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Basin Head Marine Protected Area: 2014 Operational Management Plan

Fisheries and Oceans Canada, Gulf Region
343 Université Avenue, P.O. Box 5030
Moncton, NB, E1C 9B6

2016

Basin Head Management Series 2016/01



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Basin Head Management Series

The Basin Head Management Series of publications are reports on management initiatives and monitoring undertaken in the Basin Head Marine Protected Area in the Gulf Region. This series consist of monitoring progress reports, operational management plans, consultant reports, scientific studies, workshops and other public documents related to the Basin Head Marine Protected Area. The Basin Head Management Series was established in 2014. Reports in this series have been written by or prepared under the guidance of staff of the Department of Fisheries and Oceans - Gulf Region. The content of this series is meant as a source of information for public and internal dissemination.

Série sur la gestion de Basin Head

La série de publications sur la gestion de Basin Head regroupe des rapports au sujet d'initiatives de gestion et de monitoring entreprit dans la zone de protection marine de Basin Head dans la région du Golfe. Cette série se compose principalement de rapport de progrès sur le monitoring effectué à Basin Head, plans de gestion opérationnel, d'études scientifiques, de rapports de consultants, d'ateliers et d'autres documents publics reliés à la zone de protection marine de Basin Head. La série sur la gestion de Basin Head a été créée en 2014. Ces rapports ont été rédigés par le personnel du Ministère de Pêches et Océans – dans la Région du Golfe ou ont été préparés sous la direction de ceux-ci. Le contenu de cette série se veut une source d'information pour une diffusion publique et interne.



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2014 OPERATIONAL MANAGEMENT PLAN

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ABSTRACT

The Operational Management Plan (OMP) of the Basin Head Marine Protected Area (MPA), Prince Edward Island, is to be revised every 5 years. The previous Operational Management Plan dates from 2009. Since then, research efforts have been focused on understanding the major reasons for the decline of Irish moss (*Chondrus crispus*) in the MPA and undertaking management actions to reduce this decline. In 2008, an ecological assessment of the Irish moss in Basin Head, completed through the Canadian Science Advisory Secretariat (CSAS), considered that the invasion of the green crab, cumulative effect of nutrients input in the basin and poor water quality were important factors contributing to the decline of Irish moss in Basin Head. Following the CSAS review, a departmental science and oceans workshop for Basin Head was held in December 2011 to share new data and information acquired since 2008 and to guide the review of Basin Head OMP. This 2014 OMP is a follow-up from the first plan which updates the management actions, and addresses the unforeseen challenge of one of the objectives of the MPA which is to conserve and protect a unique form of Irish moss (*Chondrus crispus*) in Basin Head.

RÉSUMÉ

Le plan de gestion opérationnel de la zone de protection marine (ZPM) de Basin Head est révisé tous les 5 ans. Le dernier plan de gestion opérationnel date de 2009. Depuis, de nombreux efforts ont été mis en place pour mieux comprendre les raisons principales pour lesquelles un déclin important de la mousse d'Irlande a eu lieu à Basin Head et des mesures de gestion ont été entreprises pour réduire son déclin. Une évaluation écologique de la mousse d'Irlande à Basin Head a été réalisée dans le cadre du Secrétariat Canadien de Consultation Scientifique (SCCS) en 2008 et a souligné l'invasion du crabe vert, l'effet cumulatif de nutriments dans le bassin ainsi que la mauvaise qualité de l'eau comme étant les facteurs principaux contribuant aux déclins de la mousse à Basin Head. Suivant la consultation scientifique, un atelier sur Basin Head regroupant le secteur des océans et des sciences a eu lieu en décembre 2011. Cet atelier avait pour but de partager les nouvelles données et information recueillies depuis 2008 et guider la mise à jour du plan de gestion opérationnel de Basin Head. Le plan de gestion opérationnel 2014 est donc un suivi du premier plan qui met à jour les mesures de gestion et adresse le défi imprévu d'un des objectifs initiaux de la ZPM, soit de conserver et protéger la forme unique de la mousse d'Irlande (*Chondrus crispus*) de Basin Head.

PREFACE

The Basin Head Marine Protected Area (MPA) (Figure 1) was designated on September 26, 2005. The purpose of this MPA is to conserve and protect a unique form of Irish moss (*Chondrus crispus*) that may exist only within the boundaries of Basin Head. To achieve this, it is necessary first to conserve and protect the marine environment supporting this unique marine plant form. The MPA designation of Basin Head represented the successful culmination of several years' work by the Basin Head Lagoon Ecosystem Conservation Committee (BHLECC).

Although it was a much anticipated event, the designation of the Basin Head MPA was the starting point for the regulatory management of the area. The Basin Head MPA Advisory Board; with representation from the Department of Fisheries and Oceans (DFO), provincial departments of Prince Edward Island (PEI), PEI Museum and Heritage Foundation, Eastern Kings Community Council, environmental non-government organization (ENGOS), conservation groups, academia, the Aboriginal community, and the fishing and agriculture industries; was formed to provide advice and recommendations to DFO on the management and monitoring of the Basin Head MPA.



Figure 1: Aerial view of the Basin Head lagoon (photo credit: Bob Semple).

This version of the Basin Head MPA Operational Management Plan (OMP) is an update to the 2009 OMP (DFO 2009a), which it replaces, and respects the commitment to a five year renewal cycle. The 2009 Basin Head MPA OMP was developed with input from local stakeholders using scientific data and background information. This version provides updates on the monitoring plan, management actions, and addresses the decline in the population of the Basin Head Irish moss. It follows closely a DFO Science and Oceans Workshop held in Moncton on December 5-6, 2011, where scientific results were presented and information exchanged and discussed amongst twenty-one participants including DFO scientists, technicians and managers; Basin Head MPA Advisory Board; PEI Mi'kmaq Confederacy and the Souris & Area Branch of the PEI Wildlife Federation. The workshop served three purposes:

- 
- 1) to share new data and information acquired since 2008;
 - 2) to better understand the ecology and dynamics of Basin Head and the reasons for the steep decline of *Chondrus crispus* and;
 - 3) to guide the review of the Basin Head OMP.

The Basin Head MPA OMP is a “living” document which is to be amended as required or renewed on five year cycles to ensure current management and monitoring objectives are met.

The major issue within the Basin Head MPA since its designation has been the substantial decline of Irish moss (*Chondrus crispus*) biomass, estimated in 2011 at less than 1% of its historic biomass. As early as 2005, monitoring in Basin Head indicated a change in the abundance and condition of this distinctive seaweed. This decline has been presented as the principal challenge to achieving the regulatory conservation objectives. A Canadian Science Advisory Secretariat (CSAS) review was conducted in November 2008. The purpose of the review was to undertake an ecological assessment of the Irish moss in Basin Head. The review conclusions identified the recent invasion of green crab and its intensive predation on blue mussels, which anchor the moss, as an important stressor on the Irish moss population. It is thought that the decrease of Irish moss in the Basin Head ecosystem is attributable to this stressor (DFO 2009b). The cumulative effects of nutrient input into the basin with subsequent annual green algal blooms and poor water quality were also considered to be contributory factors to the sub-optimal conditions for the Irish moss (DFO 2009b).

Since 2011, efforts have been directed at better understanding the causes and, where possible, direct measures were taken to reverse the declining trend of the Irish moss (e.g. green crab removal study). In the spring of 2013 after receiving recommendations from the Director General of Ecosystems Management in Ottawa, it was decided that efforts be concentrated on the established ongoing monitoring efforts in Basin Head which include: an annual survey of the population of Irish moss, annual water quality monitoring, the Community Aquatic Monitoring Program (CAMP) and the cultivation of the unique strain of Irish moss phenotype at the National Research Council facility in Nova Scotia. Fisheries and Oceans Canada has also received \$3.9 million per year in ongoing funding to ensure Marine Protected Areas are effectively managed and monitored. On May 15, 2014, the Government of Canada announced \$37 million over five years to strengthen marine and coastal conservation through the National Conservation Plan (NCP). As such, a dedicated research program was started in 2014 to look deeper into the moss decline. This included sampling and surveys of the moss beds, along with some experimental approaches to provide holding surfaces for the moss. A progress report on this research program is anticipated for completion in 2015. No major changes are thought necessary at this time to the regulatory conservation objectives as stated in the 2009 OMP, nor to the general direction of corresponding management actions (i.e. protection and monitoring).

1.0 INTRODUCTION

Basin Head is located near the eastern tip of Prince Edward Island, approximately 100 km east of Charlottetown, between the town of Souris and the community of East Point (Figure 2). Basin Head harbour is a small estuarine lagoon surrounded by agricultural land to the north and by an extensive sand dune system to the south. The Basin Head ecosystem is inhabited by a rich diversity of organisms including marine plants, invertebrates, fish, mammals and birds. Most notable to the area is a unique form of Irish moss (*Chondrus crispus*), a marine alga, which has a life cycle and natural habitat documented at Basin Head, but believed to found nowhere else in the world.

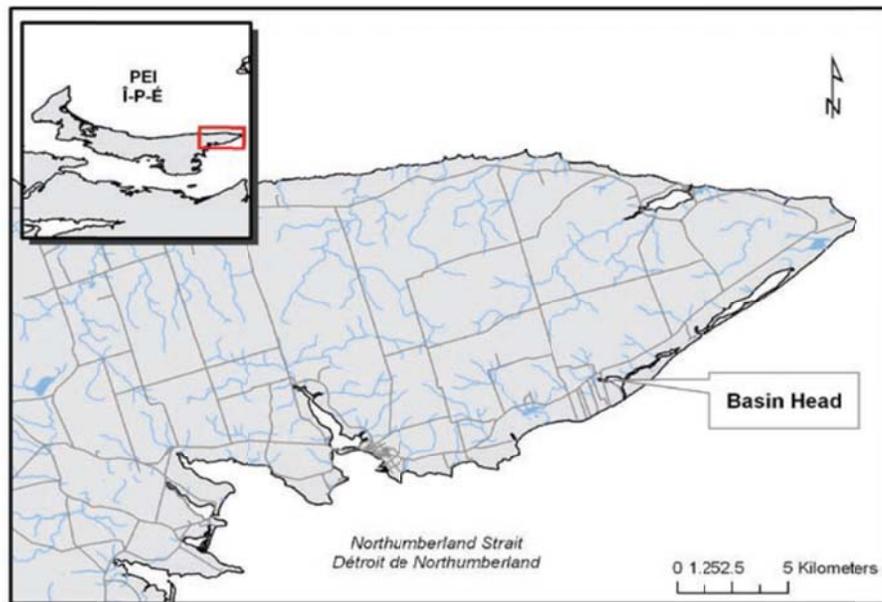


Figure 2: Location of Basin Head PEI.

