DFO Maritimes Science

2020-2021 Project Planning

PRIORITIES

Version 1 (Nov 2019)

Regional Overview

DFO Maritimes Science is a science-based organization that conducts research and monitoring to enhance regional, national and global understanding of aquatic ecosystems and provide advice to support the management of Canadian fisheries and oceans.

People are the foundation of the work we do, and our ability to generate high quality science information for decision making depends on a healthy and motivated workforce equipped with the tools and facilities needed to get the job done.

Maritimes Science Branch consists of >400 staff working from 4 locations in New Brunswick and Nova Scotia: the Bedford Institute of Oceanography (BIO), Saint Andrews Biological Stations (SABS), Mactaquac and Coldbrook biodiversity facilities. We are based in the Maritimes Region, but our work is conducted and recognized nationally and internationally.

We leverage our core capacity through partnerships with other government agencies, First Nations and Indigenous communities, academics, non-governmental organizations, and the private sector. We share the results of our work with the world through our publications, presentations, Open Data, and outreach activities.

DFO's current departmental **commitments** include:

- Further develop the Oceans Protection Plan.
- Develop new and innovative approaches to modernize fisheries and aquaculture.
- Advance Bill C-68, the proposed reforms to the *Fisheries Act*, which seeks to restore lost protections, and incorporate modern safeguards so that fish and fish habitat are protected for future generations and so that Canada's fisheries can continue to grow Canada's economy and sustain coastal communities.
- Achieve minimum protection standards for Canada's marine protected areas and marine refuges.
- Co-lead the implementation of the G7 *Charlevoix Blueprint for Healthy Oceans, Seas and Resilient Coastal Communities* and the G7 *Ocean Plastics Charter*, with a particular focus on plastics, illegal and unreported and unregulated fishing, and ocean monitoring.
- Examine the implications of climate change on Arctic marine ecosystems.
- Ensure effective use of research resulting from restored federal funding for freshwater research, federal ocean science and monitoring programs, protection of fish stocks, monitoring contaminants and pollution in the ocean, support for responsible and sustainable aquaculture industries on Canada's coasts
- Use scientific evidence, traditional Indigenous knowledge, and the precautionary principle, and take into account climate change, when making decisions affecting fish stocks and ecosystem management.

DFO's **values** are based on the federal public sector values of:

- Respect for democracy
- Respect for people
- Integrity and Stewardship
- Excellence

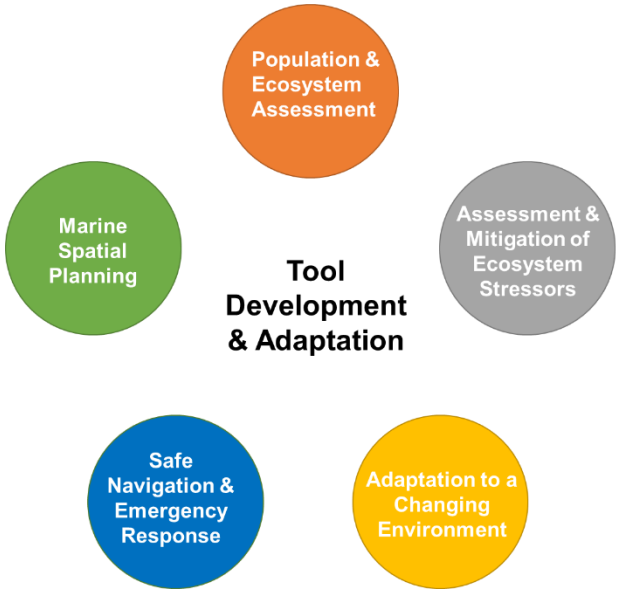
Maritimes Science Program Goals and Expected Outcomes

DFO Maritimes Science conducts **research** and **monitoring** to enhance regional, national and global understanding of aquatic ecosystems and provides **advice**, **products** and **services** to provide safe and secure access to Canada's waterways, guard against environmental disasters, and support the management of Canadian fisheries and oceans. We strive to:

- Advance public understanding of marine and freshwater environments.
- Support informed decision making and effective policies.
- Continuously improve the impact and effectiveness of science-based information and tools, and
- Achieve science program and management excellence.

