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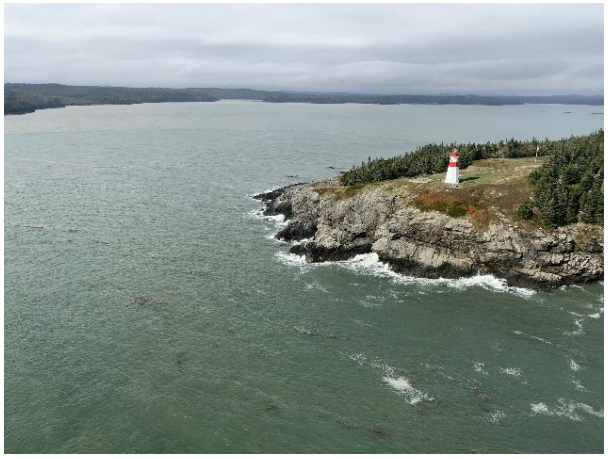
2021 REVIEW OF MUSQUASH MARINE PROTECTED AREA MONITORING



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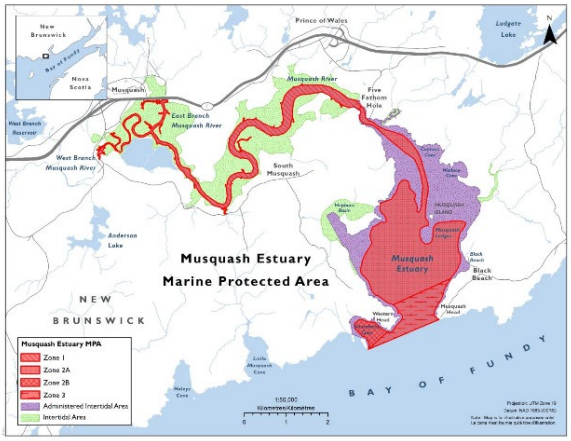

Figure 1. Musquash Estuary Marine Protected Area Management Zones, Administered Intertidal Area, and Intertidal Area.

Context:

The Musquash estuary is a coastal marine ecosystem located in the Bay of Fundy, approximately 20 km southwest of St John, New Brunswick. It encompasses a productive estuary and salt marsh environment that provides habitat for many species of fish, invertebrates, and marine plants. It is recognized as one of only a few remaining in the region that has not been significantly impacted by human development.

On December 14th, 2006, the Musquash Estuary MPA and Administered Intertidal Area (AIA) jointly received formal designation as a protected area. The Musquash Estuary MPA Ecosystem Monitoring Plan (2014–2019) was developed to guide monitoring of biodiversity, productivity, and habitat, as well as human activities and pressures that may impact conservation objectives established for the MPA (OCMD 2015). The Monitoring Plan outlines indicators and associated data streams that are available to inform managers and stakeholders about the performance and effectiveness of the MPA in meeting its conservation objectives. After five years of implementation, there is an opportunity to review the Monitoring Plan, revisit the ecosystem and anthropogenic indicators it identifies, examine the utility of available datasets, and interpret any trends revealed by surveys and sampling programs to date.

This Science Advisory Report is from the May 11–12, 2021, Review of Musquash Monitoring Plan and Assessment Framework, Canadian Science Advisory Secretariat regional advisory meeting. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.

