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Due Diligence Environmental Effects Determination (DD EED) Report

2019 Acoustic Calibration Barge, DUSN Hydrophone Array Calibration

Stephane Blouin
DRDC – Atlantic Research Centre

Defence Research and Development Canada
Reference Document
DRDC-RDDC-2020-D057
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IMPORTANT INFORMATIVE STATEMENTS

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Abstract

As part of the Canadian Arctic Underwater Sentinel Experimentation (CAUSE) Project 99ab and the Force ASW (Anti-submarine Warfare) project 01ca, the acoustic calibration of the DUSN (Distributed Underwater Sensor Network) hydrophone arrays must be calibrated at DRDC's Acoustic Calibration Barge (ACB).

A significant component of this trial involved the performance assessment of acoustic recording equipment, which required the use of acoustic projectors emitting underwater sounds. This report evaluates the environmental impact of transmitting such sounds on marine life, and in particular on marine mammals present in the area.

Significance to defence and security

The protection of the environment is a priority of the Department of National Defence (DND) and Defence Research and Development Canada (DRDC). As such, this report illustrates the use of the latest scientific evidence to assess the impact of using underwater and anthropogenic sound sources on marine life.

Résumé

Dans le cadre du projet 99ab de Recherche expérimentale d'une sentinelle sous-marine pour l'Arctique canadien (RESSAC) et du projet 01ca de Guerre anti-sous-marine (GASM) de la force, l'étalonnage acoustique des réseaux d'hydrophones du réseau distribué de capteurs sous-marins (RDCS) doit être effectué à la barge d'étalonnage acoustique (BEA) de Recherche et développement pour la défense Canada (RDDC).

L'évaluation du rendement d'appareils d'enregistrement acoustique à l'aide de projecteurs acoustiques émettant des sons sous-marins a constitué une portion importante de ces essais. Le présent rapport évalue les incidences environnementales de l'émission de ces sons sur la vie marine, en particulier sur les mammifères marins dans la région.

Importance pour la défense et la sécurité

La protection de l'environnement est une priorité du ministère de la Défense nationale (MDN) et de Recherche et développement pour la défense Canada (RDDC). Sur ce plan, le rapport démontre comment les recherches scientifiques les plus récentes peuvent aider à évaluer les répercussions de l'utilisation de sources sonores sous-marines et anthropiques sur la vie marine.

OPI Project File Number: 99ab ADSA/CAUSE
Establishment File Number: ARC_U_99AB_02_20190204 and 4118-02
EIA Number: 2019-80-102165

Department of National Defence (DND)

Due Diligence Environmental Effects Determination (DD EED) Report

Physical Activity: Acoustic Calibration Barge – DUSN hydrophone array calibration

Prepared by: Stephane Blouin
DRDC Atlantic
Date: 2019-01-24
Version: 0

Executive Summary

An internal due diligence environmental assessment was conducted for DRDC Atlantic's experiment documented in Annex A reference [1]. The trial will take place in Bedford Basin, Halifax Harbor, Nova Scotia.

Potential significant adverse effects of the activity were assessed and mitigation measures have been identified to minimize or eliminate these effects on the following Valued Environmental Components.

- Atmosphere
- Surface Water
- Ambient Noise
- Sediment/Ocean Bottom
- Fish, Aquatic Animals, and Habitat (Marine)
- Species at Risk, Migratory Birds
- Marine Mammals
- Recreational Areas

On the basis of this Environmental Effects Determination report, it has been determined that the activity is not likely to cause significant adverse environmental effects. Therefore the activity can proceed with application of the mitigation measures found in Annex B and D of this document.

Part 1. Activity Information

1.1 Title of Proposed Activity

Acoustic Calibration Barge – DUSN hydrophone array calibration

1.2 Originating Directorate, Base, or Unit

The originating Establishment is: DRDC Atlantic

1.3 Location of Proposed Activity

Latitude: 44.663513 Longitude: -63.564291

This experiment will be run in Bedford Basin and will employ DRDC's technology, in order to test mechanical design and hardware, to calibrate, to experiment with and debug algorithms, and to collect datasets for progressing deliverables of DRDCA projects. Furthermore, acoustic sources will be used as targets, communication device, sonar, etc.

Figure 1. General location for the trial; Bedford Basin (the Basin), Nova Scotia, Canada.