The Basin Head Marine Protected Area (MPA) has been established under the statutory authority of the *Oceans Act*. The rationale and purpose of the MPA is the protection and conservation of the unique strain of Irish moss and its habitat.

This Operational Management Plan (OMP) establishes the monitoring protocols and governance arrangements for regulatory compliance of activities within the Basin Head MPA. It describes how the MPA is to be managed for the short and long-term, and how the state of the MPA will be measured and reported; and allows for necessary management actions. By clearly establishing roles and responsibilities, and by using necessary feedback and reporting loops that incorporate an adaptive management approach, it will be possible to ascertain whether, or to what extent, management actions have achieved the conservation objectives. Furthermore, this plan addresses the monitoring program that will be used to follow the trend of the overall health of the ecosystem. All monitoring activities will incorporate collaborative and community-based approaches.

This is a “living” plan, with its review scheduled every five years; however; it may be amended at any time upon the advice of the Basin Head MPA Advisory Board using the results of the scientific and monitoring programs.

1.1 Operational Management Plan Framework

The Basin Head MPA Regulations constitute the starting point to understand what activities can and cannot occur within the zones of the MPA. From an operational standpoint, this Plan is not intended to be prescriptive in the manner of the Regulations, but rather provides additional guidance relating to the interpretation of the MPA Regulations to stakeholders and users of the MPA in order to meet the MPA objectives. Thus, this Management Plan is an operational tool to guide DFO, the Basin Head MPA Advisory Board and other stakeholders in managing the various activities within the MPA. It also provides guidance on management actions that may be necessary to ensure the objectives of the Basin Head MPA are being met. The Operational Management Plan for the Basin Head MPA includes details on:

- the regulations that apply within the MPA;
- a description of the regulatory and non-regulatory conservation objectives;
- a description of the permitted activities within the boundaries (compliance with the regulations);
- interpretation of the zoning scheme within the Basin Head MPA; and
- a description of the governance structure.

1.2 Format of the Operational Management Plan

The OMP outlines the framework for the management of the Basin Head MPA to assist managers in achieving the conservation objectives. The Plan is comprised of distinct sections, including background information, the management framework, governance, enforcement and education. It also states the conservation objectives established for the Basin Head MPA through the collaborative effort of DFO and the Basin Head MPA Advisory Board.

2.0 BACKGROUND

2.1 Description of Basin Head MPA

The Basin Head MPA covers an area of 923 hectares, which includes an outer coastal area. The estuary itself is approximately 5 km in length and covers 60 hectares. It is comprised of an entrance channel, a lagoon, and a long narrow channel that extends eastward parallel to the coast, behind a protective dune system (Figure 3). The deeper section of the basin is about 0.5 km in across and is attached to a shallower channel (arm) about 3 km long and up to 200 m wide. The unique strain of Irish moss is found only within this channel. Sandy substrate dominates in the centre of the channel and eelgrass fringes the shallows. The mouth of the lagoon and the first 100 m of the entrance channel are highly energetic, with tidal current speeds reaching 2 knots or more.

Estuaries are partially enclosed coastal bodies of water where ocean water and fresh water mix. Salt marshes are characterized by salt-tolerant grasses, with an extensive shallow rhizome (root) system that trap and stabilize the soft sediment. Estuaries rank as one of the most productive ecosystems on earth, and marshes are referred to as the life-support system, generating vital functions. Estuarine lagoons, such as Basin Head, are more sensitive than open mouthed estuaries due to the vulnerability of single narrow openings that create the saline environment and are more subject to sedimentation due to the lower flushing rates. Estuaries and associated salt marsh communities play an

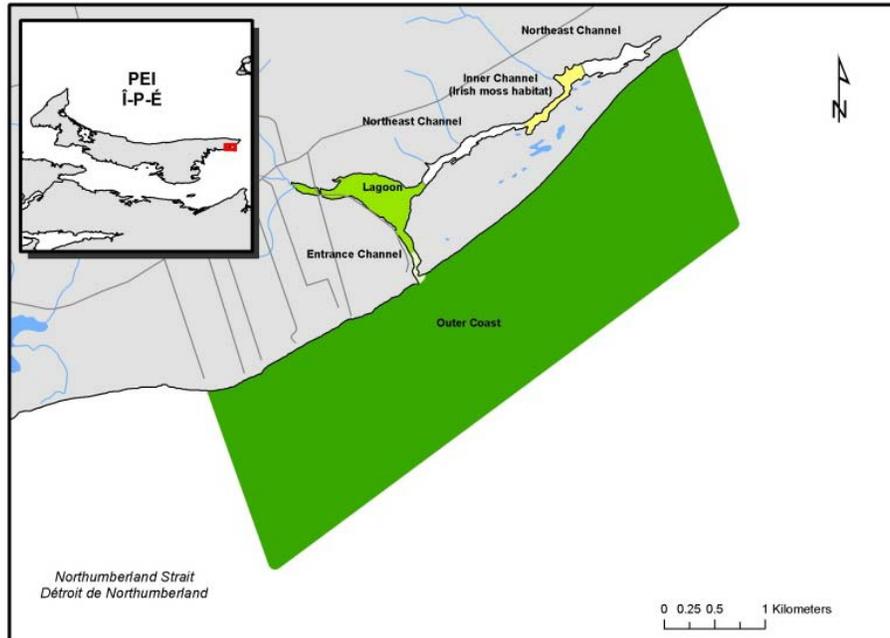


Figure 3: Basin Head Marine Protected Area.

important role in the functioning and integrity of the coastal waters of Prince Edward Island.

The Basin Head lagoon watershed is relatively small (approximately 1,750 hectares, including the sand dune), with several streams entering the north face of the lagoon. The south side of the lagoon is bordered by a fragile sand dune system (320 hectares) measuring between 0.5 and 1 km in width. The large dune complex is fronted, on the ocean side, by an extensive beach (locally known as Singing Sands) (Figure 4). The Northumberland Strait bottom adjacent to the beach is shallow and sandy. Land use in the Basin Head watershed is primarily agricultural at 53% (800 hectares) dominated by potato farming and forested at 31.5% - (477 hectares) with limited residential and commercial development at 11% (160 hectares). These land use data are provided from the PEI Department of Agriculture & Forestry: Forest, Fish & Wildlife Division from the most recent ortho survey that was completed in 2010.

The area surrounding the Basin Head lagoon is best characterized as rural agrarian. There is a strong association with renewable natural resource harvesting (fisheries) and agriculture. The area hosts a provincial fisheries museum, provincial park and a provincial campground which is adjacent to the MPA. The Singing Sands beach at the foreshore of the area draws visitors from within and from outside of PEI. An audit of human use of the area is available in the document titled *Community Use of the Basin Head Lagoon, Prince Edward Island* (2001) prepared for the Basin Head Lagoon Ecosystem Conservation Committee by the Island Nature Trust. No major changes are known to have occurred in land use since publication.



Figure 4: Aerial view of the Basin Head channel and sand dune (photo credit: Perry Williams).

2.2 Rationale for Designation

Section 35 of the *Oceans Act* authorizes the Governor in Council to designate, by regulation, MPAs for one or more of the following reasons:

- a) the conservation and protection of commercial and non-commercial fishery resources, including marine mammals and their habitats;
- b) the conservation and protection of endangered or threatened marine species and their habitats;
- c) the conservation and protection of unique habitats;
- d) the conservation and protection of marine areas of high biodiversity or biological productivity; and
- e) the conservation and protection of any other marine resource or habitat as is necessary to fulfil the mandate of the Minister.

The Basin Head MPA meets the criteria set out in paragraphs 35(1) (c) and (e) above. The criteria in paragraph 35 (1) (c) are met because of the existence of a unique form of floating Irish moss (*Chondrus crispus*) (Figure 5). The form of Irish moss has a life cycle and natural habitat limited to this ecosystem. The criteria in paragraph 35 (1) (e) are met because the Basin Head MPA formally designates the waters in the Basin Head area as an MPA under the *Oceans Act*.

Furthermore, the Basin Head harbour has long been recognized as unique by area residents. It was not until the 1960s that researchers discovered the unique form of Irish moss at Basin Head. Since then, several options were explored to protect and conserve Basin Head. Among them was a discussion of creating a National Park in the late 1960s. Some coastal lands were protected under the provincial *Recreational Development Act* in the late 1970s. The Basin Head Fisheries Museum, which interprets the natural area and related fisheries activities, was opened in 1973. In 1974, Basin Head was recognized as an area worth protecting in a report entitled “*Ecological Reserves in the Maritimes*” (Canadian Committee for the International Biological Program, 1974). It was also included on a list of sites for the Provincial Significant

Environmental Areas Program in 1991. Between 1995 and 1997, ninety-six (96) hectares of the sand dunes surrounding Basin Head were protected under the provincial statutory authority of the *Natural Areas Protection Act*. In 1999, the Basin Head Lagoon Ecosystem Conservation Committee formed and submitted a proposal to DFO to consider Basin Head as a potential MPA under the *Oceans Act*. The proposal was realised in 2005. In November 2007, the Province of PEI entered into an agreement with the Nature Conservancy of Canada (NCC) to secure and protect an extra 57.5 hectares of beach at Basin Head. In 2010, this land along with an additional 35.6 ha has now been identified under the province's *Natural Areas Protection Act*, giving a total of 189 ha protected.