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SUMMARY

- Twelve indicators have previously been identified to monitor the ecosystem-level conservation objectives for the Musquash MPA (i.e., productivity, biodiversity, habitat quality), as well as to monitor potential threats to these conservation objectives.
- For this review, twenty-three datasets were assessed for their progress/applicability to date in supporting the ongoing monitoring of the Musquash MPA, as per the established monitoring plan.
- This review concluded that these datasets provide a valuable foundation for monitoring the state of the Musquash Estuary ecosystem; however, further work is needed to develop these into a more consistent, long-term monitoring program with clear links between the conservation objectives, potential threats to these conservation objectives, and the effectiveness of management measures to prevent or mitigate these threats.
- It was recognized that there are other sources of information, in addition to the twenty-three datasets reviewed here, that contribute to the baseline characterization of the MPA. The incorporation of these datasets into the monitoring program requires additional discussion on how they can be developed into explicit indicators that are clearly linked to conservation priorities and/or potential threats.
- Currently, there are no established benchmarks against which to evaluate adequacy for each indicator in the Musquash MPA Monitoring plan. It was recommended that further consideration be given to the evaluation of indicators against thresholds, i.e., what is understood as meaningful change, especially in the context of a changing climate.
- It was agreed that the status and trends of Musquash MPA monitoring indicators also need to be considered and reported on within a broader regional context, i.e., within the context of the Bay of Fundy and Scotian Shelf-Bay of Fundy bioregional conservation network.
- Musquash monitoring is conducted by several external partners, in addition to DFO. Consequently, it was identified that further steps to standardize sampling protocols and downstream data analysis, and regularize reporting, were needed to support enhanced integration of the various monitoring data streams into a coherent assessment of status and efficacy.
- Gaps and uncertainties in baseline information were identified to guide future improvements for long-term monitoring of the MPA. Given the diversity of expertise and interest in this area, gaps were not prioritized at this meeting. Opportunities to fill these gaps will continue to be explored, and the results of exploratory monitoring indicators will continue to be assessed and presented for review at future meetings.
- Given the diversity of data sources that will be required to implement a long-term monitoring program, the development of robust data management and reporting strategies would help improve periodic assessments on the status of the MPA and its monitoring program.

BACKGROUND

An initial ecosystem-level management framework, which identified monitoring strategies to evaluate the state of the Musquash Estuary ecosystem as it pertains to stated conservation

objectives was developed in 2007 (Davies et al. 2008; DFO 2011). In 2013, there was a review of this framework, along with the research and monitoring activities that had been conducted to support it (DFO 2013; Cooper et al. 2014).

In 2015, DFO released the Musquash MPA Ecosystem Monitoring Plan (2014–2019) (Ocean and Coastal Management Division 2015), which listed twelve indicators (Table 1) for monitoring the ecological state of the Musquash Estuary, related to conservation priorities. Seven indicators were related to conservation priorities for maintaining, productivity, biodiversity, and habitat quality, and five indicators were related to conservation priorities for limiting various pressures or threats in the area.

ASSESSMENT

A review of baseline characterization, monitoring activities, and monitoring results within the Musquash MPA was conducted by DFO Maritimes Science, a summary of which is reported here, both to provide an update on the status of these activities since the last assessment in 2013 (DFO 2013) and to provide advice and recommendations on how to proceed with monitoring going forward.

Twenty-three datasets were identified, which provided information relevant to one or more of the twelve indicators in the monitoring framework. Efforts were made to:

- Assess the spatial (habitat types, management zones), seasonal (intra-annual), and temporal coverage of sampling.
- Identify key species (when applicable), observed trends and variability, as well as data limitations.

In addition, recommendations were provided to improve future monitoring.

Table 1. List of the twelve indicators, organized according to the conservation objective theme being monitored (Singh and Buzeta 2007), which were included in the Musquash MPA Ecosystem Monitoring Plan (2014–2019; Ocean and Coastal Management Division 2015).

Conservation Objective Theme	Indicator Number	Indicator Title
Productivity	1	Total biomass, abundance, and spatial distribution of **key species** in each **trophic level**
Biodiversity	2	Number of species per **trophic level** within each **habitat type**
	3	Number of species-at-risk within the MPA (by each habitat if required)
Habitat	4	Total area and location of each **habitat type** within the estuary and the proportion and frequency that is disturbed or lost
	5	Hydrodynamic and sediment regime within the estuary (e.g., sediment infilling)
	6	Temperature and salinity within the estuary

