**Characterisation of sublittoral habitats of Brier Island/Digby Neck Ecologically and Biologically Significant Area**

**Lead External investigator:** Claire Goodwin, Atlantic Reference Centre, Huntsman Marine Science Centre

**Lead DFO investigators:** Andrew Cooper, St Andrews Biological Station, Fisheries and Oceans Canada; Peter Lawton, St Andrews Biological Station, Fisheries and Oceans Canada

**Background**

Brier Island and Digby Neck has been recognised as an Ecologically and Biologically Significant Area (EBSA) (Buzeta, 2014). It was also one of four marine areas within the Bay of Fundy recognised by Parks Canada as of national significance (PC/TNB 1985). The area has been recommended as a potential MPA because it is representative of important outer Bay of Fundy features, has significant marine mammal and bird diversity and is considered to have high benthic diversity (Buzeta 2014; MCBI 1999). However, the benthic marine life in the area remains poorly documented, with only one major survey having been carried out (MacKay, 1977).

The area offshore of Brier Island has recently been identified (from historical surveys and current species distribution modelling) as having one of the most significant concentrations of sponges in the Maritimes Region (Kenchington et al., 2016) and due to the tidal and topographic conditions the sponges inshore are also likely to be rich. However, recent empirical work has not been done on sponge biodiversity around Brier Island. Many of the trawl surveys used for the density analysis are not identified to species level and only four species are reported from the inshore baseline transect survey (MacKay, 1977). As very little is known about sponges of the Bay of Fundy, species cannot currently be reliably identified visually; therefore much biodiversity information about this important functional group is lost.

**Primary objectives of project**

**The objectives of the project are to provide information to facilitate consideration of conservation management options for this EBSA. This has three major components.**

1. Provide initial qualitative information on inshore habitats and species of Brier Island to validate available historical information and prior conclusions used as the basis for identifying this location as an EBSA. These would include presence of marine algae species with unique distribution within the Bay of Fundy as well as the various subtidal species found within intertidal habitats due to special environmental conditions.
2. Perform more detailed quantitative surveys of inshore and offshore Brier Island using methodologies developed for other Bay of Fundy EBSAs to support regional MPA network planning to provide relative scales of contribution for species diversity and habitat coverage.
3. Report on sponge biodiversity of Brier Island and immediate offshore area as these were identified as potentially important aggregations of sensitive benthic species within this region.

**Description of work**

**The following project outline covers both individual and joint roles for undertaking research activities, as well as lead assignments for project reporting among the three project investigators. The specific funding mechanism(s) used to support the research and the format(s) and review processes requested for science advice delivery will influence the final “packaging” of the project.**

**Year 1**

1. Desk study collating and reporting on existing survey data/local knowledge from this region (May/June 2017) (ARC, DFO-Cooper).
2. Development of region-appropriate field identification guides and contemporary sampling protocols consistent with international standards and methods (ARC).
3. Training/orientation of dive team in methods of field identification and sampling protocols (ARC, DFO).
4. Two weeks of baseline diving survey work identifying and reporting on inshore sites of key importance (August/September 2017). The survey team would be composed of ARC staff and DFO staff from SABS and BIO and would dive from the DFO-SABS dive support vessel Seawolf.
5. Taxonomic work on species, QA/QC (October 2017-March 2018) (ARC). Samples will be collected during the diving surveys and from other sources (e.g. DFO trawl collections). Identification of these will enable a comprehensive species list to be compiled and allow for species (particularly sponges) to be identified visually from video and photographs from sampling in Year 2.

**Year 2**

1. Follow-up sampling of both inshore and offshore areas using standardised coastal EBSA survey protocols developed as part of a current SPERA project led by Peter Lawton and Andrew Cooper. This would involve diver transects yielding quantitative data on species distribution (1 to 2 weeks) and remote seabed video surveys of areas beyond diving depths (2 weeks). This second year of field activity would involve the ground-truth of sponge and other fauna occurrence in offshore areas indicated as significant for sponges by Kenchington et al. (2016). For the 2018 field season it is anticipated that a new winch deployment system and cabling will have been tested and operational to extend the current depth limit of the SABS coastal surface-deployed seabed video system beyond its current 80m depth restriction (potentially to over 120m).
2. Analysis and reporting on sampling of Brier Island habitats (including comparisons with other Bay of Fundy EBSAs); addition of Brier Island EBSA photo- and video-media to DFO image databases and libraries created through the SPERA project (DFO-Lawton).This work will be conducted in the Geospatial Image Analysis Laboratory at DFO-SABS. The technical work of quantitative analysis of the image data and other assistance with project analysis and reporting in Y2 is proposed to be undertaken by a Biologist to be hired within DFO. Alternatively, depending on the level and type of funds available, an ARC staff member working within the DFO Imaging Lab (salary rates are described in the Budget section).

