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Proceedings of the Regional Framework Discussion on Marine Safety and Area Planning Data Products

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Dartmouth, Nova Scotia

Co-chairs: Fred Page and Kristian Curran
Editor: Kristian Curran

Bedford Institute of Oceanography
Fisheries and Oceans Canada
1 Challenger Drive, P.O. Box 1006
Dartmouth, N.S. B2Y 4A2

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Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

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TABLE OF CONTENTS

SUMMARY

The Government of Canada aims to promote safe and efficient marine transportation through regulatory oversight, inspections, enforcement measures, response planning and preparation. To be well prepared for and ready to respond to marine incidents associated with vessel-based oil spill events in Canadian waters, a collaborative “whole-of-government” approach has been adopted in support of prevention, preparedness, response, and recovery in the event of an unlikely marine incident at sea. This multi-stakeholder regional pilot program requires information on the spatial and temporal distributions of biological resources for inclusion in the oil response plan. As part of the regional peer review process, a meeting was held on March 16-17, 2016, at the Bedford Institute of Oceanography in Dartmouth, Nova Scotia. The focus of the meeting was to engage in a preliminary discussion with participating federal government agencies and response organizations on the biological and human activity data products being developed in support of oil spill response planning for regional pilot initiatives in the Bay of Fundy approaches to the Port of Saint John, New Brunswick, and approaches to Port Hawkesbury-Strait of Canso, Nova Scotia. The discussion was guided by a series of presentations. This Proceedings document is the record of meeting discussions, recommendations, and conclusions. A Science Advisory Report was not a product of the meeting.

INTRODUCTION

Canada has the world's longest coastline at more than 243,000 km in length. Each year, millions of tonnes of products are shipped off its coasts, with the Government of Canada working in a number of ways to ensure maritime vessel safety and protection of the marine environment (Transport Canada 2016). The Government of Canada aims to promote safe and efficient marine transportation through regulatory oversight, inspections, enforcement measures, response planning, and preparation. To be well prepared for and ready to respond to marine incidents associated with vessel based oil spill events in Canadian waters, a collaborative "whole-of-government" approach has been adopted in support of prevention, preparedness, response, and recovery in the event of an unlikely marine incident at sea. This approach consists of an umbrella national Area Response Planning (ARP) initiative that includes four pilot sub-initiatives; one in British Columbia, one in Quebec, and two in the Maritimes. One component of the Maritimes regional pilot is a multi-stakeholder program that requires information on the spatial and temporal distributions of biological resources for inclusion in the oil response plan.

As part of the regional peer review process, a meeting was held on March 16-17, 2016, at the Bedford Institute of Oceanography in Dartmouth, Nova Scotia. The focus of the meeting was to engage in a preliminary discussion with participating federal government agencies on the biological and human activity data products being developed in support of oil spill response planning for regional pilot initiatives in the Bay of Fundy approaches to the Port of Saint John, New Brunswick, and approaches to Port Hawkesbury-Strait of Canso, Nova Scotia. Specifically, the objectives of the science discussion were:

1. identify components of a proposed regional template concerning marine species for their relevance in support of oil-spill response planning;
2. identify factors to be considered in a regional prioritization of marine species of relevance to Fisheries and Oceans Canada (DFO) to be mapped;
3. identify information sources available for spatial and temporal mapping of marine species of relevance to DFO;
4. identify methods to be used for spatial and temporal mapping of marine species (including level of uncertainty) of relevance to DFO; and
5. identify knowledge and data gaps, and potential approaches and methods to address gaps.

The meeting co-chair, Dr. Fred Page, introduced himself, followed by an introduction of meeting participants (Appendix 1). The co-chair thanked meeting participants for attending the DFO Regional Peer Review Process. Meeting Co-chair Mr. Kristian Curran then provided a brief overview of the Canadian Science Advisory Secretariat (CSAS) science advisory process and invited participants to review the meeting Terms of Reference (Appendix 2) and Agenda (Appendix 3). The discussion was guided by a series of presentations. It was agreed that review of the example cod and marine plant species biological information sheets would be removed from the agenda to allow more time for discussion on other meeting topics (several other examples of the species biological information sheets were presented). This Proceedings is the record of meeting discussions, recommendations, and conclusions. A Science Advisory Report was not a product of the meeting.

BIOLOGICAL SUMMARIES

Background

The Marine Safety Program Initiative (MSPI) is a pilot initiative to develop a risk-based approach to marine spill response planning. Environmental response regimes for vessel-based spills are a requirement in Canada, and the MSPI pilot initiative is a revisit of existing response plans for review, update, and expanded scope. The Port of Saint John, New Brunswick, and Port Hawkesbury-Strait of Canso, Nova Scotia, are the two pilot sites being tested in DFO Maritimes Region. The spatial scale of the two pilot sites are in the order of 50 nautical miles (nm) radius from the centre point of each response area. The co-chair indicated that risk assessments are being developed by a consultant on behalf of Transport Canada, with ARP plans to be developed by Task Forces co-chaired by Transport Canada and the Canadian Coast Guard. The ARP plans are to address a range of possible spill scenarios at each pilot site that include likely types of oil, oceanographic conditions, biological and ecosystem characteristics, and human activities within the response area.

The meeting co-chair indicated that he was looking to participants to identify what they believe would be useful in terms of marine spill response information needs for the two regional pilot initiatives (e.g. species distribution, status, behavior, seasonality, etc.). It was noted that the intent of this peer-review framework discussion meeting is to focus on an approach to characterize and document information related to marine species and marine ecosystem components that will factor into the two pilot ARP plans. No Working Papers were prepared for the meeting; however, a proposed species summary table and example species biological summaries were presented, as was human-use information. Considerations for data management associated with the pilot initiatives were also discussed.

BIOLOGICAL Summary table

Overview of Biological Summary Table

The science lead reviewed a proposed species table, which is to act as a summary of species that might be present in a pilot area and the most relevant information needed by response planners and responders (Appendix 4). The biological groupings of focus in the pilot initiatives are: mammals, amphibians/reptiles, fish, invertebrates, and plants. The summary table included highlights of information on species groups and key species (e.g. spatial and temporal presence, vulnerability/sensitivity to a spill, and human interest such as at-risk species or fisheries) and is to be linked to a series of species biological information sheets that provide more detailed information on each species. The summary table is designed to allow area responders to quickly identify the spatial and temporal presence of species of significance in a pilot area, as well as indicators of their social, economic and ecological importance, which will be linked to the more detailed species biological information sheets.

In general, meeting participants felt that the summary table was an effective way to summarize species that may be present in a pilot area. Moving forward, it was suggested that other summary tables could be created for smaller geographic areas corresponding with existing emergency spill response plan areas (e.g., Bay of Fundy has 11 areas identified for response purposes). A participant noted that the summary table could be organized as a series of filters, using the following criteria to successively short-list species:

1. presence;
2. vulnerability to spills;

3. human-use/human interest (e.g., fishery or at-risk); and
4. potential to mitigate.

Another participant inquired if the table could be organized by priority species (e.g. most vulnerable) and the science lead indicated this could be considered. It was agreed by meeting participants that the 'Proportion of Population in the ARP' column in the table be incorporated into the recovery potential of the species in the vulnerability section.