1.4 Activity Summary

The purpose of this task is to acoustically calibrate hydrophone arrays of all DUSN (Distributed Underwater Sensor Network) nodes at DRDC's Acoustic Calibration Barge (ACB).

1.5 Applicability of DND EIA Directive

This activity does not meet the definition of a project in Section 66 of the CEAA 2012 and therefore Section 67/68 is not applicable. However, according to the DND Environmental Impact Assessment Directive a determination on the likelihood of adverse environmental effects is required as an exercise of due diligence before the activity can proceed.

1.6 DD EED Start Date

Start date of the effects determination process: 2019-01-23

1.7 EIA number

EIA Number: 2019-80-102165

1.8 Provincial and Municipal Government Involvement

none

1.9 Other Federal Departments or Third Party Groups

none

1.10 Contacts

1.10.1 EED Point of Contact

a) Name, Rank, and Title: Jennifer Spearman, Project Manager, DRDC Atlantic

b) E-mail Address: jennifer.spearman@forces.gc.ca

1.10.2 Activity Project OPI

a) Name: Stephane Blouin, Defence Scientist, DRDC Atlantic

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Part 2. Environmental Effects Discussion

2.1 Description of Activity Components, Schedule and Site

The scope, equipment, and personnel information can be found in Annex A reference [1].

The next paragraph originates from a more comprehensive sea trial, Annex A reference [3], that took place at the same location in 2018. This experiment is a DRDC trial where contractors/visitors may be present to provide support or observe, assuming security clearance/access is granted. The experiment will focus on equipment including, but not limited to, underwater nodes/targets, gateway buoys, and autonomous underwater vehicles (AUV). Acoustic sources will be used as communication devices, targets, or sonars, and vessels may also be used as targets of opportunity. The primary objectives include, but are not limited to, the following: (1) test mechanical design and hardware, (2) experiment, test, and de-bug algorithms, (3) calibrate, (4) test deployment and recovery procedures, and (5) collect data for on-going and future research projects.

All activities will occur within Bedford Basin, Nova Scotia. The trial/experiment area is defined by a polygon described in Figure 2 and Table 1. The polygon contains most of Bedford Basin, which provides a wide range of water depths (up to 71 meters at its deepest point) and varying environmental conditions, including soft and hard sediments.

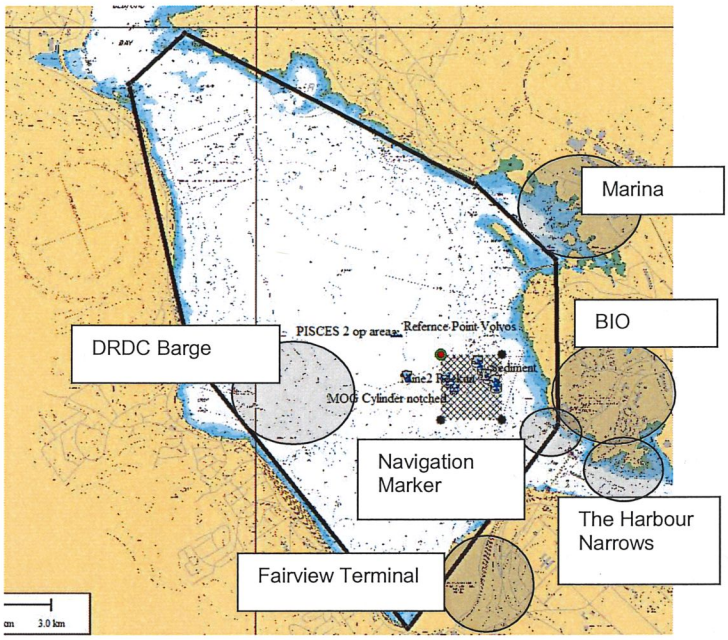

Figure 2. The overall sea-trial area.

Table 1. The coordinates for the sea-trial area

Description	Latitude	Longitude
South near Mackay Bridge	44.6812	-63.6127
South near Fairview Terminal	44.6635	-63.6310
West, near Barge	44.6875	-63.6580
Northwest Point	44.7116	-63.6657
Northeast Point	44.7161	-63.6588
Near Degaussing Range	44.7027	-63.6226
Near Degaussing Range	44.6961	-63.6127

The specific location of assets and their description is documented in Annex A reference [1]. Such description includes the source level and frequency band of acoustic sources to be used.