**Products/Deliverables [e.g., report(s), science advice, photographs and videos to be shared with DFO]**

1. Report on selected sub-tidal habitats and species of Brier Island Area. To incorporate review of existing information from desk study and survey results (lead DFO-Cooper).
2. Collection and availability (distribution/archival) of geo-referenced videos, photos and survey datasheets from project fieldwork (lead DFO-Lawton). Both the first and second years of field survey activity will yield important new scientific reference material on species and habitat characteristics in this EBSA. The team will build upon project and image database approaches developed in the current SPERA project led by Lawton and Cooper.
3. Quantitative analysis of sub-tidal habitat and species of Brier Island Area relative to other regions within the Bay of Fundy and Scotian Shelf (lead DFO-Lawton).
4. Reference collection of species (held in DFO collections at the ARC).
5. Report on sponge biodiversity in the region, to include information on visual identification of sponge species (lead ARC-Goodwin).

**Data management**

Data and information generated through this project is to be managed under the data management policies for the Department of Fisheries and Oceans in a manner is consistent with Treasury Board Secretariat Directive on Open Government (October 9th. 2014). This will include metadata, appropriate archive of data and reports, ensuring public discovery and accessibility of data and reports, and the recognition (citation) of researchers and institutions involved.

**Budget Tables ($000’s)**

***2017/18***

***Summary of overall project cost***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Funds requested for DFO** | **In-kind from DFO** | **Funds requested for ARC** | **In-kind from ARC** | **Total**  **Funds Request** | **Total In-kind** |
|  |  |  |  |  |  |  |
| **Salary** | 8.5 | 40 | 49 | 0 | 57.5 | 40 |
| **Travel costs** | 19 | 0 | 0 | 4 | 19 | 4 |
| **Other O&M** | 3 | 5 | 0 | 14 | 3 | 19 |
| **Overhead** | 3.5 | 0 | 0 | 0 | 3.5 | 0 |
| **Vessel cost** | 1 | 15 | 0 | 0 | 1 | 15 |
| **Total** | 35 | 60 | 49 | 18 | 84 | 78 |

***Details of Budget request - DFO***

|  |  |
| --- | --- |
| **Salary** | *Overtime & dive/field allowances for 4 DFO staff on 2 weeks of fieldwork that includes weekend travel. In-kind (as salary) represents time commitment of Lawton/Cooper overall on project and DFO technicians and biologists on dive surveys. Funds listed as O&M (to be converted to salary).* |
| **Travel costs** | *Training session in Saint Andrews for 2-3 BIO-based divers prior to surveys ($3K); Per diem for fieldwork in NS (10d work+4d travel) for 4 DFO staff ($6K); Accommodation (based on motel rooms; would be much less for house rental but very limited availability so would need early booking) ($5K); Regional travel (Lawton/Cooper) to consult with regional oceans managers on program activity schedule and present initial results from 2017 work ($2K); Ferries (4 personnel and 2 vehicles + Seawolf; 2 return trips)($3K)* |
| **Other O&M** | *Other field survey costs (diving equipment; SCUBA tank air refills; fabrication of transect lines; sample processing; $3K)*. |
| **Overhead** | *Maritimes Science Branch* *15% overhead on O&M not converted to salary. Not sure if this would be applied for an internal budget transfer.* |
| **Vessel cost** | *Name of vessel: Seawolf (SABS dive support vessel).*  *In-kind per day: $1.5K (based on alternative charter). No chargeback to project for general maintenance; cost for gas used, plus wharf fees.*  *Duration of mission: 2 x 5d ($1K).* |

***Details of Budget request - ARC***

|  |  |
| --- | --- |
| **Salary** | *Total time: 59 days Senior Scientist, 20 days research assistant charged at ARC standing offer rates of $716 for senior scientist and $319.20 for research assistant). Desk study and survey preparation including DFO dive team training (15 days SS), Survey time (14 days SS), Taxonomic work (20 days SS and 20 days RA, Data validation and entry (5 days SS), Reporting (5 days SS). These costs include an agreed amount of overhead which covers laboratory consumables).* |
| **Travel costs** | *Subsistence costs expected to be $4000, covered by ARC,* |
| **Other O&M** | *Diving equipment costs of $1000, covered by ARC. Purchase of portable compressor by ARC $13000.* |
| **Overhead** | n/a |
| **Vessel cost** | n/a |