Discussion of the summary table then focused on human activities. A participant asked if human activities could be ranked by priority in the table, and the science lead suggested that this type of ranking would fall into the human activities category already in the table (Appendix 4). Another participant indicated that a separate human activities table could be developed, but the species summary table and species biological information sheets should at minimum indicate if a species is part of a fishery or considered at-risk. It was suggested that a column be added to the species summary table that identified any species listed pursuant to the *Species at Risk Act* (SARA), given such species might warrant additional considerations (e.g. legal requirements for a permit) when attempting to mitigate in the event of a spill.

There was discussion on the possibility of incorporating 'mitigation potential' into the summary table. It was agreed by meeting participants that adding a column to capture mitigation would be of benefit, as if mitigation of species to a spill is not feasible, effective or advisable this would be helpful to area responders in prioritizing species during a response. An area responder at the meeting indicated that mitigation is very complex and might require further discussion with area responders whom have experience applying the range of mitigation measures in the event of a spill. Similarly, an area responder noted that it would be helpful to know if species are sensitive to certain mitigation measures that should not be used in the event of a spill (e.g. adding dispersants). The science lead asked if the summary table should exclude species if they cannot be mitigated. An area responder noted that, in the event a species cannot be mitigated, it is still helpful to know of the presence of the species, as area responders would want to ensure that mitigation does not indirectly impact a species in an adverse manner (e.g. moving a leaking vessel to a sensitive marine area). It was agreed that species of regional interest present in a pilot area should be included in the summary table.

In terms of additional considerations, it was suggested that the table include a column on 'horizontal gradient' (e.g. shore, intertidal, near-shore, mid-shore, and off-shore) to complement the columns in the table on vertical integration. An area responder supported addition of a horizontal gradient column into the table. The science lead sought clarity from area responders regarding specific definitions they may operate under for coastal, near-shore, and off-shore delineations of the marine environment. A responder noted that they work under the delineation of shoreline, sheltered, and unsheltered rather than coastal, near-shore, and off-shore. It was acknowledged by meeting participants that there are differences in how the marine environment is delineated by ecology (e.g. shore, intertidal, near-shore, mid-shore, off-shore) versus area response (e.g. shoreline, sheltered, and unsheltered), suggesting that further thought be given of how best to reconcile these two different views.

Last, a participant asked if a species sub-group classification scheme is to be made available for all pilot areas nationally, in the short-term following a recent Canadian Science Advisory Secretariat (CSAS) meeting held in Ottawa where such a scheme was discussed. The co-chair noted that for functional purposes, a revised classification scheme is unlikely to be available over next 6-12 months.

Prioritization of Species

There was discussion of how best to select species for inclusion in the summary table. The co-chair clarified the first step in this research is to complete an area response plan (biological parameters defined by ability to mitigate), while a next step might be application of the information to post-spill monitoring. With this in mind, the co-chair asked meeting participants to focus on species prioritization from a response planning point of view. It was acknowledged that prioritization of species in response will change by area.

Meeting participants liked the idea of organizing the table into a series of 'filters': information on biology in the first columns followed by information on vulnerability/sensitivity, human use/human interest, and mitigation feasibility. It was envisioned that, as an area responder worked through these types of columns, the list of species would conceivably get shorter. A participant asked how oceanography is factored into the vulnerability columns of the table, and the co-chair noted this type of information would be incorporated into the broader ARP; it is not the focus of discussion at this meeting. An area responder noted that resources are typically limited in the event of a spill (e.g. time, personnel, etc.) and that the summary table should be designed to consider this aspect of area response planning; again, it was felt that addition of a column dedicated to mitigation potential would address this comment.

Overall, meeting participants supported the proposed structure of the species summary table, feeling it generally captured an appropriate level of species information and was organized in a manner that allowed for species prioritization suitable for area response purposes.

BIOLOGICAL SUMMARY DOCUMENT

Overview of Biological Summary Template

A species biological summary template was reviewed. The template (Appendix 5) included several sections used to identify important details of the species from a spill response perspective:

1. summary;
2. life history;
3. threats and designation;
4. importance (ecologically and economically);
5. distribution (spatial and temporal);
6. vulnerability to petroleum products;
7. additional information; and
8. references.

It was noted that the summaries are to include all available sources of information, including, where appropriate, non-traditional (science) sources of information such as Traditional Knowledge, Community Knowledge, and media reports on species sightings. This type of information typically is not captured in scientific datasets. It was emphasized that a challenge remains in the different levels of information available for individual species within each grouping.

A participant asked if the proposed species biological information sheet is being used in other pilot initiatives (e.g. nationally). It was indicated that DFO Maritimes is being proactive in leading development of this type of template, although other pilot initiatives have adopted certain

elements, yet are also pursuing their own unique templates that can be cross-compared at a later date. The co-chair noted that the intent of the pilot approach is for regions to explore and develop a range of possible tools that can be applied to spill response planning in separate settings. The overall philosophy of capturing and documenting biological information, however, remains universal throughout all pilot initiatives.

The co-chair noted that working through various examples of the template would help identify data limitations, data gaps, etc., including how to proceed with spill response in the absence of information (e.g. 'Vulnerability to Petroleum Products' will still be a challenge). To demonstrate how the proposed species biological information sheet might look like in practice, various science leads reviewed example species templates.

Components of Template

A meeting participant recommended that the information sheet include a section on the potential for successful mitigation per species in the event of a spill. The co-chair noted that this would depend on the nature of the spill (e.g. floating oil, volatile oil, etc.), but it could be incorporated into the sheet. This will require input from those with expertise in response and mitigation.
It was noted that the species sensitivity to petroleum products is unknown, indicating that there is a need for further consideration of toxicology, including the involvement of toxicologists in future discussions on all species biological information sheets.

Example: Marine Mammals (Fin Whale)

Jolinne Surette presented a draft summary for Fin Whale. It was noted that spatial data incorporated in the summary was only from the DFO Whale Sightings Database. No local or traditional knowledge, opportunistic sightings reported in media, etc. were included in the summary. Known and probable occurrence maps used in the summary were presented.

The presenter indicated that the Mingan Island Cetaceans Study organization is presently working with DFO to tag Blue Whales and Fin Whales. It was noted that filling out the temporal distribution information for Fin Whale remained a challenge due to limited sightings information. It was suggested that local or traditional knowledge could be captured, tracked, and incorporated more effectively into the information sheet. The presenter reviewed gaps and limitations of data used to describe Fin Whale and that Fin Whale data for the two pilot initiatives represents two ends of the spectrum (i.e. lots of data for the Bay of Fundy versus very limited data for eastern Coastal Nova Scotia). The discussion focused on various elements of the information summary.

Factors to be Considered for Regional Prioritization

Area responders participating in the meeting noted that they have limited control over managing the behaviour of whales in the area of a spill, but they also noted that they would want to know if a given whale species was known to be present in an area. In terms of prioritizing species for mitigation, the responders noted that there is a need to consider the behaviour of the oil against the known behaviour of the species.

Information Sources for Spatial and Temporal Mapping

A participant noted that data from the Whale Sightings Database, Population Ecology Division, Dartmouth, NS (DFO Maritimes Region), had been reviewed in a recent Marine Protected Area-related regional peer-review process. An outcome of the peer-review meeting was that the DFO Whale Sighting Database is based on presence only, with no consideration given to sightings level of effort. The participant also noted that species distribution models, based on environmental attributes common to whale sightings locations, have been completed (e.g. Blue

Whale). In general, the DFO Whale Sighting Database is considered incomplete and does not include all known sightings. For example, passive acoustic monitoring (PAM) data is available for St. Anns Bank and the Scotian Shelf but is not included in this database.