In order to understand the Basin Head ecosystem, marine plant research scientists have been gathering data on the biological and physical characteristics of the lagoon as early as 1979 (McCurdy, 1979; McCurdy, 1980; Sharp et al, 2003). Irish moss normally has a life cycle with 3 phases; male, female and a spore-producing (tetrasporophyte) phase. All phases are similar in size and shape. The primary mode of reproduction is by the sexual production of spores that form small plants, which attach to a substrate. The second and usually minor process is vegetative or non-sexual, where parts of the plant break off and attach to a hard substrate. The form of Irish moss in Basin Head is found primarily in the non-sexual reproductive stage, reproducing by fragmentation. It is



Figure 5: Basin Head Irish moss (photo credit: Delephina Keen).

significantly larger than the normal plant, and is not attached to the bottom by a holdfast but instead is held in place by the blue mussels that attach to the moss by their byssal threads (the manner in which mussels attach to substrates or objects) (Figure 6). The blue mussels serve as anchors so the moss is resilient to the effects of tidal action and currents. The “free floating” Irish moss is found only in the narrow channel behind the dune complex (Figure 3). As of 2009, this species declined to 2.6% of the total basin area. Since then, the Irish moss has been reduced still further (to approximately 1% of its historic biomass by 2011). The narrow channel is well flushed, with currents reaching 1 to 1.5 knots in minimum water depths of 40 cm.

Investigators also discovered a new plant form of knotted wrack (*Ascophyllum nodosum*). When fragments of knotted wrack become entangled in marsh grass (*Spartina alterniflora*) it loses its regular form and floats, but continues to grow entwined in the lower parts of the grass, a form of plant not seen before in this region. Sea lettuce (*Ulva latuca*) is the dominant plant in the upper reaches of the northeast channel. Eelgrass (*Zostera marina*) is mostly found in the lagoon and the outer reaches of the northeast channel. These marine algae and plants provide a diverse and complex structure that support high levels of productivity and maintain high biodiversity in this small lagoon.

2.3 Consultations

Prior to and after the announcement in 1999 that Basin Head was being considered as an Area of Interest (AOI) for a new Marine Protected Area under the *Oceans Act*, there was strong local support for designation of Basin Head as a MPA. Six public meetings were held in the Basin Head area (one in 1998, two in 1999, one in 2000, one in 2001 and one in June 2002). During these public meetings, presentations outlined on-going research, proposed management objectives and proposed regulations.

To facilitate the consultative process the Basin Head Lagoon Ecosystem Conservation Committee (BHLECC) was established in 1999. The committee consisted of



Figure 6: An Irish moss clump in Basin Head. The Irish moss appears dark brown. The bright green plant is ulva (photo credit: David Cairns).

representatives from various stakeholder groups (landowners, local economic interests, DFO, and the PEI Department of Environment, Energy and Forestry). Since 2005, the BHLECC is no longer active, and its local role in stewardship of the MPA has been taken over by the Basin Head MPA Advisory Board.

The former PEI Department of Environment, Energy and Forestry (now Department of Agriculture and Forestry) was involved in the planning and consultation process since Basin Head was announced as an AOI. Meetings held with provincial government representatives on December 8, 2004 and February 15, 2005 confirmed provincial



support for the Basin Head MPA. The Province demonstrated a willingness to use existing legislation to protect part of the watershed surrounding the Basin Head MPA.

Consultation with Aboriginal groups was facilitated throughout the designation process. Letters of invitations (to meetings and open houses) were sent to Aboriginal groups and informal discussions regarding the designation process were held from 1999 onward. Presentations were given to the Abegweit and Lennox Island First Nations, the Mi'kmaq Confederacy of PEI and the PEI Native Council on June 5, 2002. A meeting was also held on February 8, 2005 with members of Abegweit and Lennox First Nations and the Mi'kmaq Confederacy of PEI. At that meeting, the bands reconfirmed their support of the concept of a MPA at Basin Head as long as a good balance could be achieved between conservation and the economy.

2.4 Scientific Review Since Designation

In 2008, following reports of a steep decline in *Chondrus* biomass, a scientific advisory process was convened under the Canadian Science Advisory Secretariat (CSAS) to consider possible causes of the decline (DFO 2009b) and to recommend research and management actions in response. It was reported that the decline had been gradual at least since 1980 (when studies began), but that the decline had increased sharply in the early 2000s (standing biomass estimated at 110 t in 1980, reduced to just over 1 t in 2008). Poor water quality (terrestrial nutrient runoff) and the ecological effects of the European green crab (*Carcinus maenas*) invasion were the likely causes reported from the CSAS process. Recommendations included increased monitoring of marine vegetation, monitoring and control of green crab, and maintaining a culture of the Basin Head Irish moss in a quarantine facility for eventual replanting, all of which have been followed.

Subsequently, a DFO Science and Oceans Workshop was held in Moncton on December 5-6, 2011, to consider the outcomes of actions taken since 2008. As noted previously, this version of the OMP is largely based on the deliberations at this Workshop. No major changes were recommended concerning the direction of monitoring or research activities, other than minor changes to methodology. During the Advisory Board meeting held in the fall of 2012, members requested that DFO undertake artificial culture of the Irish moss at Basin Head based on the advice from Dr. Glyn Sharp (retired emeritus DFO scientist). Given the inability to meet several of the conservation objectives due to the severe decline of the Irish moss at Basin Head and the potential to set precedent, in terms of artificial cultivation of the moss in the Marine Protected Area, it was decided not to pursue the artificial culture. It was concluded that artificial maintenance of the moss would not restore the biomass to the previous state given the changes in the ecological processes within the Basin Head Marine Protected Area. It was recommended that ongoing monitoring efforts continue, that Basin Head be managed to achieve the broader conservation objective relating to biodiversity and biological productivity of the area, and that the Irish moss continue to be cultivated at the National Research Council facility in Nova Scotia.

3.0 MANAGEMENT FRAMEWORK

3.1 Management Zones

The Basin Head MPA includes 3 management zones (Figure 7):

- The inner channel (Zone 1) – This zone extends from the main basin eastward for

approximately 3 km to the eastern limit of the ecosystem. Zone 1 has the highest level of protection given that it provides the unique and only habitat for the Basin Head Irish moss within this ecosystem.

- The lagoon (Zone 2) – This zone extends from the inner channel west to the limit of the basin and south to the mouth of the basin. This is the main basin area or lagoon and acts as a buffer zone for the more sensitive Zone 1 area.
- The outer coastal zone (Zone 3) – This zone extends from the mouth of the lagoon to 1 nautical mile south and covers 3 nautical miles east to west, adjacent to the eastern end of the lagoon. This zone is a buffer to protect the integrity of the dune structure.

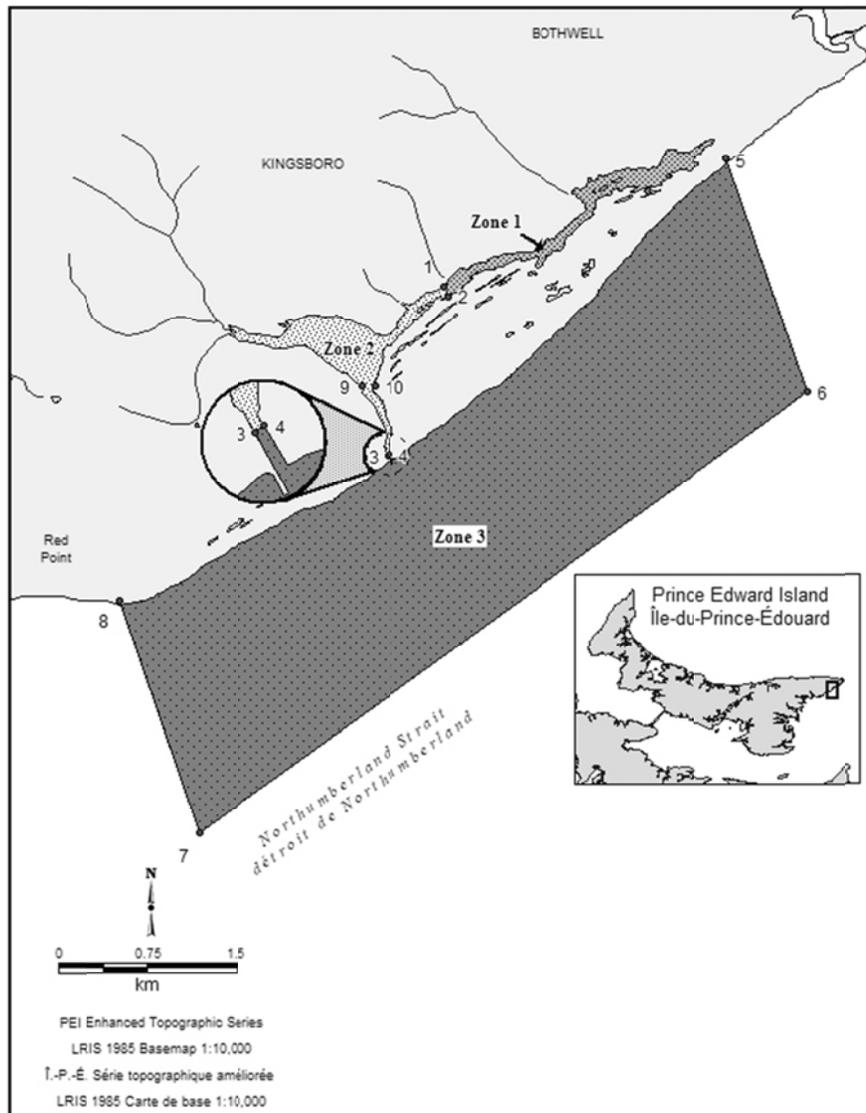


Figure 7: Basin Head MPA Management Zones.

3.2 The Regulatory Intent

The health of Basin Head is inextricably linked to surrounding marine waters and the stability of the sand dune system. These zones reflect the differences among physical environments or habitats and the management approaches required for each. In order



to conserve and protect the habitat and marine resources of the Basin Head MPA, specific activities will be prohibited within various zones of the MPA to ensure the health of the Irish moss and its supporting habitats. The *Basin Head Marine Protected Area Regulations* (Appendix I) contain a general prohibition against the disturbance, damage, destruction or removal of any living marine organism or any part of its habitat within the MPA. In addition, the Regulations prohibit activities, including depositing, discharging or dumping of substances within the MPA that result in the disturbance, damage, destruction or removal of any living marine organism or any part of its habitat within the MPA. Any accident that is likely to result in the disturbance, damage, destruction or removal of living marine organisms referred to in the general prohibitions of the Regulations, must be reported within two hours after its occurrence to the Canadian Coast Guard by calling the following number: 1-800-565-1633. Appendix IV is a flow chart describing the protocol for an environmental emergency response when a land or vessel oil spill occurs.