***2018/19***

***Summary of overall project cost***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Funds requested for DFO** | **In-kind from DFO** | **Funds requested for ARC** | **In-kind from ARC** | **Total**  **Funds Request** | **Total In-kind** |
|  |  |  |  |  |  |  |
| **Salary** | 44 | 60 | 50 | 0 | 94 | 60 |
| **Travel costs** | 26 | 0 | 0 | 4 | 26 | 4 |
| **Other O&M** | 12 | 40 | 0 | 3 | 12 | 40 |
| **Overhead** | 8 |  | 0 | 0 | 8 | 0 |
| **Vessel cost** | 16 | 48\* | 0 | 0 | 16 | 48 |
| **Total** | 106 | 148 | 50 | 7 | 156 | 155 |

***Note\* In-kind for vessel support in 2018-19 may include both Seawolf and CCGS Viola M. Davidson***

***Details of Budget request - DFO***

|  |  |
| --- | --- |
| **Salary** | *Overtime & dive/field allowances for 4 DFO staff on 3 weeks of fieldwork that includes weekend travel ($12K). Funds listed as O&M (to be converted to salary). Also requested in the second year project are funds to hire a BI-02 on a 90d casual employment basis to conduct digital image analysis and contribute to other project analysis and reporting tasks by Lawton/Cooper ($32K). In-kind (listed as salary) represents time commitment of Lawton/Cooper overall on project and DFO technicians and biologists on dive and seabed video surveys.* |
| **Travel costs** | *Per diem for fieldwork in NS (15d work+6d travel) for 4 DFO staff ($9K); Accommodation (based on motel rooms; would be much less for house rental) ($8K); Regional travel (Lawton/Cooper) to consult with regional oceans managers on program activity schedule and present initial results from 2017 work ($4K); Ferries (4 personnel and 2 vehicles + Seawolf; 3 return trips)($5K)* |
| **Other O&M** | *Other dive survey costs (diving equipment; SCUBA tank air refills; fabrication of transect lines; sample processing; $2K). Costs related to use of SABS seabed video system (drives for video files; equipment modifications for survey; Geospatial Image Lab costs for data management, archiving, and distribution of project summary media ($10K)* |
| **Overhead** | *Maritimes Science Branch 15% overhead on O&M not converted to salary. Not sure if this would be applied for an internal budget transfer.* |
| **Vessel cost** | *Seawolf (SABS dive support vessel).*  *In-kind per day: $1.5K (based on alternative charter). No chargeback to project for general maintenance; cost for gas used, plus wharf fees.*  *Duration of mission: 1 x 5d ($1K).*  *CCGS Viola M. Davidson option: In-kind per day: $4K. Cost ($15K) represents in-field costs in NS for 3 CCG crew and vessel (berthing costs) on 10d mission.*  *NS Commercial charter option: Cost at $1.5K daily charter for 10d estimated to be same cost as CCG vessel for initial budgeting purposes.* |

***Details of Budget request - ARC***

|  |  |
| --- | --- |
| **Salary** | *Total time: 61 days Senior Scientist, 20 days research assistant charged at ARC standing offer rates of $716 for senior scientist and $319.20 for research assistant). Survey time (21 days SS), Taxonomic work (25 days SS and 20 days RA, Data validation and entry (5 days SS), Reporting (10 days SS). These costs include an agreed amount of overhead which covers laboratory consumables).* |
| **Travel costs** | *Travel & Subsistence 4000, covered by ARC.* |
| **Other O&M** | *Diving equipment costs 3000 covered by ARC.* |
| **Overhead** | n/a |
| **Vessel cost** | n/a |

**References:**

Buzeta, M.I. (2014). Identification and Review of Ecologically and Biologically Significant Areas in the Bay of Fundy, Canadian Science Advisory Secretariat Research Document 2013/065.

Kenchington et al. (2016). Delineation of Coral and Sponge Significant Benthic Areas in Eastern Canada using kernel density analyses and species distribution models. DFO Can. Sci. Advis. Sec. Res. Doc. 2016/093.

MacKay, A. (1977) A biological and oceanographic study of the Brier Island Region, NS. A Report to the Department of Indian Affairs and Northern Development, Parks Canada, Ottawa, Ontario.

MCBI (Marine Conservation Biology Institute) (1999). Protecting Marine Ecosystems: Gulf of Maine workshop. Marine Conservation Biodiversity Institute.

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