The participant indicated that PAM data from the Scotian Shelf-edge suggests that Fin Whales are present year round in the area, with a lot of detections being observed in the winter time when the species is believed to be breeding. The participant noted that PAM data from St. Anns Bank, Scotian Shelf, will become available and analyzed in April 2016, and this may be a good source of seasonal information for whales proximal to the Port Hawkesbury-Strait of Canso pilot area. Last, it was noted that the North Atlantic Right Whale (NARW) Consortium Database, operated by the New England Aquarium in Boston, Massachusetts, is a good source of whale-related data for the Gulf of Maine and Bay of Fundy. The database includes data on several whale species and not just NARW. In addition, the database includes effort data associated with active whale surveys on-going in the area (the database includes DFO, National Oceanic and Atmospheric Administration (NOAA), and other data sources).

The co-chair asked if participants preferred maps based on point data rather than more complex analytical maps such as probability of occurrence. A participant noted that point data is often not informative for whales, as it only amounts to observed versus unknown locations, suggesting that more complex analyses for lesser known or unmonitored species might be informative as a supplement to sightings data. Further, the participant noted that a lot of the sightings data that was presented is very old and perhaps represents an outdated view of Fin Whale presence/absence proximal to the pilot areas. The co-chair agreed that probability maps would be of assistance to the science table for the lesser known species. A participant then asked if whale observations from other DFO databases were available. The science lead noted that whale watching companies exist in the southern Gulf of St. Lawrence and northern Cape Breton, although data from these sources has not been included in the proposed information sheet. Other potential data sources included the ferries from Marine Atlantic (marine mammal observers), the Whitehead Laboratory at Dalhousie University, and possibly from Cape Breton University. Also there is an aerial survey planned for the summer of 2016, for the region to update the work that was done in 2007 on population estimates. NOAA also has created a comprehensive regional density distribution maps (CetMap) could also be useful.

Methods for Mapping

The co-chair asked meeting participants what type of mapping format would be effective for whales (e.g. sightings maps, point data plots, species distribution models, etc.). A participant involved in area response planning indicated that responders typically focus on recently-observed locations (or sightings data) supplemented by guidance from experts. The participant further noted that it is helpful to have observations organized by months or by season, in order to demonstrate typical absence/presence of a species in the area throughout the year. It was noted that this type of information is captured in the temporal table within the information sheet, but incorporating it on to the maps might be more informative. Another participant noted that this could be achieved by colour coding the mapped observations consistent with the colour coding used in the table. Another participant noted that doing seasonal sightings data maps can work, but the caveats associated with using seasonal data must be made very clear. There may be no “official” sightings for the winter season, but it is known that whales are present year round in the Bay of Fundy. A participant cautioned that any absence/presence map should be fully described so as not to portray an incorrect sense of species distribution.

Information Limitations and Gaps

An area responder noted that the life stage of whales (calf versus adult) is not an important criterion in prioritizing species during spill response. However, Science indicated that there are

specific life-history and behavioural differences that may influence vulnerability to oil and mitigation potential. Further, from a response perspective, responders simply need to know what is known or likely to be in the area of a spill. It was recognized that this level of information might differ from that of public interest, so it was recommended that all available information be included in the species information sheets (not just information of relevance to area responders). The co-chair noted that the need for peer-reviewed methods to deal with marine mammals as well other species in ARP has been recognized by the MSPI panel. A participant mentioned that there is a lack of expertise dealing with the response to oiled marine mammals on the east coast.

Additional People to Consult

It was recommended that Dr. Hillary Moors-Murphy (DFO Science) be contacted to discuss additional data sources for whales that could be used in the information sheets.

Example: Marine Reptiles (Leatherback Sea Turtle)

Quinn McCurdy presented a draft Leatherback Sea Turtle summary. Discussion focused on the following elements of the summary.

Information Sources for Spatial and Temporal Mapping

A meeting participant noted that the Canadian Sea Turtle Network (CSTN) might be a good source for marine turtle data, suggesting that Dr. Mike James of DFO Science be contacted prior to engaging CSTN. It was further noted that the DFO observer database might have information on marine turtle bycatch that could be used, and that Heath Stone of DFO Science would be a good contact for this data. Finally, SARA logbooks (DFO Commercial Data Division), satellite tagging data, and *Notice to Mariners* calls and observations are additional data sources that could be explored. A participant noted that some Leatherback Turtle Critical Habitat falls within the Port Hawkesbury-Strait of Canso pilot area and suggested the species' SARA Recovery Strategy also be consulted to determine if any additional requirements are needed to account for this type of habitat. A participant noted that provisions pursuant to SARA may limit what can be done in Critical Habitat in the event of a spill and that additional permits may be required.

Information Limitations and Gaps

A participant advised that the Leatherback Sea Turtle Recovery Potential Assessment (RPA) and SARA Recovery Strategy be consulted for additional information on Potential Biological Removal (PBR), in order to get a sense of how many Leatherback Turtles could theoretically be removed from the population (i.e. deceased) during mitigation of a spill without having a significant negative impact on the population as a whole. It was acknowledged that data for Leatherback Turtle is limited.

Additional People to Consult

It was recommended that the science lead contact Dr. Mike James (DFO Science) to discuss additional data sources for marine turtles that could be used in the information sheets.

Example: Invertebrates (Lobster)

Claire Mussells presented a lobster summary and discussion focused on the following elements.

Information Sources for Spatial and Temporal Mapping

It was noted that grey zone lobster data is available from the DFO Commercial Data Division, which might be of importance given the grey zone partially falls in the Bay of Fundy-Port of Saint

John pilot area. Other sources of lobster-related information include site-specific Local Ecological Knowledge (LEK) reports available in the literature, which sometimes include known spawning areas, etc. Similarly, projects-specific Environmental Assessments proximal to pilot areas could also be a source of additional information, as well as DFO Significant Habitats: Atlantic Coast Initiative (SHACI) reports and Remy Rochette with the Canadian Fisheries Research Network at the University of New Brunswick (UNB), Saint John. Last, a participant noted that the Fishermen-Scientist Research Society (FSRS) has long-running studies on juvenile lobster and the DFO/industry groundfish survey (ITQ survey) and scallop surveys often capture and record lobster as bycatch, which could be incorporated into the species information sheet (available in the respective DFO stock assessment reports).

An area responder noted that lobster nursery areas are of high importance for lobster, so it would be of benefit to map these areas where possible. The co-chair noted that this information is often anecdotal and is a data gap that is difficult to resolve. A participant noted that LEK from fishermen might be a good source of this type of information.

Methods for Mapping

Presence/absence mapping is helpful for lobster. It was generally felt that knowing where lobsters are located is preferable to other indicators such as lobster catch rate or lobster abundance. It was acknowledged that due to fishery reporting by Lobster Fishing Areas, it is not possible to disaggregate landings data into point data, though point data does exist from the ground fish survey and the FSRS sampling. A participant involved in response noted that for a species with wide distribution like lobster they would consider them to be everywhere.

Information Limitations and Gaps

The co-chair asked if a limit should be placed on historical data for inclusion in the information sheets. A meeting participant noted that older data might not apply to area response, but it could be helpful in evaluating compensation in the event of a spill (so sources of such data should be tracked). It was acknowledged that data on lobster larvae are very limited, although lobster larvae has been shown to be an important public consideration in previous spill response exercises within the US Gulf of Maine (particularly in consideration of the potential use of dispersants). It was agreed that the identification of spawning and other important areas would be helpful, although this also is a gap in understanding of lobster in the region. Last, it was agreed knowing about lobster seasonality would be helpful.