Furthermore, the Regulations recognize that certain activities, such as scientific research and specific types of fishing may be allowed to occur within the MPA as long as they do not compromise the conservation objectives under specific conditions. Moreover, certain activities such as monitoring may be required to support the management and protection of the MPA, while other activities may be required for specific overriding purposes, such as public safety and security. Within the Regulations, activities are managed through (1) the submission and approval of plans for science and education activities according to specific conditions, and (2) specific exceptions to the general prohibitions according to specified conditions. Scientific research and educational activities will be approved throughout the entire MPA under specific conditions. A plan for these activities must be submitted, specific information listed in the Regulations must be supplied about the activity, and the activity must not damage or destroy the habitat of living marine organisms within the MPA (Appendix III). In Zone 1, the Minister may only approve plans for scientific activities for the purposes of managing the MPA or monitoring the effectiveness of the conservation measures. The Minister may approve plans for educational activities in Zone 1 for the purposes of increasing awareness of the MPA, or providing information respecting the conservation measures implemented in the MPA. In Zone 2 and Zone 3 scientific and educational activities can occur provided they do not damage or destroy the habitat of living marine organisms. The cumulative environmental effects of these activities, in combination with all other past and current activities will also be considered for Ministerial approval provided the activities are not likely to cumulatively result in damage or destruction of the MPA or the Irish moss it protects.

Throughout the MPA, specific exceptions to the general prohibitions will be permitted for the purpose of public safety, law enforcement, national defense, national security or emergency response to ensure the safety of Canadians. Aboriginal Peoples fishing in accordance with the *Aboriginal Communal Fishing Licenses Regulations* will also be permitted throughout the MPA.

Zone 1 (The inner channel) – Activities permitted in this area are limited to those which do not disturb, damage or destroy or remove living marine organisms or their habitat or deposit, discharge or dump harmful substances. Because of the vulnerability of the Irish moss in this zone, activities such as swimming, diving, the use of motorized vessels and fishing are not permitted.

Zone 2 (The lagoon) – This zone will tolerate some disturbances such as swimming and diving. Non-vessel based fishing will be permitted in this zone if these activities are carried out in accordance with the *Atlantic Fishery Regulations, 1985*, *Maritime Provinces Fishery Regulations* or the Prince Edward Island's *Wildlife Conservation Act*. The use of a motorized vessel will only be permitted in this zone in order to launch or land a vessel at a boat launch. The maintenance, repair, or removal of a bridge or boat launch will also be permitted in this zone if the applicable authorizations for these activities have been obtained under the *Navigation Protection Act* or the *Fisheries Act*. Requirements under this legislation are considered sufficient to ensure that these activities will be conducted in a manner consistent with the conservation objectives of the MPA.

Zone 3 (The outer coast) – Prohibitions in this zone restrict physical activities that may alter the coastline in such a way as to endanger the fragile sand dune system, and therefore the lagoon. Fishing will be permitted in this zone if these activities are carried out in accordance with the *Atlantic Fishery Regulations, 1985* or the *Maritime Provinces Fishery Regulations*. Swimming, diving and the use of motorized vessels are permitted in this area. The maintenance, repair, or removal of a bridge or wharf will be permitted in this zone if the applicable authorizations for these activities have been obtained under the *Navigation Protection Act* or the *Fisheries Act*. Requirements under this legislation are considered sufficient to ensure that these activities will be conducted in a manner consistent with the conservation objectives of the MPA.

3.3 Monitoring

3.3.1 Current and Potential Threats to the Basin Head Ecosystem

It is recognized that general conditions that favor the *Chondrus* beds will also favor system-wide ecological integrity.

Basin Head estuary is subject to a number of threats from both anthropogenic and natural influences. A primary threat to the system and in particular to the *Chondrus crispus* is eutrophication. Nutrient input into the streams from current and past land use practices elevate Nitrogen and Phosphorus concentrations well above healthy levels for the system. In general 0.63 to 3.0 mg/l total nitrogen can cause eutrophication and all of the PEI estuaries are reported to have mean levels higher than these values. Basin Head nutrient input from streams are above the mean levels of other estuaries and lagoons in PEI. This was recognized at the time of designation.

Accordingly, a Management Plan for the surrounding watershed was developed and has been in existence since March 2010 (PEI Wildlife Federation, 2010). The Plan identifies 14 major objectives, with corresponding short-, mid-, and long-term strategies. These include monitoring and attention to point sources for runoff (nutrients, bacteria, sediments); attention to agricultural practices; stream and riparian zone restoration; attention to invasive species; developing alternative human uses for the watershed and MPA ecosystem (recreation, education, tourism); and preparations to deal with climate change effects.

Under this Watershed Management Plan, monitoring and restoration work has been carried out by the local watershed group (PEI Wildlife Federation – Souris & Area Branch). A major source of the MPA nutrient overload comes from broad use agricultural fertilizers applied to surrounding farmland, and percolating through the water table.



Moreover, since this percolation may take years, any current reduction in fertilizer use would only be felt in the MPA in many years from now, perhaps decades. At the DFO Sciences and Oceans Workshop held in December 2011, it was noted that farming activities are reduced from years past, and that farmers are more diligent in the use of fertilizer, partly because of the cost. Also best management farming practices such as farm terracing and strip farming as well as following nutrient management plan and provincial environmental farm plans are being used within the Basin Head watershed to conserve soil.

Another potential threat to the estuary and the Irish moss comes from the stability of the entrance channel and the dune structure as they relate to the flushing of the estuary. Any changes in the integrity of these structures will affect the flushing rates in the estuary and hence the ability of the estuary to rid itself of excessive algal blooms and nutrients. A circulation model has been developed, which suggests that flushing of the MPA lagoon and the northeastern arm is limited despite the considerable tidal current. It is known that the tides merely transfer most of the seawater back and forth within the system but there is limited water exchange with the open sea through the entrance channel. The model will also be used to predict hydrological effects of changes in the channel dimensions and any breach in the dune structure.

The most serious recent disturbance to the Basin Head ecosystem has been the arrival of the invasive green crab (*Carcinus maenas*) (Figure 8), whose rapid population increase has coincided with the rapid decline of Basin Head *Chondrus crispus*. Green crabs are voracious predators and prey on a variety of invertebrates and bivalves. They also have the potential to displace native species through competition. Predation on blue mussels by *Carcinus* is a possible mechanism by which *Chondrus* abundance might be suppressed. It is also suggested that green crab harms the *Chondrus* (and other plants) through mechanical action (i.e. digging, foraging). More recently *Chondrus* was found in green crab stomachs, suggesting that some direct herbivory of *Chondrus* occurs.

Green crabs were first found in Basin Head in 1999. Trapping efforts in 2000 netted 600 crabs; and by 2010 the annual number of crabs trapped increased to 42,949. This difference in the catch rates clearly reflects a growing population of *Carcinus*, though no direct comparison of these numbers is possible since trapping efforts and methodology varied over the years.

A scientific trapping program for *Carcinus* was undertaken in 2009 and 2010 in the hopes of reducing the population. Trapping was restricted to the lagoon (MPA Zone 2), to avoid habitat damage and turbidity in the northeast Arm. Despite the impressive numbers of *Carcinus* trapped and destroyed (i.e. 12,647 in 2009 and 42,949 in 2010), there was little evidence of reduction of the population, so trapping was not repeated in 2011.

Green crabs in Basin Head do not form a site specific genetic population, but are part of a general Northumberland Strait population. Population abundance of the green crab is also being monitored through DFO's *Community Aquatic Monitoring Project* (Thériault and Courtenay, 2010).



Figure 8: Green crab captured in Basin Head (photo credit: Stephanie Cormier).

3.3.2 Conservation Objectives

During the MPA designation process, existing and potential threats to the Basin Head ecosystem were identified, and conservation objectives (DFO 2009a) were developed to ensure the health and viability of the ecosystem and its unique form of Irish moss. The development of Marine Environmental Quality (MEQ) objectives was meant to allow the conservation objectives to be measured and monitored as part of the original MPA OMP (DFO 2009a). Indicators of these MEQ objectives were established to measure whether the MEQ objectives are being met (Cobb et al., 2004). Appendix II identifies the conservation and MEQ objectives, the indicators that are used to monitor the objectives, the triggers that will determine management action and the agencies responsible for the management action.

The primary objective of the MPA management is to maintain the unique Irish moss form and its habitat. The first indication of a problem in the estuary should come from the measurements of environmental quality including water quality measurements and monitoring for anoxic conditions toward the *Chondrus* bed. Hence this is listed as the first conservation objective and crucial to the monitoring program.

Conservation objective 1: Maintain the quality of the marine environment supporting the Basin Head *Chondrus crispus*.

Conservation objective 2: Maintain the physical structures of the ecosystem supporting the Basin Head *Chondrus crispus*.

Conservation objective 3: Maintain the health (biomass and coverage) of the Basin Head *Chondrus crispus*.

Conservation objective 4: Maintain the overall ecological integrity of the Basin Head lagoon and inner channel. This includes avoidance of excessive *Ulva* growth, maintenance of adequate oxygen levels, and maintenance of diversity of indigenous flora and fauna.

It is clear from much of the foregoing that all of the regulatory conservation objectives

have not and are not being met. However, the major causes identified (terrestrial nutrient input, green crab invasion) originate outside the MPA. Because of this, and because of the intractable nature of both factors, regulatory management measures which would counter these two factors at their origin are not available to MPA managers. It seems at least plausible to control the Basin Head green crab population through some sort of regular and sustained fishery in Zone 2 and Zone 3 since the small scale trapping study completed in 2009 and 2010 was not sufficient to reduce a significant number of the population and required major time and effort. On the other hand, the nutrient input is a long term problem requiring major changes to land use and agricultural practices in the surrounding watershed and therefore difficult to achieve.

Table 1 outlines the regulations related to the conservation objectives. It identifies the related legislation, management action, responsible leads and associated short (3 years) and long term (10 years) goals. Table 2 outlines the non-regulatory conservation objectives and also identifies the related legislation, management action, responsible leads and associated short (3 years) and long term (10 year) goals.