Priorities

The Maritimes Region's Science Programs support the following 6 horizontal themes, which have been established to encourage collaboration and integration across our 5 Divisions:



These themes are consistent with DFO's current Departmental Results Framework (Annex 1).

Priorities and Expected Outcomes

The Table below is intended to provide some guidance to Maritimes staff on branch activities, priorities, programs and funding sources, to assist in the entry of 2020-2021 projects proposals in our Project Planning Application (English: http://dmapps/en/projects/) (French: http://dmapps/fr/projects/). It is not meant to be an exhaustive description of our programs and priorities. Please provide any suggestions for things to add, remove or modify to Tana.Worcester@dfo-mpo.gc.ca, along with any questions you may have.

Priorities and Expected Outcomes

Theme	Core Activities	Current Science and Management Priorities	Associated Programs and Funding Sources (as listed in the Project Planning Tool)
Population and Ecosystem Assessment Goal: To advance scientific knowledge, monitoring and reporting of marine and diadromous fish populations; marine mammals, sea turtles, invertebrates, as well as species and ecosystem interactions, structure and functioning. To conduct research, monitoring and modelling to advance scientific understanding of aquatic ecosystem processes and the relationships between ecosystem components, with a focus on ocean monitoring, modelling and prediction.			
Population Assessment	• Monitoring and reporting on the status of key fish, invertebrate, marine mammal and turtle species. • Improved understanding of, and communication about, stock structure, movement, growth, recruitment and maturity of aquatic species. • Development or application of appropriate assessment methodologies, reference points and harvest control rules for harvested species. • Scientific evidence to support decisions related to the recovery of species at risk, with a focus on salmon. • Provision of DFO information to COSEWIC. • Partnership and engagement with First Nations and Indigenous communities on the development of research and monitoring questions, data collection, analysis, and review.	<u>Science</u> Increase national consistency and application of common stock assessment approaches and frameworks, for rebuilding and application of the PA (Bill C68), and to provide advice informed by climate change and ecosystem considerations (EBFM). <u>Management</u> Salmon Indigenous relations	• Fisheries - Fisheries Science (Species or Group - Monitoring and Assessment) • Fisheries - Fisheries Science (Species or Group - Research) • Fisheries - Fisheries Science (Surveys) • Fisheries - Species at Risk • Aquatic Ecosystems - Fisheries Protection (Freshwater) • Aquatic Ecosystems - Ecosystem Science (Cetaceans) **Funding Sources:** • Fisheries - Fisheries Science (A-base) • Fisheries - Fisheries Science (FSERP) • Fisheries - Fisheries Science (NMF) • Fisheries - International Governance Strategy • Fisheries – Partnership Funding
Ecosystem Assessment	• Improved understanding of, and communication about, ocean and coastal processes and their influence on ecosystems and coastal communities.	<u>Science</u> Increase national consistency and application	• Aquatic Ecosystems - Ecosystem Science (Core)

	• Stabilized and modernized monitoring of key physical, chemical and biological ocean parameters. • Regional contribution to the reporting on the State of the Atlantic Zone (AZMP/AZOMP) and State of the Atlantic Ocean (SOTO), based on the best available information. • Participation in collaborative ocean science initiatives. • Integration and communication of monitoring and modelling results for use in decision-making.	of common approaches and frameworks <u>Management</u> Increased efficiency and integration of assessment approaches, in the marine and freshwater environments, including the consideration of watershed-based assessments	• Aquatic Ecosystems - Ecosystem Science (Arctic) • Aquatic Ecosystems - Ecosystem Science (Stressors) • Aquatic Ecosystems - Oceanography (Core) • Aquatic Ecosystems - Oceanography (AZMP) • Aquatic Ecosystems - Oceanography (COMDA) • Aquatic Ecosystems - Oceanography (Surveys) **Funding Sources:** • Aquatic Ecosystems - Ecosystem Science (SPERA) • Aquatic Ecosystems - Oceanography (OFSI)
Safe Navigation and Emergency Response Goal: To collect, develop and distribute scientific information, products, methods and advice to support safe navigation and emergency response in Maritimes waters.			
Safe Navigation	• Up-to-date, authoritative and standardised hydro-spatial (hydrographic) information is available to the public. • Hydrographic data is available for navigation. • Hydrographic/nautical charts and navigational products are produced and maintained. • Tide gauge / water level data is available for a variety of uses, including tsunami response, monitoring of storm surges and climate change, etc.	<u>Science</u> Move towards electronic charting and data-driven organization	• Marine Navigation - CHS - Electronic Navigation Charts • Marine Navigation - CHS - High Priority Charting