Additional People to Consult

It was recommended that the science lead contact Dr. Adam Cook (DFO Science) and Cheryl Denton (FSRS) to discuss additional data sources for lobster that could be used in the summary.

Example: Invertebrates (Scallop)

Quinn McCurdy presented a draft scallop summary and discussion focused on the following elements.

Information Sources for Spatial and Temporal Mapping

A participant noted that the ‘2005 NS Coastal Resource Mapping Project’ data source cited in the species biological information sheet was likely compiled using data collected in the 1990s, so is likely outdated. It was also noted that commercial and recreational scallop dive fisheries are possible sources of data; particularly, in southwest New Brunswick. Recreational licencing information itself may be informative.

Methods for Mapping

It was noted that presence/absence maps do not reflect areas of importance for scallop because of their wide distribution. From an operational response point of view, it was noted that this is a limitation because responders give priority to fishing areas and not species presence.

A responder noted that knowing concentration (e.g. using heat maps) and temporal distribution of fishery-related activities is helpful when implementing mitigation, such as use of dispersants that may impact fisheries or fishing grounds, though Science noted that knowing when and where pelagic larvae and benthic juveniles are present can be helpful from a resource and fishery productivity stand point, to predict or measure consequence after a spill event.

Information Limitations and Gaps

The co-chair noted it is often difficult to obtain data published as graphical maps, while going to the figure's original databases poses further challenges in correctly querying and replicating the data as it was published. It was agreed that, for scallop, maps of sensitive life stages would be informative for mitigation. Mapping seasonality of a fishery would also be helpful (this was discussed further during the human-use section of the meeting).

Additional People to Consult

It was recommended that the science lead contact Dr. David Keith (DFO Science) to discuss additional data sources for scallop that could be used in the information sheets. In addition, Dr. Peter Cranford (DFO Science) has undertaken research on the exposure of scallop to potential oil impacts and could be consulted on this aspect of the information sheet.

Example: Pelagics (Bluefin Tuna)

Karen Coombs presented a draft Bluefin Tuna summary and discussion focused on the following elements.

Information Sources for Spatial and Temporal Mapping

A participant asked what data takes priority in area response planning (e.g. landings, habitat, satellite tagging data, probability mapping, etc.). The co-chair noted that all of the data would be factored into any decision to respond in consultation with species experts.

Methods for Mapping

It was suggested that a map showing zero catch sets in the ARP areas may be helpful for determining presence/absence on a monthly or seasonal basis. A participant cautioned that any absence/presence map should be fully described so as not to portray an incorrect sense of species abundance. For example, consider the following presence of Bluefin Tuna map based on fishery records from 2002-2015 (Figure 1). To an untrained eye, the figure would suggest an abundance of Bluefin Tuna within the pilot area proximal to the Strait of Canso, Nova Scotia. The figure, however, represents all observations over a 13-year period and is not disaggregated by year or season, yielding a greater sense of abundance than might be expected for Bluefin Tuna disaggregated by year or by season. Thus, capturing the context of the data is an imperative to accurate interpretation of the associated data products.

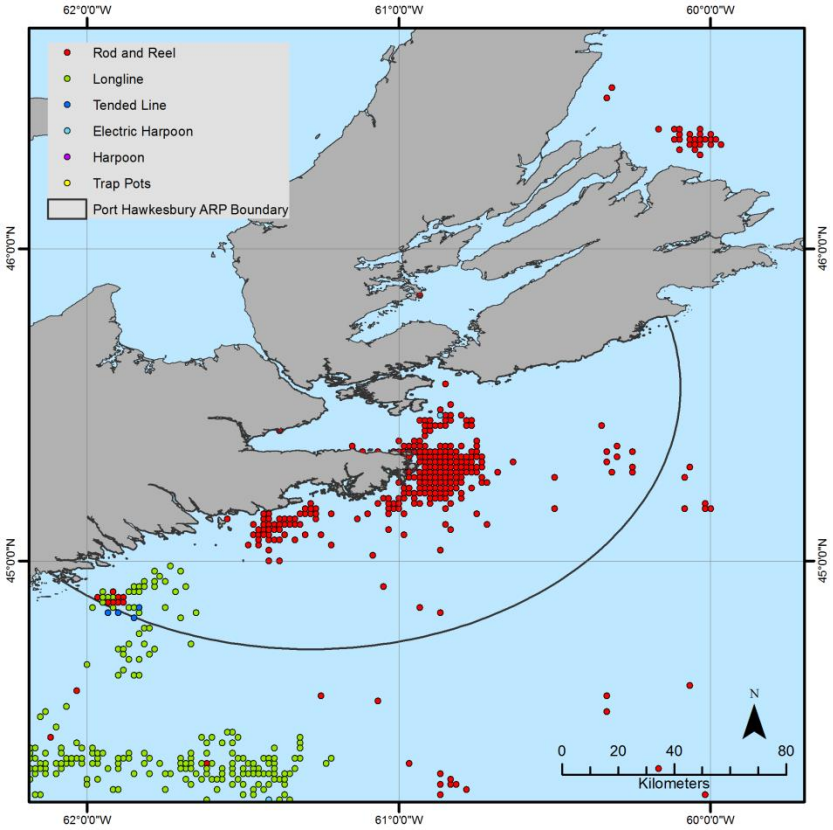

Figure 1. Distribution of Bluefin Tuna landings by gear type from 2002-2015 within the Port Hawkesbury-Strait of Canso Area Response Planning pilot site, Nova Scotia.

Information Limitations and Gaps

A participant noted that the data is representative of fishing by gear type and catch, which ultimately drives the spatial distribution patterns observed in the landings data; thus, the underlying driver of fishing patterns and catch rates should be used to better describe the data context presented in the species spatial distribution map. It was again emphasized that conveying the underlying context of data is very important.

Additional People to Consult

It was recommended that the science lead contact Dr. Alex Hanke (DFO Science) and Mr. Mark Fowler (DFO Science) to discuss additional data sources for Bluefin Tuna that could be used in the information sheets.

HUMAN-USE INFORMATION

Scott Coffen-Smout presented an overview of the human activity data inputs submitted in August 2015 to Transport Canada/Dillon Consulting for the MSPI area risk assessment (formerly World Class Tanker Safety Initiative, or WCTS). Revised human-use data layers are planned in 2016-2017 for incorporation into the ARP process. The human-use data layers presented included:

- commercial fisheries (pelagic, demersal, shark, invertebrate and inshore lobster composites);

- tourism (important whale watching areas);
- transportation infrastructure (small craft harbours);
- aquaculture lease sites in Nova Scotia and along New Brunswick's Fundy coast;
- legislated protected areas (*Oceans Act* designated marine protected areas and *Species at Risk Act* designated and proposed critical habitat); and
- important habitats (ecologically and biologically significant areas, or EBSAs).

The EBSAs have no regulatory designation or status, rather are defined based on peer-reviewed science knowledge of special ecosystem attributes that require a higher degree of risk aversion in management advice for activities conducted in these areas. It was agreed that maps associated with species important habitats (e.g. salmon) for non-listed species pursuant to SARA remain under the species biological information sheets and not be included in human-use/management special areas until any official designation.