Conservation Objective Theme	Indicator Number	Indicator Title
	7	Nutrient concentrations within the estuary
Pressures/Threats	8	Commercial and recreational fishing catch per unit effort (CPUE)
	9	By-catch number per impacted species
	10	Number of non-indigenous species in the MPA (within each **habitat type** if required) relative to non-indigenous species in region
	11	Degree of human induced perturbation or loss
	12	Contaminant concentrations within the estuary

CURRENT STATE OF MONITORING

While monitoring in the Musquash Estuary MPA has been conducted opportunistically to date, the research conducted has produced valuable baseline information, which will provide a useful basis for comparison in the future and inform how monitoring is conducted going forward. Under the current monitoring program, statistical deviation from baseline was indicated for 8 out of 12 indicators. However it was noted that deviations from baseline is not always a trigger for management actions. Thresholds and limits based on known risks could also be used. For example: Environmental thresholds are available for contaminant metals in sediment through the Canadian Council of Ministers for the Environment (CCME) and bacterium for the purposes of food safety through the Canadian Shellfish Sanitation Program (CSSP). In these cases, use of thresholds may require less intensive sampling and could be incorporated within the monitoring program when available from other sources. The applicability of thresholds to environmental health of the Musquash MPA would still need to be assessed.

The impacts of external stressors on the Musquash MPA ecosystem were generally considered to be relatively minimal, which suggested that the MPA could act as a reference point of naturalness for other areas in the Bay of Fundy. The opportunity for the MPA to serve as a reference point emphasized a need to evaluate interoperability of monitoring activities within the MPA with other datasets that cover larger spatial scales, i.e., the entire Bay of Fundy. A standardized network of monitoring would support the comparison of indicator trends within the MPA versus the broader Bay of Fundy area.

Gaps in the current monitoring program, and, as a result, in the baseline data available to characterize the area, can largely be attributed to the difficulty of obtaining data in certain areas of the MPA. For this reason, it has been challenging to establish what is meant by “baseline conditions” for many indicators, and to assess the adequacy of the data collected to describe baseline conditions at consistent scales or levels of certainty.

The following sections review monitoring activities and results from the 2014–2019 time period for indicators within each conservation priority theme, as listed in Table 1.

PRODUCTIVITY AND BIODIVERSITY

Data detailing the composition and/or abundance of nearshore fish communities reflected three of eight identified habitat types within Zone 2 (Figure 1). All species recorded in the nearshore were classified as carnivores. Data detailing the composition and/or abundance of bird communities were representative of four habitat types associated with the marsh areas surrounding Zone 1 (Figure 1), covering a spectrum of trophic categories. Benthic infauna included key suspension and deposit feeding species in two habitat types within Zone 2 and Zone 3 (Figure 1).

Sampling for different species groups (e.g., fish, birds, or infauna) requires different sample designs, equipment, and expertise. Not unexpectedly, data derived from each study are limited in overall ecosystem-level coverage with individual elements of the ecosystem being captured for discrete periods of time and locations. These data are not yet linked together in aggregate over time and the monitoring program should incorporate methods to examine this information more holistically for overall health of the ecosystem.

Some organism data such as fish and benthic infauna had been collected at multiple times within a year. Preliminary analysis demonstrated that periods of peak information (abundance, species) could be used prioritize sampling periods. Similar approaches should be structured for other organism and physical features (e.g., presence of juveniles, freshwater inputs) where seasonal fluctuations are yet to be known.

Comparison of species composition and abundance within the MPA against the broader Bay of Fundy area will also be important moving forward.

Indicator 1 (Total biomass, abundance, and spatial distribution of **key species** in each **trophic level**): Neither abundance nor biomass of key species are considered adequate proxies for productivity. It was suggested that the indicator, as stated, cannot be monitored and should be revised to focus on specific elements of productivity that are currently valued. Examples might include, primary productivity within areas of the estuary less subject to tidal variability, or an organism-based proxy such as number of juveniles or age-class information on species known to be persistent within MPA.