	• High-resolution data on the depth, shape and structure of Canada's oceans is available for oceans management.		
Emergency Response	• Science-based information is provided to support risk-based emergency response plans in aquatic environments. • DFO science information is provided to emergency responders in the event of an incident.	<u>Science</u> Regional implementation of the national vulnerability assessment framework, and provision of key science data layers to Emergency Response Applications <u>Management</u> Access to critical science-based information in emergency situations	• Aquatic Ecosystems - Planning for Integrated Emergency Response (PIER)
Mitigation of Ecosystem Stressors Goal: To advance scientific knowledge, monitoring, reporting and mitigation of the effects of ecosystem stressors, such as shipping, petroleum production, tidal and hydro power production and distribution, and aquaculture on marine and freshwater systems, including cumulative effects.			
Aquaculture	• Research to advance understanding of interactions between aquaculture and the aquatic environment. • Scientifically defensible environmental impact and risk assessments. • Monitoring of key stressors and ecosystem variables of relevance to aquaculture. • Advice on aquaculture siting, expansion, as well as introductions and transfers.	<u>Science</u> Increase national consistency in approach to aquaculture assessment and risk assessment, and development of a framework for advice on Introductions and Transfers	• Aquatic Ecosystems - Aquaculture Science (Core) • Aquatic Ecosystems - Aquaculture Science (ACRDP) • Aquatic Ecosystems - Aquaculture Science (AEIP) • Aquatic Ecosystems - Aquaculture Science (AMP) • Aquatic Ecosystems - Aquaculture Science (PARR)

OPP	• Research and science advice on underwater noise and the impacts of noise on marine mammals, with a focus on North Atlantic Right Whales. • Research and science advice on impacts of shipping.	<u>Science</u> Deliver according to agreed to workplans and project milestones (i.e., deliver what we've promised)	• Aquatic Ecosystems - OPP (Baseline) • Aquatic Ecosystems - OPP (Drift Prediction) • Aquatic Ecosystems - OPP (Fate and Behaviour) • Aquatic Ecosystems - OPP (MEQ) • Aquatic Ecosystems - OPP (Whale Detection and Avoidance)
Other Ecosystem Stressors	• Provide advice on impacts of ecosystem stressors on fish and fish habitat, to support environmental assessment of human activities, such as renewal energy, in coastal and marine environments. • Conduct research and monitoring on priority ecosystem stressors, such as harmful algal blooms, nutrient loading and plastics. • Support development and implementation of a cumulative effects framework for application in the Maritimes Region.	<u>Science</u> Increase regional consistency in approach to assessment of individual ecosystem stressors, making use of common data sources and tools, as well as national consistency in approach to cumulative effects assessment and impact mapping <u>Management</u> Information and advice on key development projects, to support concrete decisions on fish and fish habitat Marine debris and plastics	• Aquatic Ecosystems - Ecosystem Science (Stressors)

Adaptation to a Changing Environment Goal: To conduct research, monitoring and modelling to support adaptation to a changing aquatic environment, with a focus on the impacts of climate change, aquatic invasive species, and ocean acidification.			
Climate Change	• Research to identify vulnerabilities and impacts of a changing climate on key species, ecosystems and processes, as well as to support decisions related to climate change adaptation. • Development of adaptation tools. • Improved ocean forecasting in vulnerable coastal regions to inform Departmental decisions related to adapting fisheries and oceans management and coastal infrastructure. • Research and monitoring on the state and extent of ocean acidification and hypoxia, and the consequences of these changes on marine ecosystems and commercial fisheries. • Research on how, why and at what rate aquatic ecosystems are reacting to climate change. • Research, monitoring and advice on impacts of sea-level rise and storm surges on coastal infrastructure to facilitate the adaptation of DFO programs to climate change. • Improved predictions of changing ocean conditions to help fisheries managers understand movement of commercial fish species and species at risk.	<u>Science</u> Incorporation of climate change considerations into stock assessment, conservation planning, and other areas of DFO accountability, including assessment and mitigation of vulnerabilities to sea-level rise and storm surge <u>Management</u> Information on potential/expected climate change impacts at timescales relevant for decision-making	• Aquatic Ecosystems - Oceanography (ACCASP)
AIS	• Annual monitoring through field assessments (e.g. collector plates, rapid assessment, eDNA). • Research (e.g. field and laboratory experiments) and development on physiological tolerance, population structure, suitable habitat and connectivity modelling, and climate projections.	<u>Science</u> Early detection and response, including monitoring of key threats.	• Aquatic Ecosystems - Aquatic Invasive Species (Core) • Aquatic Ecosystems - Aquatic Invasive Species - Assessment and Monitoring (Flex)