Table 1: Basin Head MPA Non-regulatory Conservation Objectives and Management Actions with Associated Short (3 years) and Long Term (10 years) Goals

Please note that more details on specific management actions taken for each of the goals can be found in the annual Management Plan Implementation Progress Reports.

Regulatory Conservation Objective	Management Action	Lead Responsible	Related Legislation	Status
Maintain the quality of the marine environment supporting the Basin Head <i>Chondrus crispus</i> .	Short Term Goals (3 years): To maintain twice-monthly water quality monitoring (May through October) at 11 water stations within the MPA. Information will be collected on nitrate, nitrites, phosphates, chlorophyll, turbidity, temperature, dissolved oxygen and salinity.	DFO	<i>Basin Head Marine Protected Area Regulations</i>	Regular on-going monitoring <u>completed annually.</u>
	To monitor continuous water temperature in the inner channel station and the main basin.	DFO	<i>Basin Head Marine Protected Area Regulations</i>	Regular on-going monitoring completed annually.
	To monitor 3 stations in the basin to test for <i>E.coli</i> contamination.	Environment Canada (in co-operation with PEI Department of Environment, Labour and Justice)	Canadian Shellfish Sanitation Program	Last completed in the summer of 2011 .

	<p>Long Term Goals (10 years): By using the data collected, determine if there is a significant decline in the quality of the marine environment supporting the Basin Head Irish moss.</p>	DFO	<i>Basin Head Marine Protected Area Regulations</i>	On-going. Results archived in the Basin Head shared drive at DFO. Research paper developed on the cause of the steep <i>Chondrus</i> (unpublished Cairns et al.).
Regulatory Conservation Objective	Management Action	Lead Responsible	Related Legislation	Status
Maintain the physical structure of the ecosystem supporting the <i>Chondrus crispus</i> .	<p>Short Term Goals (3 years): Establish the limits of the barrier dune structure at the ocean entrance and northern limit.</p>	DFO	<i>Basin Head Marine Protected Area Regulations</i>	Estuary Model developed and presented at the December 2011 Workshop; the model can be used to study scenarios of physical changes to the dune systems and entrance channel. No further action taken since.
	<p>Long Term Goals (10 years): Monitor the land use activities and erosion of the watershed area.</p>	DFO (with support from PEI Dept. of Agriculture and Forestry)	<i>Basin Head Marine Protected Area Regulations</i>	Land use survey completed in the fall of 2013 by the PEI Wildlife Federation (Souris & Area Branch). Provincial land use survey is completed on a 10 year cycle (last one was in 2010). No regular on-going erosion measures in place.
	Develop water circulation model to evaluate any water circulation changes.	DFO	<i>Basin Head Marine Protected Area Regulations</i>	Updated in 2011 for the Basin Head Science & Oceans Workshop.

Regulatory Conservation Objective	Management Action	Lead Responsible	Related Legislation	Status
Maintain the health (biomass and coverage) of Basin Head <i>Chondrus crispus</i> .	Short Term Goals (3 years): Establish monitoring transects within the <i>Chondrus crispus</i> bed to evaluate biomass and coverage. Due to drastic decline in <i>Chondrus</i> , aerial photography and glass bottom boat deemed no longer useful and Irish moss survey is now done by walking/swimming along transects spaced 4 m apart until biomass increases.	DFO	<i>Basin Head Marine Protected Area Regulations</i>	Regular on-going monitoring. Completed annually.
	Continue weekly photo mosaic at three locations (i.e. eastern end of the arm, vicinity of the <i>Chondrus</i> bed and Ching's Bridge) to quantify the green algae (<i>Ulva lactuca</i>) coverage.	DFO	<i>Basin Head Marine Protected Area Regulations</i>	Regular annual on-going monitoring since 2011. Photography and methodology archived in Basin Head shared drive at DFO.
	Long Term Goals(10 years): Maintain the biomass and coverage of the Basin Head <i>Chondrus crispus</i> to healthy and sustainable levels.	DFO	<i>Basin Head Marine Protected Area Regulations</i>	On-going effort but has not been successful due to the dramatic decline in the <i>Chondrus</i> . Memorandum of Understanding with NRC renewed yearly for maintenance of Basin Head <i>Chondrus</i> cultured in research facility at Sandy Cove, NS.

Regulatory Conservation Objective	Management Action	Lead Responsible	Related Legislation	Status
Maintain the overall ecological integrity of the Basin Head lagoon and inner channel	<p>Short Term Goals (3 years):</p> <p>To continue the Community Aquatic Monitoring Program to monitor trends in community abundance and diversity of fish and benthic invertebrates within the Basin Head lagoon.</p>	DFO	<i>Basin Head Marine Protected Area Regulations</i>	Annual monitoring from May to September.
	To create detailed contour maps of percent cover by major plant species.	DFO	<i>Basin Head Marine Protected Area Regulations</i>	<p>Not initiated but baseline data exists for <i>Ulva</i> and <i>Chondrus</i>.</p> <p>Visual aerial record of <i>Chondrus</i> cover archived in Basin Head shared drive at DFO.</p>
	<p>Long Term Goals(10 years):</p> <p>Maintain the diversity of indigenous flora and fauna within the Basin Head Marine Protected Area by evaluating the effectiveness of the monitoring plans, indicators and triggers up to date.</p>	DFO	<i>Basin Head Marine Protected Area Regulations</i>	Hold a Science and Oceans workshop in FY 2015-2016 to evaluate the effectiveness of the monitoring plans and better define the indicators and triggers.

Table 2: Basin Head MPA Non-regulatory Conservation Objectives and Management Actions with Associated Short (3 years) and Long Term (10 years) Goals

Please note that more details on specific management actions taken for each of the goals can be found in the annual Management Plan Implementation Progress Reports.

Non-Regulatory Conservation Objective	Management Action	Lead Responsible	Status
To ensure the participation of interested and affected stakeholders in the operation of the MPA.	Short Term Goal (3 years): Continuation of annual Advisory Board meetings to ensure stakeholder support and involvement.	Basin Head Advisory Board (with support from DFO)	Meets yearly.
	Long Term Goals (10 years): Increase Aboriginal involvement in the MPA.	DFO (with support from the Mi'kmaq Confederacy of PEI)	On-going.
Non-Regulatory Conservation Objective	Management Action	Lead Responsible	Status
To increase the public awareness of the Basin Head <i>Chondrus crispus</i> , the ecosystem of the Basin Head MPA and its conservation measures.	Short Term Goals (3 years): To develop a Basin Head MPA website.	DFO	Existing info link to DFO website; PEI Wildlife Federation site partnering in highlighting the MPA.
	To enhance the existing on-site laboratory to maximize education potential.	DFO (with support from the Basin Head Fisheries Museum)	As of June 2014, laboratory facility at the cannery was enhanced.
	Long Term Goals (10 years): To increase public awareness through publication of brochures, interpretive touchscreen kiosk and involvement in community events.	DFO (with support from Basin Head Advisory Board)	In 2014, an interpretive kiosk with touch screen was installed and is hosted at the Basin Head Fisheries Museum. Pilot project summer 2014 - Eco Tour of Basin Head lead by the Souris & Area Branch of the PEI Wildlife Federation.

			PEIWF communicates regularly to local stakeholders through the “Souris & Area Watershed News” on any activity that involves Basin Head.
Non-Regulatory Conservation Objective	Management Action	Lead Responsible	Status
To promote scientific research to increase the level of understanding of the Basin Head MPA.	Short Term Goals (3 years): To continue to collaborate with Island Nature Trust, Souris and Area Watershed Group and University of Prince Edward Island to meet the monitoring requirements identified in the Operational Management Plan.	DFO	Yearly contract with PEIWF – Souris and Area Branch, to provide assistance with summer and fall monitoring program. PEIWF members active on Basin Head MPA Advisory Board. Fund UPEI through Academic Research Contribution Program for specific research on interaction of green crab with Irish moss.
	Development of Activity Plans and Approvals as outlined in Section 5.0 of the Basin Head MPA regulations.	DFO	Approval Process in place; activity plans are reviewed and approved yearly.
	Long Term Goals (10 years): To continue to identify potential partners for collaborative research projects.	DFO	On-going; PEIWF contracted to provide monitoring assistance plus engagement in the greater watershed initiative.

Non-Regulatory Conservation Objective	Management Action	Lead Responsible	Status
To maintain and enhance the quality of the Basin Head ecosystem.	<p>Long Term Goals (10 years):</p> <p>To implement best management practices to reduce the impact of nutrient enrichment on marine environmental quality within the Basin Head ecosystem.</p>	DFO (with support from PEI Departments of Agriculture and Forestry & Environment, Labour and Justice)	Effort on-going.
	To reduce the spread of aquatic invasive species in the Basin Head ecosystem by public awareness or stewardship initiatives.	DFO	On-going through the monitoring/education being done by the Aquatic Invasive Species program (AIS) at DFO and the Community Aquatic Monitoring Program as well as the Eco-Tours.

4.0 GOVERNANCE

4.1 Roles and Responsibilities

Fisheries and Oceans Canada is the sole responsible authority for designating Basin Head as a MPA. The *Oceans Act* allows DFO to collaborate with a variety of stakeholders to achieve the goals of the *Oceans Act* including the management of projects under the MPA program.

Section 32(c) of the *Oceans Act* states that the Minister *may, on his or her own or jointly with another person or body or with another minister, board or agency of the Government of Canada, and taking into consideration the views of other ministers, boards and agencies of the Government of Canada, provincial and territorial governments and affected Aboriginal organizations, coastal communities and other persons and bodies, including those bodies established under land claims agreements,*

- (i) *establish advisory or management bodies and appoint or designate, as appropriate, members of those bodies, and*
- (ii) *recognize established advisory or management bodies*

To effectively manage the Basin Head MPA, an advisory board has been established in 2005 under the authority of the Section 32(c) of the *Oceans Act*. This Advisory Board is

comprised of members that are representative of the community, industry, Aboriginal community, academia, conservation/non-governmental organizations, municipal governments and provincial and federal governments with knowledge and experience relating to the ecology, management, conservation and use of the area.