The presenter noted that data formats for composite fisheries data layers included raster and polygon-gridded catch weight per 2-minute grid or km^2, as well as raster-gridded species presence or absence. There was discussion regarding the mapping of commercial fisheries by gear type and by season (e.g. quarterly maps), in addition to species-specific landings maps. It was suggested that landings maps could be included in the species biological information sheets to supplement the species distribution maps of abundance and biomass. With regard to the data integration of various data sources (i.e. landings and gear effort mapping, coastal fisheries mapping project, Aboriginal Traditional Knowledge (ATK) mapping, survey data, etc.), it was suggested that a symbology template would be useful to indicate the confidence level in the data when presenting multiple data sources. The co-chair asked if data exists for individual fisheries, and the presenter noted it is available but had been aggregated for simplicity by types of fish species (e.g. demersal, invertebrate). The presenter noted that fishery effort maps by gear type were also being compiled. Last, the co-chair asked if fishery landings and effort data can be compared to Research Vessel (RV) survey data, in order to see if they yield the same results. It was suggested that this could be done to help scale back the number of data sets to be included in the ARP.

The presenter noted that 'other' human activity data (e.g. tourism, transportation infrastructure, aquaculture, legislated protected areas, and important habitats) is formatted in polygons, points, and lines. The International Standards Organization (ISO) naming standards have been applied to data layers for compliance with data standardization, although some data layers may not meet ISO standards and may, therefore, have limited application in an ARP response context (e.g., species at risk distribution layers from the National Aquatic Species at Risk Web-mapping Tool). The presenter indicated that metadata samples from the data layers illustrated incomplete and inconsistent formatting; however, metadata is to be formatted to the ISO 19115 (2003) metadata style in revised versions of the data layers.

In view of the forthcoming data layers in the spring of 2017 under MSPI-funded contracts and class contribution agreements designed to fill gaps in DFO's coastal data and information base, questions were raised on the merits of integrating multiple data sources for optimum application in ARP. A coastal fisheries mapping project with the Fishermen's and Scientists Research Society, the Fundy North Fishermen's Association and the Guysborough County Inshore Fishermen's Association will produce data layers of fishers' LEK on fishing intensity, importance, area/species sensitivity and priority protection areas. Aboriginal traditional knowledge studies with Unama'ki Institute of Natural Resources, Maritime Aboriginal Peoples Council and the Confederacy of Mainland Mi'kmaq will result in data layers for targeted species, food, social and ceremonial (FSC) activities, commercial activities, and significant places.

A project with the Applied Geomatics Research Group at the Nova Scotia Community College (NSCC) will generate shoreline and subtidal classifications based on topo-bathymetric Lidar and orthophotos of the regional pilot areas in the Bay of Fundy-Port of Saint John and Port Hawkesbury-Strait of Canso. The presenter noted that data from these LEK/ATK projects may be at different spatial and temporal scales from DFO data, and the resulting polygons and lines may not easily integrate with existing points and gridded data. A discussion ensued on whether to merge disparate coastal data sets with government-sourced data into a single authoritative data layer for response organizations and Environment Canada's National Environmental Emergency Centre, or to keep forthcoming data layers separate. Merging data layers may result in the loss of data source identities and details for response prioritization, as well as technical complications in merging data sets at different spatial scales and geometries. Preserving separate data layers maintains data source identities and details for response prioritization.

It was noted that much of the data presented on human-use is guided by *Privacy Act* considerations; particularly, the 'Rule of Five'. Meeting participants inquired about the 'Rule of Five'. It was noted that pursuant to the *Privacy Act*, fishery-related information (e.g. landings) falls under personal or third party information and does not meet the threshold required to invoke the public interest clause for release publicly. Generally, public interest relates to urgent matters of health and safety and the existing jurisprudence supports this point of view. Internal to DFO, however, all fishery-related information is available to scientists for science purposes, although the Department's standard approach to reporting the information is to apply a variety of aggregation and de-identification techniques to depersonalize the data when fishery-related information pertains to "less than" five licence holders, vessel identifications, and fisher identifications ('Rule of Five'). Alternatively, DFO scientists can seek written permission from individual licence holders to report publicly on personal or third party information that pertains to an area (e.g. NAFO unit area) or fishery where less than five licences are held. It was clarified that such limitations should not apply to data being organized for spill response purposes and that DFO is working to ensure effective information sharing.

The co-chair asked if it made sense to integrate human-use information into the species biological information sheets and meeting participants supported adding reference to a fishery if the species is fished, with a clear note in the sheet to consult the human-use section of the ARP for additional information.

DATA CONSIDERATIONS

TYPE OF DATA

Meeting participants agreed that vector-based 'point data' (rather than raster-based data) is the most desirable form of data given its ease of incorporation into Environment Canada's geo-database, as well as its ease of analysis with other geo-spatial data layers.

DATA MANAGEMENT

Tobias Spears presented on ISO standards, naming conventions, and metadata, which require consideration as the regional science team compiles geo-spatial datasets for incorporation into the ARP. Metadata consistent with standards was noted as being particularly important. It was clarified that metadata is an element of geo-spatial databases that captures 'fit for use' of the data by cataloguing all data limitations a user should be aware when determining if a dataset is suitable for the user's intended purpose (e.g. if the dataset has a course geo-reference framework it may not be suitable for identifying small sub-marine hazards such as hidden rocks

or shoals). The presenter noted it is necessary that metadata fields be consistent with ISO Standards before data can be uploaded to Government of Canada external data portals.

The presenter emphasized the importance of employing a consistent naming convention for all datasets and data products (e.g. maps). In general, a naming convention should be obvious and easy to track. The presenter noted that a standard naming convention is being worked out in collaboration with Environment Canada, suggesting that the adoption/incorporation of a standard naming convention for the project would help reduce any downstream workload associated with having to rename data files and data products. The presenter sought guidance on classifications and code lists, inquiring which of these elements should be included as source products or added to the EEMAP public pathway, as well as how to capture absence/presence. The presenter indicated that answers to these types of questions were not required now, but they would require further discussion/consideration over the short term.

A science lead sought clarity on what content of an 'abstract' should be included in the metadata. The presenter indicated that the abstract should be viewed as a short summary of the dataset and data product (e.g. map generated from the dataset). It can include references to publications where the data is more fully described, but it should be brief. The presenter suggested that a good approach to minimize effort is to have a generic abstract of the data with small additions to the abstract that describe separate data products generated from a common dataset. A participant asked how one creates a data product consistent with ISO standards when metadata is not available for the dataset. The presenter noted that data products such as maps can be presented from datasets with limited metadata provided the lineage of the data (e.g. history, methods used to transform data within the map post data acquisition, etc.) and level of uncertainty (quality, accuracy, etc.) of the resultant data product are provided in the metadata field. The presenter noted that data quality and data accuracy is an on-going issue in the Government of Canada, but the best that can be done is to document what is known of the dataset. In general, well-documented data will be trusted as reliable compared to poorly-documented data.

The co-chair asked a meeting participant from Environment Canada what type of data would be of most benefit to them for inclusion in the EEMAP database; for example, all input data layers or one output composite data layer (it was clarified that EEMAP is a database that includes both data and maps). The participant responded that it is difficult to say what data is most desirable, as it often depends on the data itself. The participant acknowledged, however, that all data cannot be incorporated into the EEMAP system and that the science experts would have to rely on expertise and judgment regarding what data would be suitable for inclusion in the system. In general, it was noted by the participant from Environment Canada that data is more important than maps, emphasizing in particular a need for good attribute tables to accompany the datasets (e.g. whales, species, at-risk being built into the attribute table). Again, the participant noted that point data is the preferable data format, as it allows for easier inter-comparison with other data layers in the system.