	• Risk analysis and assessment, including rapid response and delineation, SLRAs, DLRAs. • Data management and sharing.	Management Prevent the introduction, establishment, and spread of AIS in Canadian waters; support AIS management and control, including improving effectiveness of AIS control measures.	• Aquatic Ecosystems - Aquatic Invasive Species – Research (Flex)
Support for Marine Spatial Planning Goal: To collate, develop, and distribute scientific information, tools and techniques to support marine conservation and marine spatial planning, and advance scientific understanding of spatial processes, in the Maritimes Region.			
Marine Conservation	• Develop ecological overviews of MPAs and Areas of Interest that are publically available. • Develop monitoring indicators, protocols and strategies to support MPAs, AOIs, and Other Effective Conservation Measures. • Monitor existing MPAs – Gully, Musquash, and St. Anns Bank, and provide science advice and information for site monitoring plans and activities. • Conduct research, baseline studies and hydrographic surveys in MPAs, AOIs and marine refuges • Support development and implementation of the Scotian Shelf/Bay of Fundy Bioregional MPA Network Design. • Support establishment, monitoring and management of marine refuges.	Science Increase regional consistency in approaches to monitoring, evaluation and reporting on existing MPAs/AOIs and the design of the bioregional MPA network; standards for Other Effective Conservation Measures Management Finishing what we started: Eastern Shore Islands and Fundian Channel AOIs, and Eastern Canyons Marine Refuge; Finalize MPA	• Aquatic Ecosystems - MPAs - Monitoring and Assessment • Aquatic Ecosystems - MPAs - Research

		Network Plan to support 25% by 2025	
MSP	• Develop and maintain a geo-spatial inventory (archive) of projects relevant to MSP. • Contribute science data and spatial data layers to the MSP marine atlas and associated data sharing portals and tools, including the Marine Spatial Data Infrastructure. • Update Ecologically and Biologically Significant Areas as new information becomes available. • Identify priorities and gaps in MSP-related biological, ecological, and pressure-based data layers. • Contribute to the development of MSP planning and assessment tools, methods and activities, as agreed to through national, zonal and regional work planning discussions. • Contribute towards development of a marine spatial plan for the Scotian Shelf/Bay of Fundy Bioregion (2022-23).	Application of lessons learned from one area of focus to another Improved data management, integration, and accessibility	• Aquatic Ecosystems - Marine Spatial Planning (Core) • Aquatic Ecosystems - Marine Spatial Planning (Flex)
Technology Application and Development Goal: To develop, adapt and adopt tools and technologies that advance Canadian understanding of our marine and freshwater environments, in support of our core program activities.			
Equipment Development and Maintenance	• Ongoing maintenance of existing regional equipment (e.g. CTDs, etc.). • Support for new technologies purchased with Science 2016 funding, e.g. glider program.	Increased interoperability and system integration	• Fisheries – Fisheries Science (Technology)