The main objective of the Basin Head MPA Advisory Board is to provide on-going advice and recommendations to DFO on the management and monitoring of the Basin Head MPA. While the Basin Head MPA Advisory Board does not have legal or delegated powers from DFO and does not replace the regulatory mandate or decision-making authority of existing bodies, it will play a major role in the implementation of the OMP.

The Province of Prince Edward Island is responsible for the management of activities on the lands adjacent to the Marine Protected Area. The Province is interested in engaging in watershed based management across PEI. DFO and the Basin Head MPA Advisory Board will support the watershed management concept by endorsing and promoting the goals and objectives of integrated watershed management and apply it to Basin Head.

As well, the Province of PEI is responsible for water quality testing with respect to the Canadian Shellfish Sanitation Program under a Memorandum of Understanding between the Province of PEI and Environment Canada. DFO and the Basin Head MPA Advisory Board may assist the Province with this responsibility.

4.2 Basin Head MPA Advisory Board Terms of Reference

The Terms of Reference establishes the roles and responsibilities for the Board and includes a commitment to ensure there is annual reporting for environmental and financial responsibilities. The Basin Head MPA Advisory Board will work collaboratively with and report to the Regional Committee on Coastal and Oceans Management (RCCOM) to ensure that the following tasks are undertaken as described in the Basin Head MPA OMP:

- 1) Primary research activities (conducted under approved research plans)
- 2) Monitoring programs (as established by the OMP)
- 3) Communication strategy (as established by the OMP)
- 4) Collaboration with the municipality, provincial government and other federal departments to ensure regulatory compliance and jurisdictional issues are dealt with in the proper forum
- 5) Review the Basin Head Management Plan Implementation Progress Report which describes the activities accomplished during the last fiscal year
- 6) Review the Advisory Board Terms of Reference every three years to ensure that membership and roles and responsibilities are still relevant

As for the day to day requirements of managing the MPA, the following tasks are considered to be essential and will require coordination by DFO in consultation with the Basin Head MPA Advisory Board. These include but are not restricted to:

- 1) Arrange meetings and other logistics as required for board business;
- 2) Be the contact for media and other communication requirements;
- 3) Supervise and schedule field staff as directed by the Board and supporting research scientists; and
- 4) Complete the annual Basin Head Management Plan Implementation Progress Report (with assistance from field staff and researchers) and OMP.



The Advisory Board will be co-chaired by DFO and another member to be determined by the Board. Advisory Board membership is outlined in Table 3 and is comprised of government departments and agencies with a direct role in ocean management as well as primary users of the MPA and directly affected industrial sectors and conservation and academic interests.

The respective government agencies are expected to appoint their representatives through an internal decision making process to be part of the Advisory Board Members. Non-government agencies will be invited by DFO to participate. If needed, a guest could also be appointed by the Advisory Board and could include but is not limited to: a resource person involved in the MPA monitoring, a marine plant specialist, an aquatic invasive species specialist, a nutrient modelling specialist, just to name a few.

All participants on the Advisory Board are expected to attend board meetings, contribute to discussion, review distributed materials and provide comments and advice in a timely manner. A quorum of 50 percent attendees + 1 with at least 2 non-government representatives is needed for the advisory board meeting to be held.

The consensus based recommendations from the Advisory Board will be forwarded to DFO for final decision. The Advisory Board will provide, via DFO, an annual report to the RCCOM. DFO will develop a mechanism to identify annual budget requirements and will report annually on the activities and environmental monitoring through the Basin Head Management Plan Implementation Progress Report. DFO will arrange any third party funding agreements, define schedules for transfer of funds and develop reporting responsibilities on a year to year basis. DFO will also provide secretariat support. The extent of DFO funding will depend on annual budgets.

5.0 ENFORCEMENT AND COMPLIANCE

Statutory authority for the Basin Head MPA and its regulations are in accordance with Section 35 (3) of the *Oceans Act*, which states:

35. (3) *The Governor in Council, on the recommendation of the Minister, may make regulations*

(a) designating marine protected areas; and

(b) prescribing measures that may include but not be limited to

(i) the zoning of marine protected areas,

(ii) the prohibition of classes of activities within marine protected areas,
and

(iii) any other matter consistent with the purpose of the designation.

Table 3: Basin Head MPA Advisory Board Membership

Stakeholder	Designate	Justification
Fisheries and Oceans (3 members)	Regional Director - Ecosystems Management	Most Senior DFO representative for the Ecosystems Management
	Regional Manager, Oceans – Gulf Fisheries Centre (NB)	Responsible for the Oceans Program at the Gulf Fisheries Centre
	Science Manager	Research and Monitoring capabilities
Province of PEI (2 members)	Department of Agriculture and Forestry	Responsible for Provincial Natural Areas Program
	Department of Fisheries, Aquaculture and Rural Development	Responsible for fisheries and aquaculture in PEI
	Department of Tourism and Culture (ex-officio)	Responsible for Basin Head Provincial Park
PEI Museum and Heritage Foundation	Basin Head Fisheries Museum	Responsible for on-site Basin Head Fisheries Museum
Eastern Kings Community Council	Appointment by Community Councilor	Responsible for Community Bylaws
Environmental Non-Government Organization (ENGO) (2 members)	Souris & Area Branch PEI Wildlife Federation	Dedicated to the conservation, protection and enhancement of wildlife habitat in eastern PEI
	Vacant	
Conservation Group	Island Nature Trust	Devoted to the protection and management of natural areas on PEI
Academia	University of Prince Edward	Research and monitoring capabilities
Aboriginal Community	Mi'kmaq Confederacy of PEI	Represents Aboriginal interests in the Basin Head MPA
Fishing Industry	Appointment by PEI Fisherman's Association	Fishing is an important industry in the Basin Head area
Agriculture Industry	Appointment by Agricultural Community	Agriculture is an important industry in the Basin Head area
Guest	Appointed by the Advisory Board as required	

Section 37 of the *Oceans Act* states that:

37. *Every person who contravenes a regulation made under paragraph 35(3)(b) or an order made under subsection 36(1) in the exercise of a power under that paragraph*

(a) is guilty of an offence punishable on summary conviction and liable to a fine not exceeding \$100,000; or

(b) is guilty of an indictable offence and liable to a fine not exceeding \$500,000

Enforcement responsibilities for the Basin Head MPA and regulations are derived from Section 39 (1) of the *Oceans Act*, which states:

39. (1) *The Minister may designate any person or class of persons to act as enforcement officers for the purposes of this Act and the regulations.*

The Basin Head MPA Advisory Board has identified a need for enforcement with respect to illegal fishing and the use of motorized vessels in areas of the MPA where these activities are not permitted. Fisheries and Oceans Canada, through the Conservation and Protection Branch of the Fisheries and Aquaculture Management Division, has the primary responsibility of enforcing these regulations. DFO Fishery Officers in Souris will serve as the primary deliverers of the compliance program and may be complemented by other law enforcement personnel (or enforcement officers so designated by the Minister according to Section 39 of the *Oceans Act*). A high level of local support for the MPA suggests that a community watch initiative will be formed to complement DFO surveillance activities.

6.0 PUBLIC AWARENESS AND EDUCATION

The communications strategy outlines the steps for public communication of the Basin Head MPA. It recognizes that the Basin Head Area is one of the most visited areas in eastern PEI. Basin Head Beach currently attracts upwards of 75,000 visitors a year, while the Basin Head Fisheries Museum receives approximately 20,000 visitors per year, plus children and school trips. This provides an excellent opportunity to shine the spotlight on the MPA program as people can have easy access to see a Marine Protected Area.

This communications strategy will take advantage of the unique opportunity to partner with local residents, environmental organizations such as Souris & Area Branch PEI Wildlife Federation, Island Nature Trust, the Aboriginal community and the Basin Head Fisheries Museum (owned and operated by the Province of Prince Edward Island).

The overall goal of this communications strategy is to ensure that all parties and sectors influenced by the OMP become aware of the MPA and its associated regulations. It will provide a general education on marine/coastal ecology and conservation in PEI.

The objectives of the strategy are to inform key stakeholders in the local communities surrounding Basin Head about the Basin Head MPA, its regulations and the *Oceans Act*; to promote the collaborative process that has taken place since 1999 between DFO, the Province of PEI and the BHLECC; and to create awareness on the ecological, economic and cultural importance of Basin Head.



The audiences for the communications plan consist of:

- Stakeholders including, but not limited to, local landowners, fishing, agriculture, tourism and industrial sectors, environmental groups and community groups
- Aboriginal representatives
- Federal (including DFO), provincial and municipal levels of governments
- Academia
- Media (local, provincial, national, and international)

6.1 Communication Tools

The following is a list of the different communication tools that may be used to inform stakeholders, including the general public about the Basin Head MPA.

Basin Head Marine Protected Area Signage

It is anticipated that signage identifying Basin Head as a MPA be developed in the near future.

Display panels/Information Kiosks

Display panels (Figure 9) developed in partnership with the Province of Prince Edward Island have been installed to showcase the historical, cultural and ecological values of Basin Head, the *Oceans Act* and Marine Protected Areas. These displays raise the awareness of the regulations to protect the MPA.

An interactive educational touch screen display has been installed as of May 2014 at the Fisheries Museum which will improve the experience for the visitors at the Basin Head Marine Protected Area (Figure 10). This interpretive kiosk communicates information on the MPA program and highlight MPAs across Canada. The kiosk provides an overview of Basin Head which will allow visitors to understand the types of research and monitoring that are ongoing throughout the MPA.

Promotional Material

Promotional material (e.g. information sheets/brochures/bookmarks) will be developed to inform visitors about the Basin Head MPA and its regulation. This material will be available at the information kiosks and at the Basin Head Fisheries Museum.

Interpretation of the MPA

The Souris & Area Branch of the PEI Wildlife Federation has received provincial funding to conduct an Eco-Tour to discover Basin Head. This pilot project has received funding for the summer of 2014 and will be evaluated to determine if such eco-tourism could be a viable industry and continue beyond 2014. The proposed eco-tour will explore the history of the community starting with the first settlers, local fishing industry and the importance of the Basin Head Harbor. They will then visit the newly develop interpretive kiosk telling the story of Basin Head and how it became a Marine Protected Area providing ecological and biological information to the audience. This will be followed with a guided walk along the beach explaining the importance of the barrier sand dunes and the local flora and fauna. A beach seine sweep will also be done within the Basin Head Lagoon to discover the rich coastal environment and its diversity.