Indicator 2 (Number of species per **trophic level** within each **habitat type**): Species number was examined. For fish, bird, and benthic infauna datasets, variability in the number of species recorded was influenced by location, time and sampling intensity. Continued monitoring should be applied using standardized methods to ensure that time series data are comparable. Although the number of species is identified as the base metric for this indicator, multivariate approaches that assess changes in species number and abundance relative to the effects of location, habitat, environment, and sampling period are recommended to inform changes in biodiversity.

Indicator 3 (Number of species-at-risk within the MPA): Only the bird surveys had intermittently recorded species-at-risk (SAR). It is important to note that monitoring strategies within the MPA were not focused on measuring SAR, and the Musquash MPA has not been noted as core area (i.e., critical habitat) for any *Species at Risk Act* (SARA)-listed species. The presence or absence of SAR can be indicative of changes in biodiversity, similar to other non-SARA-listed species. As such, the absence or reduction of SARA-listed species in the data does not necessarily reflect a negative outcome associated with the MPA and its regulations. It is

recommended that the role of habitat within the MPA should be evaluated to determine whether a SAR-focused indicator should be applied relative to the conservation objectives of the MPA, or whether the presence of SARA-listed species should be considered in a similar manner as non-listed species (e.g., captured in changes in richness). If the SAR-focused indicator is merited, a more targeted monitoring approach should be considered, i.e., methods that focus on specific species traits, acoustic technologies, or those with higher sensitivity like eDNA.

HABITAT

Habitat-related datasets included geomorphology, sedimentation, hydrodynamics, and water quality (e.g., temperature, salinity, and nutrients). The scale of variability for these data can range from hours, days, and seasons, for tide and weather influenced measurements such as water quality to years or longer for habitat types, geomorphological features, and large scale hydrodynamics. Monitoring changes for these habitat characteristics need to consider different time scales for different data but also the means to connect these measurements into an overall understanding of change.

Indicator 4 (Total area and location of each **habitat type** within the estuary and the proportion and frequency that is disturbed or lost): Habitat maps based on bottom type and tidal levels provided a baseline on which to estimate area occupied by each habitat type. Data used to develop these maps were collected over a multi-year timespan. Although not anticipated to change rapidly, this information should be updated and re-mapped in order to periodically assess how habitat is changing within the MPA (Table 1), which ultimately will tie into biological focused indicators, e.g., Indicators 1–3. Additional research should focus on how ecosystem productivity is stratified by habitat, identifying which habitat types are associated with important/unique ecosystem functions, e.g., spawning areas, juvenile nurseries, areas of high carbon sequestration.

Indicator 5 (Hydrodynamic and sediment regime within the estuary): Changes in hydrodynamic and sedimentation regimes are not part of an ongoing monitoring program. Data to support these have not been assessed since 2013. Although external forces such as Bay of Fundy currents, tide, and physical hydrographic features of the MPA are not expected to have changed during this period, periodic changes from upstream freshwater sources and the surrounding coastline via rainfall, and storm surge are not known. Changes to these and associated patterns of sedimentation can have a significant influence on the distribution of habitats (Indicator 4) and, thus, biological functions (Indicators 1–3). As previously recommended (Cooper et al. 2014), monitoring of the hydrodynamic and sedimentation regime could be designed around a coupled hydrodynamic-sediment model, with baseline data collected broadly throughout the MPA to improve understanding of spatial and temporal variability, and to identify locations and seasons of interest under a pressures/threats monitoring approach.

Indicators 6 and 7 (Temperature, salinity, and nutrient concentrations within the estuary): Water quality, including temperature, salinity and nutrient concentration(s), are more dynamic in a tidal estuary, particularly in the Bay of Fundy, where Musquash experiences significantly greater tidal range compared to tidal estuaries in other bioregions. The current baseline water quality information has been conducted over discrete spatial and temporal scales with comparable information collected outside of the MPA but limited continuous data to inform on effects of tide and weather. Some additional work should be conducted with continuous measurement

techniques to assess the degree to which periodic measurements are representative of larger time scales.