Support vessels like Zodiac, RHIB (Rigid Hull Inflatable Boat), or contracted boats will be employed to serve many functions such as deployment/recovery, monitoring, etc.

A primary environmental consideration of the trial is the use of acoustic sources in an area known to be populated by marine mammals and any related impacts to the surrounding environment in the Bedford Basin.

The schedule for the in-water part of the testing program can be found in Annex A reference [1].

2.2 Identification of Valued Ecosystem Components (VECs)

The Environmental Effect Matrix found in Annex C identifies some of the potential adverse effects. This VEC matrix is based on a more comprehensive sea trial, Annex A reference [3], that took place at the same location in 2018.

2.3 Description of Valued Ecosystem Components

The Valued Ecosystem Component information largely refers to Section 4 of document [2].

General Description:	See Section 4.0, page 32, Annex A ref. [2].
2.3.1 Physical Components:	Sections 4.1-3, pages 33-39, Annex A [2]
2.3.2 Biological Components:	Sections 4.4, pages 39-49, Annex A ref. [2]
2.3.3 Social and Cultural Components:	Sections 4.5, pages 49-52, Annex A ref. [2]

2.4 Activity Effects and Associated Mitigation Measures

The activity effects and related mitigation measures are presented in Annex B through D. Mitigation measure for acoustic sources can be found in Annex B and other mitigation measures in Annex D. These measures are based on a more comprehensive sea trial, Annex A ref. [3], that took place at the same location in 2018.

2.5 Indigenous Community Engagement

Aboriginal community engagement was not warranted for this activity. The scientific trial includes activities that are frequently completed in the area of work (Bedford Basin) by DRDC, BIO, DND, Canadian Forces, universities, and private companies. Environmental effects and the related mitigating measures are well defined and presented in establishment procedure and/or policy documents.

2.6 Public Participation

Public participation was not warranted for this activity. The scientific trial includes activities that are frequently completed in the area of work (Bedford Basin) by DRDC, BIO, DND, Canadian Forces, universities, and private companies. Environmental effects and the related mitigating measures are well defined and presented in establishment procedure and/or policy documents.

2.7 References and Expertise from Other Federal Government Bodies or Third Party Groups

Other Federal Government Body engagement was not warranted for this activity. The scientific trial includes activities that are frequently completed in the area of work (Bedford Basin) by DRDC, BIO, DND, Canadian Forces, universities, and private companies. Environmental effects and the related mitigating measures are well defined and presented in establishment procedure and/or policy documents.

Part 3. Environmental Effects Determination

On the basis of this DND DD EED Report, it has been determined that the impact of this Physical Activity on the environment is as follows:

☒ The Physical Activity is not likely to cause significant adverse environmental effects. The Physical Activity **can** proceed with application of the mitigation measures specified in the interaction tables in this report.

☐ The Physical Activity is likely to cause significant adverse environmental effects that cannot be mitigated. As per the Environmental Impact Assessment Directive, it is recommended that the Physical Activity must not proceed.

DND EED Report Prepared by:

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Signature 29-01-2019 Date (dd-mm-yyyy)

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Location: DCC Halifax site office
Date: 2019.01.28 14:20:16 -04'00' Date (dd-mm-yyyy)

DND EED Report Accepted and Approved by (Project OPI):

The undersigned accepts the determination and recommendations of this environmental effects determination report. The undersigned also accepts the responsibility to incorporate the recommendations of the report into the activity design and implementation.

Name: Jennifer Spearman
Title: Project Manager, DRDC Atlantic
Contact: 902-407-0386, jennifer.spearman@forces.gc.ca

Signature 29-01-2019 Date (dd-mm-yyyy)

Annex A: References

1. S. Blouin, Short Trial Plan (A-352-1), "ARC_U_99AB_02_20190204 Acoustic Calibration Barge – DUSN hydrophone array calibration", File 4118-02, 2019.

2. Stantec Consulting Limited, 2016. Updated Environmental Baseline Study of the DRDC Atlantic Acoustic Calibration Barge. March 2016.