Figure 9: Display panel at Basin Head (photo credit: Delephina Keen).



Figure 10: Interpretive kiosk at Basin Head Fisheries Museum (photo credit: DFO).

Aboriginal Involvement

Eastern Prince Edward Island is rich in early Aboriginal culture. Paleo-Indian artifacts dating as far back as 9,000 years have been found at Basin Head and more recently Mi'Kmaq people used the area seasonally for hunting and fishing. Efforts have been made to highlight significant examples of Aboriginal cultural heritage within the Basin Head MPA through the newly developed interactive touch screen display installed at the Basin Head Fisheries Museum.

7.0 MONITORING AND MANAGEMENT PLAN FOLLOW-UP

As discussed, success of the management actions to meet the MPA conservation objectives will be achieved through scientific and compliance monitoring. The Basin Head MPA OMP will be reviewed every five years with provisions for amendment on a continuing basis. A yearly Basin Head Management Plan Implementation Progress Report will be written to report on activities and achievements in Basin Head MPA that contribute to management plan implementation which will also serve as guide for the preparation and review of the OMP.

8.0 ACKNOWLEDGEMENTS

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Appendix I: Basin Head Marine Protected Area Regulations

Please note that this document is not the official version of these Regulations. It is intended for information and reference purposes only. The Regulations are current to 2015-08-04 and last amended on 2008-04-03 and are published by the Minister of Justice at the following address: <http://laws-lois.justice.gc.ca>

Basin Head Marine Protected Area Regulations

SOR/2005-293

[OCEANS ACT](#)

Registration 2005-09-26

Basin Head Marine Protected Area Regulations

P.C. 2005-1657 2005-09-26

Her Excellency the Governor General in Council, on the recommendation of the Minister of Fisheries and Oceans, pursuant to subsection 35(3) of the [Oceans Act^a](#), hereby makes the annexed [Basin Head Marine Protected Area Regulations](#).

S.C. 1996, c. 31

INTERPRETATION

1. (1) The following definitions apply in these Regulations.

“Area”

“Area” means the Basin Head Marine Protected Area designated under section 2. (*zone*)

“vessel”

“vessel” has the same meaning as in section 2 of the [Canada Shipping Act](#). (*bâtiment*)

“waters”

“waters” means, in addition to the waters, the seabed and subsoil below the waters to a depth of two metres. (*eaux*)

(2) In these Regulations, all geographical coordinates (latitude and longitude) are expressed in the North America Datum 1983 (NAD 83) geodetic reference system.

(3) In the schedule, the lines connecting the points are rhumb lines.



DESIGNATION

2. The areas of the sea at Basin Head comprised of the management zones described below — and depicted in the schedule — are together designated as the Basin Head Marine Protected Area:

(a) Zone 1, consisting of waters lying generally northeast of a rhumb line connecting points at 46°23'20" N, 62°06'10" W and 46°23'18" N, 62°06'08" W, that are within an area of the sea bounded by the low-water line of the harbour and by the rhumb line to its points of intersection with the low-water line;

(b) Zone 2, consisting of waters that are within an area of the sea bounded by the low-water line of the harbour and by the following rhumb lines to their respective points of intersection with the low-water line, namely,

(i) a line connecting points at 46°23'20" N, 62°06'10" W and 46°23'18" N, 62°06'08" W, and

(ii) a line connecting points at 46°22'39" N, 62°06'29" W and 46°22'40" N, 62°06'29" W; and

(c) Zone 3, consisting of waters that are within an area of the sea bounded by the low-water line of the Northumberland Straight and by the following rhumb lines, namely,

(i) to its points of intersection with the low-water line, a line connecting points at 46°22'39" N, 62°06'29" W and 46°22'40" N, 62°06'29" W,

(ii) to its point of intersection with the low-water line, a line connecting points at 46°23'51" N, 62°04'30" W and 46°22'55" N, 62°04'02" W,

(iii) a line connecting points at 46°22'55" N, 62°04'02" W and 46°21'07" N, 62°07'36" W, and

(iv) to its point of intersection with the low-water line, a line connecting points at 46°21'07" N, 62°07'36" W and 46°22'04" N, 62°08'04" W.

PROHIBITED ACTIVITIES

3. (1) In the Area, no person shall

(a) disturb, damage or destroy, or remove from the Area, any living marine organism or any part of its habitat; or

(b) carry out any activity — including depositing, discharging or dumping any substance, or causing any substance to be deposited, discharged or dumped — that is likely to result in the disturbance, damage, destruction or removal of a living marine organism or any part of its habitat.

(2) Despite subsection (1), a person may carry out any activity excepted under section 4 or any scientific or educational activity for which a plan is approved under section 6.

EXCEPTIONS

4. The following activities may be carried out in the Area:



- (a) the following fishing activities, namely,
- (i) fishing that is carried out in accordance with the [Aboriginal Communal Fishing Licences Regulations](#),
 - (ii) in Zone 2 or 3, any recreational fishing activity that is carried out in accordance with the [Maritime Provinces Fishery Regulations](#) or the *Wildlife Conservation Act* of Prince Edward Island, R.S.P.E.I. 1988, c. W-4.1, as amended from time to time, and
 - (iii) in Zone 2 or 3, any commercial fishing activity that is carried out in accordance with the *Atlantic Fishery Regulations 1985*, or the [Maritime Provinces Fishery Regulations](#);
- (b) in Zone 2, the operation of a motorized vessel south of a rhumb line connecting points at 46°22'56" N, 62°06'39" W and 46°22'56" N and 62°06'34" W solely for the purpose of transiting that area in order to launch the vessel from, or land it at, a boat launch;
- (c) any of the following activities — for which approval or authorization is not required under the [Navigable Waters Protection Act](#) or the [Fisheries Act](#), as the case may be, or that is carried out in accordance with an approval or authorization required under either of those Acts — namely,
- (i) in Zone 2, the maintenance, repair or removal of a bridge, wharf or boat launch, and
 - (ii) in Zone 3, the maintenance, repair or removal of a bridge or wharf; and
- (d) any activity that is carried out for the purpose of public safety, national defence, national security or law enforcement or in response to an emergency.

SOR/2008-99, s. 23(E).

ACTIVITY PLAN

5. Every person who proposes to carry out a scientific or an educational activity in the Area shall submit to the Minister for approval, not less than 60 days before the day on which the activity is proposed to begin, a plan that contains the following information and documents:

- (a) the name, address and telephone number and, if applicable, the facsimile number and electronic mail address of a person who can be contacted in respect of the plan;
- (b) a detailed description of the proposed activity that sets out
 - (i) its purpose,
 - (ii) the period or periods during which it is to be carried out,
 - (iii) a map on which its location is identified,
 - (iv) the types of data that are to be collected, if any, and the sampling protocols or other techniques to be used to collect the data,

- (v) the types of equipment, if any, that are to be used during the proposed activity, including those for gathering data and, if any of the equipment is to be anchored or moored in the Area, the methods by which the anchoring or mooring is to be conducted,
 - (vi) the type and identity of every vessel that is to be used to carry out the proposed activity, and
 - (vii) every substance, if any, that is to be deposited, discharged or dumped within the Area during the proposed activity;
- (c) an assessment of the environmental effects that are likely to occur within the Area as a result of the proposed activity; and
- (d) a list of every licence, permit, authorization or consent obtained or applied for in respect of the proposed activity.

6. (1) The Minister shall, within 30 days after the day on which a plan that is submitted in accordance with section 5 is received, approve the plan if the proposed activity is not likely to damage or destroy the habitat of a living marine organism in the Area and

(a) in the case of a scientific activity that is proposed to be carried out in Zone 1, the activity is for the purpose of managing the Area or monitoring the effectiveness of conservation measures implemented in the Area; and

(b) in the case of an educational activity that is proposed to be carried out in Zone 1, the activity is for the purpose of increasing public awareness of the Area or providing information in respect of the conservation measures implemented in the Area.

(2) Despite subsection (1), the Minister shall not approve a plan if the cumulative environmental effects of the proposed activity, in combination with any other past and current activities carried out within the Area, are likely to damage or destroy the habitat of living marine organisms in the Area.

SOR/2008-99, s. 24(E).

REPORTING OF ACCIDENTS

7. Every person involved in an accident that is likely to result in any disturbance, damage, destruction or removal prohibited under subsection 3(1) shall, within two hours after its occurrence, report the accident to the Canadian Coast Guard.

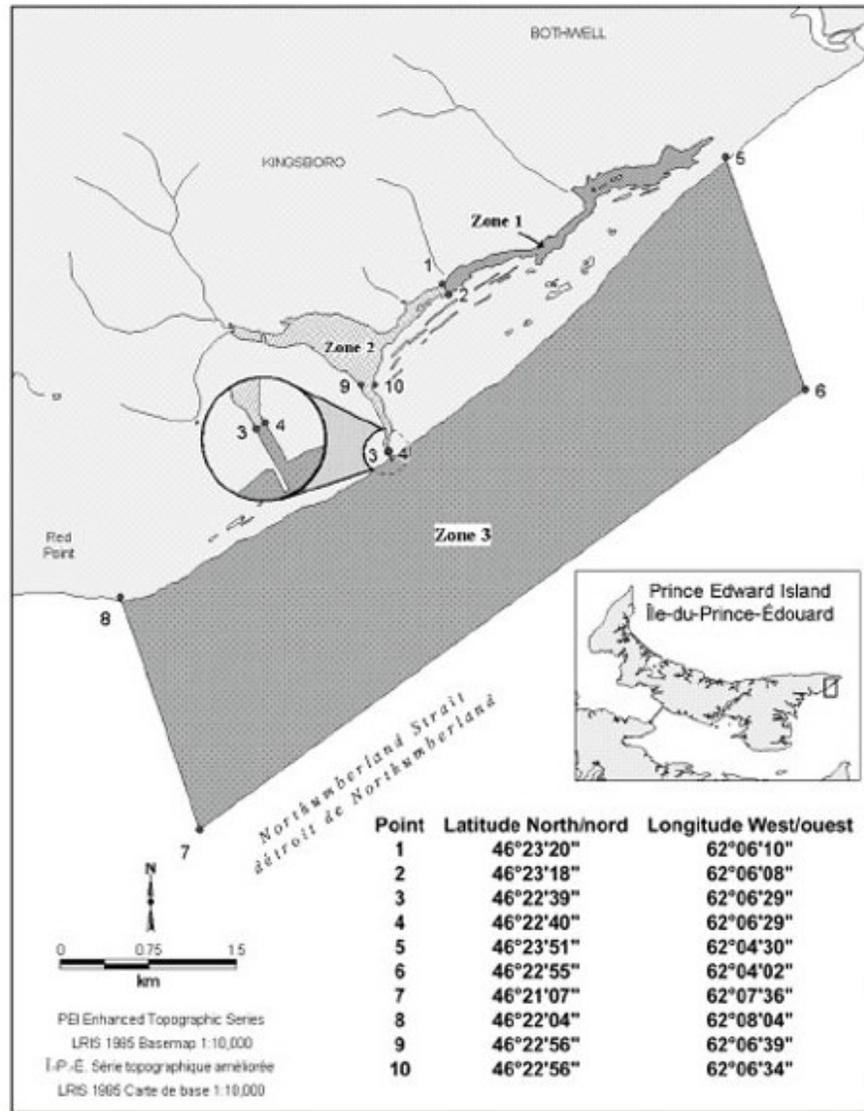
COMING INTO FORCE

8. These Regulations come into force on the day on which they are registered.

SCHEDULE/ANNEXE

(Subsection 1(3) and section 2/paragraphe 1(3) et article 2)