PRESSURES AND THREATS

Several data sources were explored under a pressures and threats category within the MPA and Administered Intertidal Area (AIA). These include observations from the aquatic invasive species monitoring program, commercial logbook data for fisheries and fisheries bycatch, accumulation of shoreline debris, periodic measurement for metal concentration in sediment, and bacteria in surface water. There was some information for aquatic invasive species, fishing pressure, and bycatch within the MPA.

Indicators 8 and 9 (Commercial and recreational fishing catch per unit effort, and bycatch number per impacted species): Little commercial fishing activity is reported inside of the MPA, but that is in part due to reporting requirements that are not precisely geo-referenced and recorded on a larger scale (fishery management areas) than the MPA area. Pressure/threat from commercial fishing needs to be reassessed to determine which specific threats are of concern and to develop a means to gather the information relevant to the MPA.

Indicator 10 (Number of non-indigenous species in the MPA relative to non-indigenous species in region): Aquatic invasive species (AIS) surveys have been completed for tunicates, green crabs, and other invasive species. Green crabs have been observed in the MPA since the 1950s. Tunicates had not been observed within the MPA during monitoring periods 2012 to 2015 although they were in other areas throughout Southwest New Brunswick. Periods of low salinity near the sampling location at Five Fathom Hole were thought to have contributed to this negative observation. In subsequent years, the MPA sample location was moved to a position within the Zone 2 of Musquash Harbour, presumably less susceptible to periods of low salinity. This new data will be included in the next monitoring assessment. Climate anomalies (warm years), which are becoming more common in the region, can lead to establishment of non-indigenous species. Continued AIS monitoring in conjunction with indicators 6 and 7, can provide a source of information detailing how the Musquash MPA ecosystem is being impacted by a changing climate. The AIS monitoring should consider how low salinity, as well as extreme temperature events experienced within the MPA, would influence the persistence of AIS.

Indicator 11 (Degree of human induced perturbation or loss): Debris surveys are conducted annually within AIA of Zones 2 and 3. Much of the debris identified was thought to be derived from land-based sources, and a small portion of the debris could be identified as marine, potentially arriving from outside the managed zones. The amount of debris has been steadily declining, likely due to blocking off certain areas and by increased recreational presence to discourage dumping. Although a continued debris survey is encouraged, additional monitoring under this indicator should be explored to inform on human induced perturbation or habitat loss throughout the MPA.

Indicator 12 (Contaminant concentrations within the estuary): Metals and bacterial contaminants have been monitored in the MPA over several sampling years. Concentrations of metal contaminants and bacteria within the MPA can be compared against established thresholds but require investigation to determine the degree to which concentrations are of natural versus human origin.

Monitoring of metal contaminants could be conducted using sediment sampling more widely distributed throughout the MPA (addition of Zone 1), or selected on the basis of a hydrodynamic-sediment model to target locations of concern. Additional methods such as testing for contaminants in Atlantic silverside should be considered to obtain a time-integrated sample of contaminant availability to resident species.

Bacterial concentrations that have been monitored through CSSP provide a baseline time series of bacterial loading throughout the estuary during the spring, summer, and autumn, and its change during rainfall events. Microbiological contamination exceeded thresholds when sampling occurred after rainfall events. This type of bacterial contamination monitoring was designed to inform shellfish harvest management and should be reviewed in terms of appropriate methodologies for monitoring broader ecosystem-level conservation objectives. Some considerations are to add more sampling in Zone 1; assess correlations between salinity and measured densities of *Enterococci* versus fecal coliform; conduct additional sampling to determine variability and trends; or comparison with other estuary locations in the Bay of Fundy.