3. S. Blouin, "DUSN Local Sea-trial Activities For 2018", File 4118-02, 2018.

Annex B: Marine Mammal Mitigation Procedure

Ref: NAVORD 4003-6 Marine Mammal Mitigation Procedures for Active Sonar Use

Introduction

1. DRDC-Atlantic performs various acoustic experiments in Bedford Basin. This SOP (Standard Operating Procedure) is to ensure that such experiments do not harass or injure any marine mammals in the area in accordance with the reference.

Scope

2. This SOP covers only DRDC-Atlantic acoustic activities as they affect marine mammals. It does not cover any noise level issues for the personnel involved.

3. This SOP is to be observed by all DRDC-Atlantic personnel performing acoustic experiment in Bedford Basin. If the experiment takes place at the Acoustic Calibration Barge, then the procedure found in Annex A ref. [2] supersedes this SOP.

Overview

4. NAVORD 4003-6 stipulates that for activities planned for Halifax Harbour and the MARLOAs, MARLANT are recommending following the marine mammal mitigation procedures within the Halifax Class SEMS [A]. As per NAVORD 4003-6 paragraph 2.3, a Mitigation Avoidance Zone (MAZ) must be calculated and reference [A] mentions a sound level (SL) of 160 decibel (dB) relative to 1 micro-Pascal at the marine mammal location as a reasonable and diligent planning figure for use in defining the boundary of MAZ.

5. Most of DRDC-Atlantic acoustic experiments will be at lower intensities than the Halifax Class acoustic sources listed in Table SOP-E05B.1 of reference [A]. This SOP provides a procedure for much less powerful acoustic sources and it follows an approach similar to that of reference [B].

6. Definitions

a) SL Source Level – The level of sound radiated by an acoustic projector, measured in decibel (dB) referenced to 1 micro-Pascal at a distance of 1 meter

b) SPL Sound Pressure Level - The level of sound measured at a particular point, measured in dB relative to 1 micro-Pascal

c) TL Transmission Loss – The quantity of power lost from the source signal as it travels through water

d) Sonar Equation (from [C]) SPL=SL –TL where TL = 20 $\log_{10}(r)$ + alpha(r) for spherical spreading and TL=10$\log_{10}(r)$ + alpha(r) for cylindrical spreading, where r is the distance in meters, alpha is the absorption coefficient calculated based on salinity, temperature, depth, pH, and frequency as per references [D] or [E].

e) Marine Mammal Survey. A visual and or acoustic survey of the area

7. The following table gives an approximate reduction in SPL to distance dependent on frequency. The equation used is TL = 20 $\log_{10}(r)$ + alpha(r) for distances up to 400 m and TL=20 $\log_{10}(400)$ + 10$\log_{10}(r/400)$ + alpha(r) for distances beyond 400 m.

Frequency ->	0.1 kHz	0.3 kHz	1 kHz	10 kHz	30 kHz	100 kHz	1000 kHz
alpha (dB/km) ->	0.001	0.01	0.06	1.13	7.63	28.78	404.3
Distance (m)	Approximate reduction in SPL						
3	9.5	9.5	9.5	9.5	9.6	9.6	10.8
10	20.0	20.0	20.0	20.0	20.1	20.3	24.0
30	29.5	29.5	29.5	29.6	29.8	30.4	41.7
100	40.0	40.0	40.0	40.1	40.8	42.9	80.4
400	52.0	52.0	52.1	52.5	55.1	63.6	213.8
900	55.6	55.6	55.6	56.6	62.4	81.5	----
1500	57.8	57.8	57.9	59.5	69.2	101.0	----
3000	60.8	60.8	61.0	64.2	83.7	147.1	----
4500	62.6	62.6	62.8	67.6	96.9	192.1	----

Table 2. Approximate reduction in SPL (dB relative to 1 micro-Pascal) for some common frequencies. Above values are based on default settings of a pH of 8, a salinity of 35 ppt (parts per trillion), a water temperature of 5 degree Celsius, and a depth of 50 metres.

Procedures

8. Before any experiment involving an acoustic source, the maximum expected SPL shall be calculated. Each day, the projector details, maximum transmitted SPL, and frequency shall be entered in a log book for further reference.

9. If the expected SPL during a specific evolution is less than 170 dB, no mitigation is required.

10. If the expected SPL during a specific evolution is between 170 dB and 190 dB, the area within a 100 meter radius of the acoustic source location shall be surveyed and clear of marine mammals.