BASIN HEAD MARINE PROTECTED AREA/ZONE DE PROTECTION MARINE DE
BASIN HEAD



Appendix II: Conservation and Marine Environmental Quality (MEQ) Objectives, Identified Triggers and Management Directions for Monitoring in the Basin Head MPA

Regulatory Conservation Objective	Marine Environmental Quality Objective	Ecological Indicators	Responsibility	Triggers
<p>Maintain the quality of the marine environment supporting the Basin Head <i>Chondrus crispus</i>.</p>	<p>Maintain water quality at minimum to baseline data collected for the last 6 years.</p>	<p>11 water quality monitoring stations within the MPA.</p> <p>Sample these 11 stations at least twice monthly from May 1 to October 31 for temperature, dissolved oxygen and salinity with hand held YSI probe.</p> <p>Analyze surface water samples at each station for, nitrate, nitrites, phosphates (soluble), suspended solids.</p> <p>Monitor continuous temperature in the inner channel station and the main basin with recording thermographs.</p> <p>Once a year or at a minimum once every 3 years, sample 3 stations in the basin for <i>E.coli</i> contamination (done through CSSP).</p>	<p>DFO</p> <p>DFO</p> <p>DFO</p> <p>DFO</p> <p>DFO provided to Province of PEI through MoU with Environment Canada.</p>	<p>Management action needed when:</p> <p>Water quality indicators show persistent increases in either nitrogen or phosphorus (i.e. over three consecutive summers) and persistent hypoxic or anoxic conditions and expansion toward the <i>Chondrus</i> bed.</p> <p>Dissolved oxygen levels below 3 mg/L is considered hypoxic and is stressful to most aquatic organisms.</p>

Regulatory Conservation Objective	Marine Environmental Quality Objective	Ecological Indicators	Responsibility	Triggers
<p>Maintain the physical structures of the ecosystem supporting the Basin Head <i>Chondrus crispus</i>.</p>	<p>Maintain the integrity of the basin, the dune structure, the ocean opening, flushing and limit the erosion of land and sedimentation into the basin.</p>	<p>Monitor erosion of the watershed area and land usage patterns.</p> <p>Aerial photography either directed by or obtained from the Province of PEI.</p> <p>Establish the limits of the barrier dune structure at the northern limit and in the area of the ocean entrance (combine with 3 year survey of algal cover).</p> <p>Based on the above, evaluate any water circulation changes that may result using a model.</p> <p>Monitor municipal land use and permit approval data.</p>	<p>DFO</p> <p>DFO/ Province of PEI</p> <p>DFO</p> <p>DFO</p> <p>DFO with Eastern Kings Community Council</p>	<p>Take management action if:</p> <p>A breach occurs within the barrier sand dune system.</p> <p>Changes in flushing rates from baseline data.</p>

Regulatory Conservation Objective	Marine Environmental Quality Objective	Ecological Indicators	Responsibility	Triggers
<p>Maintain health (biomass and coverage) of Basin Head <i>Chondrus crispus</i></p>	<p>Maintain the biomass and coverage of <i>Chondrus crispus</i> to healthy and sustainable levels.</p>	<p>To quantify coverage of <i>Chondrus</i> bed and other algae (green algae):</p> <p>Once every 3 years develop an aerial photo mosaic of the entire basin or at a minimum the inner channel in mid to late July.</p> <p>Since 2011, pictures were taken weekly at three locations within Basin Head during the summer months to quantify the green algae blooms.</p> <p>Establish 3 permanent monitoring transects using geographical positioning (GPS) in the <i>Chondrus</i> bed of the inner channel*.</p> <p>Once every 3 years map distribution, abundance of <i>Chondrus</i> and associated plant species on these transects.</p>	<p>DFO</p> <p>DFO</p> <p>DFO</p> <p>DFO</p> <p>DFO</p>	<p>Take management action if there are declining trends in <i>Chondrus</i> biomass and bed size from baseline data.</p>

Regulatory Conservation Objective	Marine Environmental Quality Objective	Ecological Indicators	Responsibility	Triggers
Maintain the overall ecological integrity of the Basin Head lagoon and inner channel.	Maintain diversity of indigenous flora and fauna, avoidance of excessive <i>Ulva</i> growth, maintenance of adequate dissolved oxygen levels in water.	<p>Community Aquatic Monitoring Program (CAMP) sampling at 6 stations from May to September (includes species richness and abundance and life history).</p> <p>Other data to be collected as part of the CAMP program include: 3 random quadrats quantifying vegetation percent cover within the area beach seined, salinity, temperature and dissolved oxygen at each station and sediment sample once a year.</p> <p>Create detailed contour maps of percent cover by major plant species (<i>Ulva</i>, <i>Chondrus</i>, <i>Zostera</i>) by glass bottom boat surveys, or other suitable survey methods. Repeat survey series at least once every three years.</p>	<p>DFO</p> <p>DFO</p> <p>DFO</p>	<p>Declining trends in community abundance and diversity of fishes and benthic invertebrates over time.</p> <p>Increasing coverage of <i>Ulva</i>, and/or decreasing coverage of <i>Zostera</i> and <i>Chondrus</i>.</p> <p>Decreasing levels of dissolved oxygen below water quality standard of 3 mg/L or consistently low dissolved oxygen levels.</p> <p>Increasing numbers of cancelled beach seine haul conducted through CAMP because of green algal bloom.</p> <p>Early season (May-June) invasion of major <i>Ulva</i> growth and persistent throughout the summer.</p>

* Up until 2011 three permanent transects spaced 50 m apart at the southern edge, northern edge and center of the bed were established to quantify the Irish moss by aerial photography but due to the drastic *Chondrus* decline this technique was deemed no longer feasible. Starting in 2013, transects were spaced 4 m apart and were surveyed walking along with waders or by swimming.



Appendix III: Application for Approval to Conduct Research/Educational Activities in the Basin Head MPA

PRIVACY NOTICE STATEMENT

The information you provide on this form is collected pursuant to specific Marine Protected Area (MPA) Regulations under the authority of the Oceans Act for the purpose of activities plans (e.g. scientific research or monitoring activities, educational activities, commercial tourism activities) in MPAs.

Personal information such as name and contact information is requested so that DFO may correspond with a primary contact person in relation to the proposed activity. Information to be submitted such as a description of the proposed activity will be used to evaluate the environmental impacts of proposed activity in order to determine if approval of the activity is to be granted or not. The information may be used or disclosed for reporting to senior management and evaluation. In some cases, the information may be disclosed to other federal institutions and/or third parties, including stakeholders of the Marine Protected Area, mainly via a Marine Protected Area Advisory Committee, for the purpose of gathering advice on the evaluation of the environmental impact of the activity and used to determine eligibility to conduct that particular activity in the MPA. Personal information of proponents who are successful in having their activities approved may be shared with the public via an annual MPA progress report.

Failure to provide the requested personal information may result in the denial of the proposed activity. You have the right to the correction of, access to, and protection of, your personal information under the Privacy Act and to file a complaint with the Privacy Commissioner of Canada over DFO's handling of your information. Personal information collected through the processing of your application is described in the Marine Protected Area Activity Applications Personal Information Bank DFO PPU 500 and can be accessed and assessed for accuracy. For more information visit Info Source www.infosource.gc.ca.

**APPLICATION FOR APPROVAL TO CONDUCT RESEARCH/EDUCATIONAL ACTIVITIES IN
THE BASIN HEAD MPA**

(Insert Title Here)

Application submitted (date):

Contact Information		
<i>Applicant:</i>	<i>Telephone:</i>	<i>E-mail:</i>
<i>Chief Research Scientist/Educator:</i>	<i>Telephone:</i>	<i>Email:</i>
Detailed Description Of Proposed Activity		
<p><i>Purpose of Proposed Activity:</i></p> <p><i>Period(s) during which the proposed activity is to be carried out:</i></p> <p><i>Location of the proposed activity (attach map)</i></p> <p><i>Type of data to be collected, and the sampling protocols or other techniques to be used to collect data:</i></p> <p><i>Type(s) of equipment that are to be used during the proposed activity (including those for gathering data). If any of the equipment is to be anchored or moored in the Area, the methods by which the anchoring or mooring is to be conducted must be indicated.</i></p>		

Type of every vessel that is to be used to carry out the project:

A description of every substance, if any, that is to be deposited, discharged or dumped within the Area during the proposed activity:

Include an assessment of the environmental effects that are likely to occur within the Area as a result of the proposed activity

List of every licence, permit authorization or consent obtained or applied for in respect of the proposed activity. A Scientific Collection Licence from Fisheries and Oceans is required for any collection of aquatic species.

Monitoring and Evaluation

References

Appendix IV: Example of an Environmental Emergency Protocol when a Land or Vessel Oil Spill Occurs

