describe the number and type of buildings and structures on your property.
(5) Is the main residence a cottage or a house?
(6) What distance is the residence from the edge of the sea at normal high tide?
(7) What size is your property?
(8) Does your property include one or more of the following? (Check all that apply)
- Sandy or gravel beach
- Rocky shore
- Sand dunes
- Mudflats
- A cliff
  If so, how high is the drop? What is the cliff made of, and what is the approximate angle?
- A salt marsh or other wetland
- A pond
- Other coastal feature

(9) What lies between the residence and the ocean? (Check all that apply)
- Grass/lawn
- Trees
- Shrubs and wild grass
- Field
- Sand dunes
- road
- driveway
- neighbour's house,
- dyke
- boardwalk or staircase
- other

(10) Describe how you access the water from your property.
(11) I'm trying to get a sense of how decisions are made about property maintenance and repair. Do you mind telling me how many people own this property?

(12) Are the owners
- Family
- Friends

(13) Are other people, such as relatives or spouses involved in decision-making for the property?
(14) How long have you owned this property?
(15) How many months is the residence occupied each year?
(16) Is there anything else you think I should know about your property?

Section Two: Questions about erosion

(17) What do you think causes coastal erosion to happen?
(18) Do you think erosion is currently affecting your property? (Y/ N/ Not sure)
(19) Have any buildings or structures on your property been damaged by erosion?
(20) Have you relocated any buildings or structures on your property because of erosion?

Section 3: Managing erosion

(21) If you think erosion is affecting your property, are you taking any action to deal with it? Y/N/Don't know
(22) If no, why not?
(23) If yes, what kind of methods are you using? (Check all that apply)
- Shoreline wall
- Boulders
- Other shoreline protection structures
- Planting vegetation
- Dune protection
- Other

(24) How long ago did you install the erosion control method?
(25) What are the main goals of your erosion control efforts? (Check all that apply)
- Reduce loss of land
- Prevent buildings from being damaged
- Maintain beach
- Protect wildlife habitat
- Other

(27) Where did you learn about potential options to deal with erosion?
- Neighbours
- Family member
- Contractor
- Landscaper
- Government
- Other

(28) Did you discuss different options to deal with erosion with your neighbours?

(29) What did you consider when deciding which method(s) to use? (Check all that apply)

- Cost
- Effectiveness (how well it will work)
- Durability (how long it will last)
- Familiarity
- Ease of installation
- What the neighbours are doing
- Coastal regulations and permitting

(30) Did you install the erosion control method yourself?
If not, who did the work?
(31) Can you estimate how much you've spend dealing with erosion to date?
(32) How effective do you think your efforts to manage erosion on your property have been? (Check which best fits)

- Very effective
- Somewhat effective
- Not effective at all
- Don't know

Section 4: Perceptions of erosion/change

(33) What was erosion like on your property before you started actively trying to manage it?

How much property did you lose annually?
What time of year did you notice it most?
What happened after winter storms?
Was there a big event like a hurricane that had a dramatic effect?

(34) What changes have you noticed since you installed erosion control methods?

Has the location and kind of erosion changed?
Has the rate of erosion changed?
Have you noticed changes on the beach or shore near your property?
Are you still losing property?

(35) What are your future plans for dealing with erosion on your property?

Section 5: Erosion control trends in the community

(36) What are the most common methods of dealing with erosion in your community?
(37) Have you noticed any changes in the way people in your community deal with erosion?
(38) Have you noticed any of the following impacts sometimes associated with using erosion control structures? (Check all that apply)

- Less wildlife (fish, shorebirds)
- Harder to get to or get in the water
- Less natural looking shoreline

- Beach is narrower than it used to be
- Less sand on beach
- Other

(39) One aspect of this research is to get a better understanding of whether coastal property owners might consider trying to manage erosion by using vegetation rather than boulders and shoreline walls. Have you ever considered planting trees or other vegetation to manage erosion on your property? (Y/N/Don't know)

(40) If you are using vegetation to manage erosion, what made you decide to do so? (Check all that apply)

- Cost
- Want natural looking shoreline
- Concerned about impacts of erosion control structures or boulders on beach
- Want to preserve wildlife
- Other

(40) If not, what made you decide not try using vegetation to mange erosion? (Check all that apply)

- Do not know enough about what works
- Did not think it would work
- Needed a quick solution
- Family or co-owners did not want to use vegetation
- Did not want to be only person in the community using vegetation
- Could not find a contractor or landscape who knew how
- Other

Section 6: Climate change questions

(41) Do you think climate change is having/will have an impact on the coast in your area? Y /N/ Don't know
(42) How do you think climate change will affect erosion rates?
(43) What (if anything) are you doing to prepare for climate change impacts on your property?

Section 7: Property owners values and perspectives

(44) What do you value most about your coastal property? (Choose top three?)