CONSISTENT TERMINOLOGY

The co-chair noted that the project has yet to address consistency of terminology and mapping standards with Environment Canada and response organizations. A participant from Environment Canada noted that a new library of symbology is presently being updated and will be shared with the regional science team once it is available (e.g. red is used for species at risk).

RECOMMENDATIONS

1. Expand the summary table into a screening table that includes as many species as possible and design it with a series of filters (presence/absence, vulnerability, human interest, mitigatable). Include/revise columns on human-use and mitigation. The section on mitigation could identify measures that would be effective for assisting particular species (at various life stages), as well as expertise and groups that could assist with the implementation of mitigation measures (e.g. local groups to clear oiled-birds). In addition, it should be noted on the species biological summary if a species supports a fishery. Science staff are more broadly engaged in the completion of the species biological summaries.
2. Vector-based 'point data' is the preferred format for ARP data. It was emphasized that all data and data products clearly describe the nature of the data, in order to provide the user complete context in which the data should be applied. It was noted that point data plots that show all observations within a defined time and space window may convey false information about abundance. For example, a species map for a pilot area compiled using 30 years of data could suggest a higher than expected presence of a species in the area in any given year or season. It was noted that there may be other approaches, such as a gridded approach, that show presence/absence and that are not confounded by abundance and effort. Incorporating seasonality onto maps could be helpful.
3. A temporal window for standardizing datasets was discussed. Participants agreed that a temporal window is dependent on a particular dataset, and the most recent data available is most desirable for spill response planning purposes. All data layers could include a mechanism to flag when data should be reviewed and updated. In addition, nomenclature, standards (e.g., metadata, symbology, and base maps), and data archive protocols should be adopted up front rather than defer workload to downstream components of project.
4. Be aware of *Privacy Act* considerations when discussing and presenting data.
5. Consult with Response Organizations (ROs) (regulated by Transport Canada under the *Shipping Act*) to populate the mitigation potential sections within biological species summaries, the summary table and screening tables.

NEXT STEPS

The co-chair indicated that next steps for the project are to continue to complete the species summary table, biological species summaries, and human-use information. It was as agreed by meeting participants that species prioritization for summary work planning would be organized by criteria including, presence/absence, vulnerability, human and ecological importance, designated status and mitigation potential. Particular focus would be dedicated to choosing species that are representative of the various sub-groups of species present in each pilot area. The co-chair stated that the regional research team would continue to engage other pilot initiatives to ensure consistency in data standards at an early stage. Last, the meeting co-chair indicated that the Task Force would be updated regarding outcomes of the meeting.

CONCLUSIONS

Meeting participants felt that the proposed approach of organizing species and human-use information using a summary table and more detailed species biological summaries was a good way to proceed with the project. It is noted that a lot of science experts for the various species discussed were not in attendance at this meeting, and they should be engaged as the project continues to proceed. It is further noted that the approach to organizing species information

could prove useful as a decision-support tool beyond marine spill planning, with a need for annual CSAS processes to evaluate species and marine attributes on an on-going basis for incorporation into such decision-support tools. Last, the importance of data management was recognized, although the co-chair felt that this aspect of the project was on track.

REFERENCES CITED

Transport Canada. 2016. Tanker Safety and Spill Prevention. Transport Canada website (accessed: March 7, 2016).

APPENDICES

APPENDIX 1: LIST OF MEETING PARTICIPANTS

Regional Framework Discussion on Marine Safety and Area Planning Data Products

Regional Peer Review – Maritimes Region

16-17 March 2016
Dartmouth, Nova Scotia

Co-chairs: Fred Page and Kristian Curran

LIST OF PARTICIPANTS

Day 1	Day 2	Name/Nom	Affiliation
x	x	Alex Hanke	DFO Maritimes
x	x	Allan Anderson	Transport Canada
x	x	Angela Sangster	Canadian Coast Guard Atlantic
x	x	Catherine MacEachern	Canadian Coast Guard Atlantic
x	x	Christine Desjardin	DFO Quebec
x	x	Claire Mussells	DFO Maritimes
	x	Dominique Poulin	Environment Canada
x		Donovan Case	Irving Oil/ALERT
x	x	Fred Page	DFO Maritimes
x	x	Glen Herbert	DFO Maritimes
x		Hilary Moors-Murphy	DFO Maritimes
x	x	Jerome Marty	DFO Headquarters
x	x	Jolinne Surette	DFO Maritimes
x	x	Karen Coombs	DFO Maritimes
	x	Keith Laidlaw	Canadian Coast Guard Atlantic
x	x	Kristian Curran	DFO Maritimes
x	x	Quinn McCurdy	DFO Maritimes
x		Ryan Green	Canadian Coast Guard Atlantic
x	x	Scott Coffen-Smout	DFO Maritimes
x	x	Sean Corrigan	DFO Maritimes
x	x	Serge Proulx	DFO Maritimes
x	x	Stacey Paul	DFO Maritimes
x	x	Tobias Spears	DFO Maritimes
x	x	Robert Totten	Irving Oil/ALERT

APPENDIX 2: MEETING TERMS OF REFERENCE

Regional Framework Discussion on Marine Safety and Area Planning Data Products

Regional Peer Review – Maritimes Region

16-17 March 2016,
Dartmouth, Nova Scotia

C-chairs: Fred Page and Kristian Curran

TERMS OF REFERENCE

Context

Canada has the world's longest coastline at more than 243,000 km in length. Each year, millions of tonnes of products are shipped off its coasts, with the Government of Canada working in a number of ways to ensure the safety of the marine environment (Transport Canada 2016). The Government of Canada aims to promote safe and efficient marine transportation through regulatory oversight, inspections, and enforcement measures. To be well prepared for and ready to respond to marine incidents associated with vessel based oil spill events in Canadian waters, a collaborative "whole-of-government" approach has been adopted in support of prevention, preparedness, response, and recovery in the event of an unlikely marine incident at sea. This multi-stakeholder regional pilot program requires information on the spatial and temporal distributions of biological resources for inclusion in the oil response plan. To support this need, the review will serve as a preliminary discussion with participating federal government agencies on the biological and human activity data products being developed in support of oil spill response planning for regional pilot initiatives in the Bay of Fundy approaches to Saint John, New Brunswick, and approaches to the Strait of Canso, Nova Scotia.

Objectives

The objectives of this science discussion are:

1. identify components of a proposed regional template concerning marine species for their relevance in support of oil-spill response planning;
2. identify factors to be considered in a regional prioritization of marine species of relevance to DFO to be mapped;
3. identify information sources available for spatial and temporal mapping of marine species of relevance to DFO;
4. identify methods to be used for spatial and temporal mapping of marine species (including level of uncertainty) of relevance to DFO; and
5. identify knowledge and data gaps and potential approaches and methods to address gaps.

Expected Publication

- Proceedings

Participation

- Fisheries and Oceans Canada
- Transport Canada
- Environment and Climate Change Canada
- Other Invited Experts

Reference

Transport Canada. 2016. Tanker Safety and Spill Prevention. Transport Canada website (accessed: March 7, 2016).