10. Marine Mammal surveys will be done 10 minutes before transmissions start and every hour thereafter, except as covered in paragraph 12

12. When the expected SPL during a specific calibration is greater than 180 dB, the following sequence shall be undertaken:

a) Starting at a level less than 180 dB, transmit for 5 min, followed by a mammal survey of area;

b) Transmit at level between 180 dB and max power for 5 min, followed by another mammal survey of the area; and

c) Transmit at full power for 5 min, followed by a final mammal survey of the area.

13. If the expected SPL during a specific evolution is greater than 190 dB, the entire basin up to Mill cove and to the McKay Bridge shall be surveyed for marine mammals and should mammals be observed in this larger area, no experiment shall be performed until area is clear.

14. Any sightings within the exclusion area shall institute the termination of any kind of transmissions until cleared. Sightings shall be recorded in a log book for future reference

References

[A] HALIFAX CLASS SAFETY AND ENVIRONMENTAL MANAGEMENT SYSTEM (SEMS) MANUAL, May 2010

[B] FINAL REPORT Updated Environmental Baseline Study of the DRDC Atlantic Acoustic Calibration Barge, DCC Project # DRDC1516-5, March 29, 2016

[C] Urick, Principles of Underwater Sound, p105

[D] http://resource.npl.co.uk/acoustics/techguides/seaabsorption/

[E] Ainslie, M.A., McColm, J.G., A simplified formula for viscous and chemical absorption in sea water. JASA, 103, 3 (1998)

Annex C: Valued Ecosystem Components

Table 2. Environmental Effects Matrix

ACTIVITY COMPONENTS	VALUED ECOSYSTEM COMPONENTS (VEC)																	
	PHYSICAL							BIOLOGICAL					SOCIAL AND CULTURAL					
	Atmosphere	Surface Water	Groundwater	Soils and Geology	Ambient Noise	Sediment/Ocean Bottom	...	Terrestrial Animals and Habitat	Fish, Aquatic Animals and Habitat (Marine)	Vegetation	Species at Risk and Migratory Birds	Marine Mammals...	Land Use	Parks and Recreational Areas	Population	Cultural Resources	Aboriginal / Traditional Activities	...
1. Launch/Recovery Vessel Operations	X	X			X				X		X			X				
2. Deployment/Recovery of DUSN Node, net with equipment, reference hydrophone, gateway buoy, Starfish Cubes, AUV, etc.						X			X			X		X				
3. Underwater acoustic comms./ source use					X				X			X		X				

Legend: [*Blank*] = No Effect | [X] = Potential Significant Adverse Effect

Annex D: Other Mitigation Measures

The Activity effects and related mitigation measures are presented in Table 3.

Table 3. Potential effects of the activity on each Valued Ecosystem Component (VEC, refer to Table 2) with mitigation measures

VEC(s) Affected	Activity Component(s)	Description of Effects	**Mitigation Measures** (numbers appearing after a measure indicate the activity component(s) with which it is associated)	Are residual significant adverse effects likely?
Atmosphere	1 .Launch/Recovery Vessel Operations	Air quality could be negatively affected by combustion/emissions launch and recovery vessel operations. – Based on the small scope of activities and use of vehicles/combustion engines in an urban commercial/industrial setting, minimal impact to the environment is anticipated.	1., Reduce: boats, and equipment will be in good working order. Unnecessary idling will be limited.	NO
Surface Water	1. Launch/Recovery Vessel Operations	Spills/releases of deleterious substances may negatively impact VEC. – Spills or releases of deleterious substances are a possibility.	1., Reduce: boats, and equipment will be in good working order and inspected on a regular basis. 1., Respond: boats, spill response and Emergency notification procedures to be communicated to the vessel crew/ Harbour response teams (QHM)	NO
Ambient Noise	1. Launch/Recovery Vessel Operations 3. Underwater acoustic comms./source use	Noise generated by activity may negatively impact VEC. – Based on the small scope of activities and in an urban commercial/industrial setting and in a busy working harbour, minimal contribution of ambient noise to the environment is anticipated.	1., Reduce: Vehicles, boats, and equipment will be in good working order. Unnecessary idling will be limited. 3. Reduce: To reduce potential interactions with VECs, boat, AUVs, and acoustic sources will only be operated during trial activities. When trial component is not being monitored,	NO