Sources of Uncertainty

There are numerous sources of uncertainty associated with each of the indicators monitored, as well as considerations when applying the results of this monitoring to assess the state or changes within the MPA. Many of these indicators have not been developed sufficiently; for example, in terms of the development of appropriate triggers or thresholds to suggest management action, to be used in this context without further discussion. Comparison of the results obtained from within the Musquash MPA to results from similar types of monitoring at locations outside the MPA might help to provide useful context in terms of the scale of variability or trend relative to other locations or sampling programs.

CONCLUSIONS AND ADVICE

Progress has been made to identify a baseline of information for each of the 12 indicators; gaining insight as to what is possible to measure, and the timeframes that measurements need to occur. However, gaps in ongoing data collection persist, which impedes the ability to fully implement and report on the current ecosystem-based monitoring plans ability to describe how the ecosystem functions or to identifying thresholds of concern.

The use of both DFO and partner/stakeholder monitoring activities has guided a collaborative approach to baseline monitoring and has helped to support broader community interest and understanding of this area. Additional effort is required to integrate the sometimes disparate data sources into a coherent story that links monitoring results to the status of conservation priorities and objectives, as well as to the impact of human pressures.

Periodic assessment of the monitoring program would benefit from more specific indicators under the three conservation categories. Further refinement of what is intended (and hence, monitored and assessed) by terms such as habitat type, key species, and baseline conditions would facilitate a more consistent approach to the assessment and communication of the data.

Ongoing prioritization of monitoring activities that communicates with key data providers and local collaborators (e.g., through a Monitoring-focused subgroup of the Musquash Advisory Committee) would help to facilitate an adaptive management approach. Information collected on pressure/threats indicators should reflect management and stakeholder concerns as they arise

and evolve over time. It is expected that these indicators will need to be periodically updated, to ensure they can be used to inform management decision-making in a timely and effective manner.

Overall, this review indicates there is sufficient baseline data to monitor changes in biodiversity for marsh birds within the AIA of Zone 1; changes in biodiversity for benthic infaunal species within three habitats of Zone 2 and 3; changes in water quality within Zones 1 and 2; changes in marine debris located at Black Beach (AIA adjacent to Zone 2) and Gooseberry Cove (AIA adjacent to Zone 3); and changes in bacterium (fecal coliform) within Zones 1 and 2. More data are needed for: productivity to inform on ecosystem; abundance and health of harvested species; biodiversity to meet the current indicator categories for key species in each habitat type; changes in percent habitat coverage; a sedimentation and hydrodynamic model; presence of species-at-risk and persistence of non-indigenous species; fishery effort and bycatch; and human induced perturbation or loss.

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SOURCES OF INFORMATION

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Cooper, A., Abbott, M., Allard, K., Chang, B., Courtenay, S., Doherty, P., Greenlaw, M., Ipsen, E., Koropatnick, T., Law, B., Losier, R., Martin, J., Methven, D., and Page, F. 2014. Musquash Estuary Marine Protected Area (MPA): Data Assessment. DFO Can. Sci. Advis. Sec. Res. Doc. 2014/001: v + 57 p.

Davies, J., Singh, R., and Buzeta, M.-I. 2008. Musquash Estuary Marine Protected Area ecosystem framework and monitoring workshop report. Can. Tech. Rep. Fish. Aquat. Sci. 2787: 23 p.

DFO. 2011. Musquash Estuary: A Proposed Monitoring Framework for the Marine Protected Area and Intertidal Area Administered by Fisheries and Oceans Canada. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2011/040.

DFO. 2013. Review and Assessment of the Baseline Data for the Musquash Estuary Marine Protected Area Monitoring Indicators. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2013/073.

Oceans and Coastal Management Division (OCMD). 2015. Musquash Estuary Marine Protected Area Ecosystem Monitoring Plan (2014–2019). Can. Manuscr. Rep. Fish Aquat. Sci. 3077: v + 17 p.

Singh, R. and Buzeta, M-I. 2007. An ecosystem framework for the management of Musquash Estuary marine protected area. Can. Tech. Rep. Fish. Aquat. Sci. 2707: v + 27 p.

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