APPENDIX 3: MEETING AGENDA

Regional Framework Discussion on Marine Safety and Area Planning Data Products

Regional Peer Review – Maritimes Region

16-17 March 2016
George Needler Boardroom
Bedford Institute of Oceanography
Dartmouth, Nova Scotia

C-chairs: Fred Page and Kristian Curran

DRAFT AGENDA

DAY 1 (Wednesday, March 16, 2016)

Time	Topic
09:00 – 09:15	Welcome & Introduction • Introduction of participants • Overview of the purpose and structure of the meeting • Review the agenda • Suggestions or comments on the agenda
09:15 – 10:00	Overview of Template – Fred Page
10:00 – 10:15	***Break*** *(not provided)*
10:15 – 11:15	Marine mammal (e.g., Fin whale) – Jolinne Surette
11:15 – 12:00	Marine reptile (e.g., Leatherback turtle) – Quinn McCurdy
12:00 – 13:00	***Lunch*** *(not provided – cafeteria on-site)*
13:00 – 14:00	Invertebrate (e.g., Lobster) – Claire Mussells
14:15 – 15:00	Invertebrate (e.g., Scallop) – Quinn McCurdy
15:00 – 15:15	***Break*** *(not provided)*
15:15 – 16:15	Fish (e.g., Tuna) – Karen Coombs

DAY 2 (Thursday, March 17, 2016)

Time	Topic
09:00 – 09:30	Review of Previous Day
09:30 – 10:30	Fish (e.g., Cod) – Claire Mussells
10:30 – 10:45	***Break*** *(not provided)*
10:45 – 11:45	General Discussion: Fred Page and Kristian Curran • Spatial representation of data (useful for ROs?), how do we represent an unknown vs. a zero/not present, • Data management – ISO standards, metadata categories needed, naming convention – Tobias Spear • Structure of summary table for ARP document

Time	Topic
	• Consistency in terminology with Environment Canada EE map (colour coding)
11:45 – 12:45	***Lunch*** *(not provided – cafeteria on-site)*
12:45 – 14:00	Human Activities – Scott Coffen-Smout (Oceans) Data layers provided to TC / Dillon Consulting –Fisheries – Various composites –Tourism – Whale Areas –Transportation infrastructure - SCH –Aquaculture – NS and NB –Legislated Protected Areas (MPAs, CH) and Important Habitats
14:00 – 14:30	Marine Plants – TBA
14:30 – 14:45	***Break*** *(not provided)*
14:45 – 16:00	Summary and next steps – Fred Page and Kristian Curran

APPENDIX 4: SPECIES SUMMARY TABLE (TEMPLATE EXAMPLE)

Important species within group: No. sp. – is the number of species we have identified to begin working on species templates. Not an extensive list. Eventually we will have number of species we have completed/ total species that fit into that group within the ARP. Need solid group definitions before we can populate lists

Group	Sub-groups			Important Species within Group (*denotes SARA)	Areas of Importance	Vertical distribution				Seasonal Presence				Vulnerability			Proportion of Population within ARP domain	Human Importance	Biological/Ecological Importance	Biologically Significant Area
						Surface	Water column	Benthic	Intertidal	Winter	Spring	Summer	Fall	Exposure	Sensitivity	Recovery Potential				
Marine Invertebrates	Benthic	-	-	No. sp. = 13/200	-	EL	EL	JA		JFM LJA	AMJ JA	JAS ELJA	OND ELJA	Y SCM	Y FRT	MS		C R A		S
		-	-	Sea Scallop	Scallop beds	EL	EL	JA		JFM LJA	AMJ JA	JAS JA	OND LJA	Y CM	Y RT	MS	Small	C R A		S
	Demersal	-	-	No. sp. = 8/100	-	EL	EL	JA		JFM LJA	AMJ JA	JAS ELJA	OND LJA	Y SCM	Y FRT	MS		C R A		S
		-	-	American Lobster	Throughout, Flagg Cove	EL	EL	JA		JFM JA	AMJ JA	JAS ELJA	OND JA	Y S	Y T	S	Small	C		N
	Pelagic	-	-	No. sp. = 2/500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Corals and Sponges	-	-	No. sp. = 4/	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marine Reptiles	Sea Turtles	-	-	No. sp. = 1/2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	Leatherback*	-	A	A	-	-		J A	JAS A	O A	Y S	Y T	PR	Small	-	-	M

Group	Sub-groups			Important Species within Group (*denotes SARA)	Areas of Importance	Vertical distribution				Seasonal Presence				Vulnerability			Proportion of Population within ARP domain	Human Importance	Biological/Ecological Importance	Biologically Significant Area
						Surface	Water column	Benthic	Intertidal	Winter	Spring	Summer	Fall	Exposure	Sensitivity	Recovery Potential				
Marine Fish	Pelagic	-	-	No. sp. = 12/	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	Atlantic Bluefin Tuna	Throughout	JA	JA	-	-		J JA	JAS JA	ON JA	Y S	N	P	-	C R A	P	F M
	Diadromous	-	-	No. sp. = 7/	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	Atlantic Salmon	Throughout, estuaries	JA	JA	-	-	JFM A	AMJ JA	JAS JA	ON A	Y SC	N	P	-	R	-	M S
	Demersal	-	-	No. sp. = 15/	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	Halibut	-	-	L	JA	-	-	-	-	-	N	Y F	S	Small	C	-	N
	Semi-demersal	-	-	No. sp. = 5/	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	Cod	-	EL	EL	JA	JA	JFM LJA	AMJ ELJA	JAS ELJA	OND ELJA	Y S	Y T	P	-	C R A	-	-
	Sharks	-	-	No. sp. = 4/	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	Porbeagle*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marine M	Cetaceans	Baleen		No. sp. = 3/	Throughout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Group	Sub-groups			Important Species within Group (*denotes SARA)	Areas of Importance	Vertical distribution				Seasonal Presence				Vulnerability			Proportion of Population within ARP domain	Human Importance	Biological/Ecological Importance	Biologically Significant Area
						Surface	Water column	Benthic	Intertidal	Winter	Spring	Summer	Fall	Exposure	Sensitivity	Recovery Potential				
			Wide Range	Fin Qhale	Throughout	JA	JA	-	-	JFM JA	AMJ JA	JAS JA	OND JA	Y S	Y FRT	R	Small	T	-	MF
				Right Whale*	Throughout, Grand Manan Basin	JA	JA	-	-		MJ	JAS JA	OND JA	Y SC	Y FRT	PRG	Large	T	-	FC
		Tooth	Large	No. sp.= 5/	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Northern Bottlenose Whale	Rare Sightings	JA	JA	-	-	JFM	AMJ	JAS	OND	-	-	-	Small	-	-	-
			Small	No. sp.= 4/	Throughout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Harbour Porpoise*	Throughout	JA	JA	-	-	JFM	AMJ	JAS	OND	Y S	Y R	R	Small	T	-	PFS
	Pinnipeds	Phocids (earless/ true seals)		No. sp. = 2/	Throughout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Harbour Seal	Throughout	JA	JA	-	-	JFM	AMJ	JAS	OND	-	-	-	Small	T	-	FS
				Grey Seal	Throughout	JA	JA	-	-	M	AMJ	JAS	ON	-	-	-	Small	T	-	F
Marine Plants	-	-	-	No. sp. = 2/	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX 5: SPECIES BIOLOGICAL INFORMATION SHEET (TEMPLATE EXAMPLE)

Summary of the Temporal and Spatial Distribution of (Common name) (*Latin name*) Within the Port Hawkesbury-Canso Area Response Plan (PH-Canso ARP)

Prepared by:
last name, first name

Preparation Date: Day Month, Year

Preface

All sections of this template are to be filled out. If a section is not relevant to the subject species, record that it is not an applicable filed to be filled, and explain why not. If no information could be found for a particular field, record as a gap in section 6.1.