- View
- Natural setting
- Wildlife and shorebirds
- Access to beach and water
- Recreational opportunities (swimming, boating etc.)
- Out-of-town get away

- Place for family to be together
- Neighbours and community
- Income property

The following statements are intended to get your perspective on different ways of thinking about how to manage coastal erosion at a community level. I am looking for your reaction to a series of statements.

"If my residence is physically threatened by erosion, I would consider relocating it elsewhere on the property, if I thought it would extend the length of time I could continue to enjoy it

- Strongly agree
- Somewhat agree
- Slightly disagree
- Strongly Disagree

Please explain your response.

(45) "I would not mind losing some of my own property to erosion if I knew that overall the beach and coastal waters where healthier"

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly Disagree

Please explain your response.

(47) "I would consider using vegetation to manage erosion if I thought it could be as effective at slowing erosion on my property"

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

Please explain your response.

(48) "I think neighours should work together to figure out how best to deal with erosion in their shore"

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

Please explain your response.

(49) "I would consider not using boulders or shoreline walls to manage erosion if others stopped using them as well"

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

(50) "I accept that coastal erosion is a natural phenomena and part of the experience of living near the coast"

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

Please explain your response.

(51) "I would support land use regulations that ensure that new houses or cottages must be build a certain distance from the sea"

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

Please explain your response.

Section 8: Information needs

(52) Have you ever received any information about erosion from the municipality, government or other institution or organization? Y / N/Don't know
If so, from whom and in what form (e.g., pamphlet, newsletter)?

(53) Have you ever looked up coastal erosion information (e.g. read a book or brochure, looked on the internet, talked to a specialist)?

(54) Are you interested in receiving information about the following topics (yes/no)

- General information about coastal erosion
- Information about different methods of dealing with erosion
- "How to guides" on "using vegetation to manage erosion"
- A list resources and expertise in your area
- Information about coastal climate change impacts and adaptation
- Other

(55) What topics (or topics) would be a priority for you? Pick three.
(56) Would you like to receive information about managing coastal erosion?

- Newspaper
- Radio

- Brochures distributed to all households
- Community meeting
- Website
- Displays in public places
- Presentations
- Private consultation

What would be your top three ways to get information?

(57) Would you attend a meeting or workshop in your community on managing with erosion? Y / N/ Maybe
(58) What would be the best way to invite you or your neighbours to such a workshop?
(59) How much would you be willing to pay for a community workshop on managing erosion?
(60) How much would you be willing to pay for a private consultation?
(61) That is the end of my questions for you. Is there anything else you would like to say?
(62) Do you have any questions for me?

At the end of survey ask them,

- Another part of this survey involves a focus group discussion reviewing different education materials about coastal erosion. The focus group will take place in late January somewhere in your area. Would you be interested in being contacted and asked to participate in the survey?
- Are you interested in receiving a copy of the final report?
- Electronically? If so, may I record you contact information?
- Interested in information from EAC?
- Thank you
- You can contact me at: coastal@ecologyaction.ca or 442-5046 to learn more about this research or coastal issues in Nova Scotia.

Appendix B: Key informants

Environmental non-governmental organizations interviewed

- Chantal Gauthier, Southern Gulf of Saint Lawrence Coalition on Sustainability
- Julie Whalen, Southern Gulf of Saint Lawrence Coalition on Sustainability
- Tom MacDonald, Clean Nova Scotia
- Heather Mayhew, Antigonish Harbour Watershed Association
- Alice Power, Friends of Pugwash Estuary

Municipal government

- Penny Hennerty, Planner, Municipality of Cumberland County
- Jim Hannon, Municipal Emergency Measures Organization (EMO), Municipality of Cumberland County
- Crawford MacPherson, Director of Planning, Municipality of Cumberland County
- Debbie Nielson, Sustainability Coordinator, Union of Nova Scotia Municipalities

Provincial Government

- Justin Huston, Fisheries and Aquaculture
- Adam Rostis, EMO
- Garth Demont and Ian Nailor, DNR – Mineral Resources Division
- Ian McCullough and Bob Pett, Transportation and Infrastructure Renewal
- Graham Fischer and Andrew Paton, Service Nova Scotia and Municipal Relations
- Will Green and Kyla Milne, Nova Scotia Environment Climate Change Division
- Mike McDonald, DNR – Oxford office

Federal

- Bob Taylor, Geological Survey of Canada

Industry

- Christine Keilor, Education Coordinator, Nova Scotia Association of Realtors
- Peter Finlay, Mystic Coast Realty
- Janet Coulter, Coulter Contracting
- Bill Adams, Insurance Bureau of Canada

Appendix C: Focus group for rating communication materials

- Mike MacDonald, Department of Natural Resources, Oxford
- Alice Power, Friends of Pugwash Estuary
- Chris Wild, Coastal Landowner
- Penny Hennerby, Planner, Municipality of Cumberland County
- Peter Finlay, Mystic Coast Realty
- Jim Hannon, Municipal EMO, Municipality of Cumberland County
- Jane Coulter, Contractor