Analytical Tool Development and Implementation	• Support for the investigation the genetics and genomics of a variety of aquatic organisms.	Investigation of emerging tools and approaches, including eDNA, Close Kin Genetics (CKG), and evaluation of population structure	• Fisheries - Biotechnology and Genomics (Core) • Fisheries - Biotechnology and Genomics (GRDI) • Fisheries - Biotechnology and Genomics (Research)
Data Management	• Support for data collection, processing, storage, and publication. • Development and maintenance of regional databases and applications.	Systems modernization, including development and use of web-based applications Support for GOC's Cloud First policy – with a focus on testing the new cloud environment	• General – Data Management
Other Core Activities			
Advice (CSAS)	• To complete the agreed to CSAS schedule, applying the SAGE principles. • To assist with CSAS Renewal.	Schedule to be established through joint planning with clients	• General – CSAS (core)
Administration	• To complete necessary administrative functions and accountabilities of the branch, in accordance with departmental policies.	Develop more efficient tools and approaches	• Aquatic Ecosystems – Ecosystem Science (Core) • Aquatic Ecosystems – Oceanography (Core) • Fisheries - Fisheries Science (A-base)
Training	• To support staff learning and development.	Completion of mandatory training requirements; group learning activities	• Aquatic Ecosystems – Ecosystem Science (Core) • Aquatic Ecosystems – Oceanography (Core) • Fisheries - Fisheries Science (A-base) • Fisheries - Fisheries Science (TESA)

Annex 1. Links to DFO's Departmental Results Framework (DRF)

Regional Themes	Linkages to National Responsibilities and Program Inventory	Departmental Performance Indicators
Population Assessment	▪ P11 - Fisheries Science ▪ P15 - Species at Risk	▪ % of scheduled fisheries science advisory processes that were completed ▪ Increase monitoring coverage of species. ▪ Number of sites for which scientific data on marine mammals is available to inform vessel traffic management
Ecosystem Assessment	▪ P18 - Oceans and Climate Change Science	▪ % of scheduled science advisory processes on aquatic ecosystems that were completed ▪ # of science products related to aquatic ecosystems that are available ▪ Increase monitoring coverage of ecosystems ▪ Report annually on the state of Canada's oceans and aquatic ecosystems ▪ Increase monitoring coverage of ocean conditions ▪ Number of regional study areas that have baseline information on marine ecosystems
Safe Navigation and Emergency Response	▪ P25 - Hydrographic Services, Data and Science ▪ P27 – Environmental Response	▪ # of official navigational products created and/or updated from incorporation of new and/or archived modern hydrography per year in key areas ▪ # of key priority areas across the country covered by modern hydrographic information, products and charts (there are 23 total commercial ports)
Mitigation of Ecosystem Stressors	▪ P17 - Aquatic Ecosystem Science ▪ P13 - Fisheries Protection ▪ P10 - Aquaculture Science	▪ Number of peer-reviewed or other publications that are published per year on the stressors and impacts of shipping on marine life and their habitats ▪ Number of scientific publications and products related to oil in the marine environment ▪ Number of sites for which scientific data on marine mammals is available to inform vessel traffic management ▪ % of sustainable aquaculture research projects which provide information and/or advice to policy and decision makers
Marine Spatial Planning	▪ P16 - Oceans Management	▪ Increase the amount of scientific data that is disseminated by DFO through the Open Data and Federal Geospatial Platform ▪ Number of biophysical overview conducted for new network driven OA MPAs

		▪ Number of products demonstrating integration of data to support marine planning (atlas) ▪ Number of products demonstrating integration of data to support marine planning (network design)
Adaptation to a Changing Environment	▪ P18 - Oceans and Climate Change Science ▪ P14 - Aquatic Invasive Species	▪ Framework for incorporating climate change considerations into fisheries analysis is developed ▪ Adaptation activity priorities and scientific research needs are identified for relevant DFO sectors and research needs are developed and informed by relevant internal programs and external stakeholders ▪ % of approved requests for science advice on oceans forecasting that are completed within the required timeline ▪ % for requests for scientific data completed in the time required ▪ % of planned aquatic climate change research projects completed ▪ # of Departmental and/or national reports that have incorporated Aquatic Climate science research findings ▪ % of managed fisheries stock assessments that incorporate climate change science considerations
Technology Application and Development	▪ P8 – Aquatic Animal Health ▪ P9 - Biotechnology and Genomics	▪ % of research project milestones completed as planned ▪ % of tests completed for submitted fish samples at DFO NAAHLS Laboratories within the agreed timeline ▪ % of Genomics Research and Development Initiative (GRDI) projects that provided genomics knowledge and advice to decision makers ▪ % of responses to requests for biotechnology knowledge and advice completed and provided to decision makers within the required timeline specified by the client ▪ # of peer reviewed publications in relation to the 5 year average