SUMMARY

- Present/Absent within the ARP
- Grouping:
- Status: SARA status Y/N (status), COSEWIC status Y/N: (status) Critical Habitat Y/N
- Is the species a Commercial, Recreational and or Aboriginal (CRA) fishery :
- Socio-economic or biological significance:
- Temporal Distribution: Found in ARP from Month X-Y or by Season
- Spatial Distribution: Area of biological importance:
- Spatial Distribution: Within, on fringe, adjacent
- Horizontal Distribution: If the species is found only in one specific region, or found throughout the entire ARP, include life stages
- Vertical Distribution: Pelagic/ Benthic and include life stages
- Abundance data available? Y/N. If yes:
- Presence:

  1 - Certain
  2 - Likely
  3 - Possible
  4 - Unlikely
  5 - Rare
  (Number system is based on Sept 2015, Dillion document, page- 10)
- Proportion of population within the PH-Canso ARP:
- Vulnerability to oil:

1.0 LIFE HISTORY OVERVIEW

1.1 Species Description and Taxonomy

- General information on the species:

- Taxonomy (Family)
- Physical description: color, size, weight, “special” or identifiable marker used to differentiate comparable species apart.
- If species is sexually dimorphic, age of sexual/ physical maturity, how many young are “born”, years between “births”. Are they a long lived species?

1.2 Diet/Predation

- What prey species are they consuming? Where are they hunting? Time of day/ tides…. Where in the water column is their prey found (surface, pelagic, benthic..)
- What other species is preying on them during different life stages

1.3 Habitat/ Global Distribution

- Species depth distribution (near-shore, off-shore, combination), water temperature/ salinity range.
- What is their geographic range? Habitat characteristics (substrate etc.)
- Does habitat change with life stage?
- Species habitat (marsh spawner, intertidal, etc)

2.0 THREATS AND DESIGNATION

2.1 Natural and Anthropogenic Threats

- What are known threats (if any) to species/population during various life stages? Do they occur in ARP?
- Habitat loss? Bycatch? Vessel strikes? Climate change? Predation? Competition? Invasive species?

2.2 Population Status and Designation

- Is there a stock assessment for this species? What is the most recent status of the assessment? Contact name of assessment biologist?
- Is the species designated under any of the following?
- COSEWIC: Endangered (2004), Last Assessment May 2014
  SARA: Rejected for listing in schedule 1 (2006)
  IUCN Global : Endangered (2006)
  IUCN Regionally : Endangered (2006)
  CITES: Appendix II (2010)
  IWC: Commercial whaling moratorium (1986)
- Critical Habitat: Y/N If yes, where and what is it used for
- Is ARP ‘significant’ to the species – i.e. population level impacts are possible (For example, destruction of critical nursery)

3.0 IMPORTANCE

3.1 Socio- Economic

- Is this species of Commercial, Recreational or Aboriginal (CRA) importance? Expand on each

- Is there a stock assessment associated with this species? If so, what is the current stock health? Who is the assessment biologist?
- Are communities heavily reliant on this species?
- Is there CRA presence from multiple sources? Multiple management areas? International fisheries?
- What are the expected yearly landings for the species in NS (PH and BoF ARP) and NB (BoF). What do we expect the landings are in the ARP? Is this species a significant contribution to the economy of either province?

3.2 Ecological

- Is the species of ecological significance (ESS)? Would there be repercussions to additional species if this one was significantly reduced?? (Keystone species)

4.0 DISTRIBUTION WITHIN _____ ARP

4.1 Spatial Distribution

- Spatial distribution within the ARP as text description and GIS maps for adults, larvae, juveniles and spawning grounds where available.
- Do we expect that the majority of the population of any of these life stages will reside in the ARP?
- If a GIS layer of species distribution exists what method was used to create it, and what is the confidence associated with the layer?

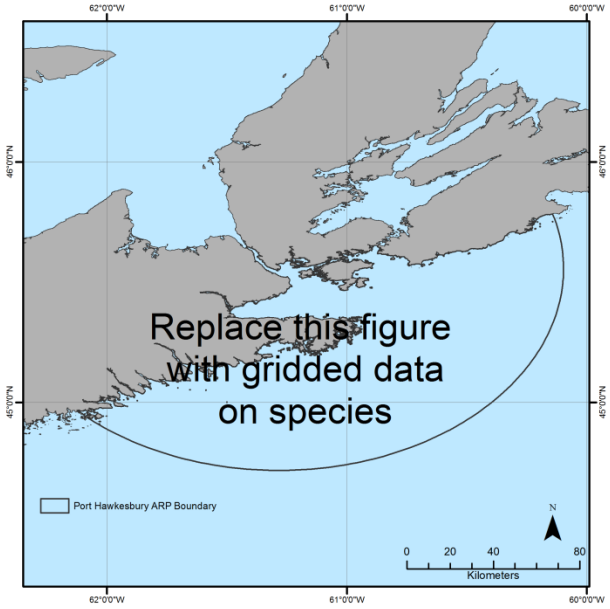

Figure X: Location of species x within the ____ ARP. This figure is available as a shapefile and can be found at the following link XXXX.

4.2 Temporal Distribution

- Describe exactly how each life stage in the table got the assigned its designation.

- Example: There is insufficient data listed between October and March for Right Whales because no whale watching companies were running at the time to collect opportunistic sightings data.

Table X: Temporal distribution of (taxa X) within the _____ ARP

Life Stage	P/B/S/I	Month											
		J	F	M	A	M	J	J	A	S	O	N	D
Spawning/ Mating/ Calving													
Larval													
Juvenile													
Adult													

Key:

: Species is present in the ___ ARP

: Species is likely present in the ___ ARP

: ? : Low probability/ not probable that species is present in the ___ ARP

: x : Unknown/ insufficent data on species

P/B/I/S : Pelagic, Benthic, Surface, Intertidal. Where the life stage occurs in the water column

5.0 SUSCEPTIBILITY TO PETROLEUM PRODUCTS

- Have studies been conducted on how petroleum might affect the species, or a species with similar life history traits?
- Is the species more susceptible during different life stages? Are different petroleum products more or less harmful?
- Would petroleum products significantly affect habitat? ex, porous substrate for benthic invertebrates? Will the species interact with the surface, including intertidal areas?
- Does the species have the ability to process or excrete toxins in oil ?

6.0 ADDITIONAL INFORMATION

6.1 Knowledge Gap

- What information do we not know?
- Is some of the information unreliable?
- Trouble finding multiple sources with same info?

6.2 Acknowledgements

- Include people who contributed to the information summarised
- For real time information concerning the present status of (Taxa), please contact:

6.3 Communication

- Extra notes or comments, place here so they can quickly be looked over and deleted before being added to the manuscript.

6.4 Terms Searched

Database Searched:

DFO WAVES (last day searched)

Search Terms Used:

Database Searched:

Google Scholar (last day searched)

Search Terms Used:

Database Searched:

Search Terms Used:

Media Search for coverage of species (Last day searched):

Search Terms Used:

- Search areas like, CBC, CTV, ATV, Chronicle Herald, other local media
- We do not need all media stories related to same “incident” but if you can add a few links to them.

7.0 TABLES AND FIGURES

Figure Caption format

Table Caption format

8.0 REFERENCES CITED

- Reference citation format