VEC(s) Affected	Activity Component(s)	Description of Effects	**Mitigation Measures** (numbers appearing after a measure indicate the activity component(s) with which it is associated)	**Are residual significant adverse effects likely?**
			acoustic sources are to be powered down.	
Sediment/Ocean Bottom	2. Deployment/Recovery of DUSN Node, gateway buoy, Starfish Cubes, AUV	Equipment installed or deposited on ocean bottom may negatively impact VEC. – Based on the limited quantity and the small footprint of the node mooring (1m2) for equipment being deployed to the ocean bottom, minimal impact to the sediment/ocean bottom environment is anticipated.	2., Reduce: All equipment installed or lost on the ocean bottom will be retrieved at the end of the trial with the exception of moorings. 2. Reduce: Mooring for DUSN node, gateway buoys, and recovery lines that will be deployed on location and not dragged to prevent significant disturbance of the ocean bottom environment.	NO
Fish, Aquatic Animals and Habitat (Marine)	2. Deployment/Recovery of DUSN Node, gateway buoy, Starfish Cubes, AUV 3. Underwater acoustic comms./source use	Operation of equipment and completion of trial activities may negatively impact VEC. – Based on the small scope of activities and in an urban commercial/industrial setting and in a busy working harbour, minimal impact to fish, marine invertebrates, and their habitat is anticipated. – There is potential that DUSN node could malfunction and descend and settle onto the ocean floor. – There is potential for acoustic release to malfunction and that	2.,3. Reduce: To reduce potential interactions with VECs, boat, AUVs, and acoustic sources will only be operated during trial activities. When trial component is not being monitored, acoustic sources are to be powered down. 2., 3. Reduce: If the DUSN Node or acoustic release malfunctions so that equipment descends to or stays on the ocean floor, the equipment will be retrieved by divers or retrieval equipment at a later time.	NO

VEC(s) Affected	Activity Component(s)	Description of Effects	Mitigation Measures (numbers appearing after a measure indicate the activity component(s) with which it is associated)	Are residual significant adverse effects likely?
		equipment stays in water longer than expected.		
Species at Risk, Migratory Birds	1. Launch/Recovery vessel Operations	Operation of equipment and completion of trial activities may negatively impact VEC. – Based on the small scope of activities and in an urban commercial/industrial setting and in a busy working harbour, minimal impact to species at risk/migratory birds and their habitat is anticipated.	1. Reduce: To reduce potential interactions with VECs, boat, AUVs, and acoustic sources will only be operated during trial activities. When trial component is not being monitored, acoustic sources are to be powered down. Additional mitigation measures about Marine Mammals and acoustic sources can be found below.	NO
Marine Mammals	1. Launch/Recovery Vessel Operations 2. Deployment/Recovery of DUSN Node, gateway buoy, Starfish Cubes, AUV	Operation of equipment and completion of trial activities may negatively impact VEC. Acoustic sources: – Acoustic sources transmit sound into the water at frequencies and source levels as detailed in the trial plan. – For high frequency acoustic sources, the sound does not propagate to long ranges before being attenuated to lower than the existing ambient noise level. – Based on the small scope of activities and in an urban	1., 3. Reduce: To reduce potential interactions with VECs, boat, AUVs, and acoustic sources will only be operated during trial activities. When trial component is not being monitored, acoustic instruments to be powered down. 2. Reduce: To reduce potential impacts to marine mammals related to the use of acoustic sources, Annex B of the Due Diligence Environmental Effects Determination (DDEED) Report includes a marine mammal mitigation procedure in agreement with:	NO

VEC(s) Affected	Activity Component(s)	Description of Effects	Mitigation Measures (numbers appearing after a measure indicate the activity component(s) with which it is associated)	Are residual significant adverse effects likely?
		commercial/industrial setting and in a busy working harbour, minimal impact to marine mammals is anticipated with the application of the recommended mitigation measures. – The Bedford Basin is home to regular shipping traffic as well frequent pleasure craft all of which emit acoustic navigational sources while transiting through Halifax Harbour. – Thus it is anticipated that the AUVs, vessel, and all acoustic sources will have a negligible effect on the ambient noise of the basin.	– NAVORD 4003-6-Marine Mammal Mitigation Procedures for Active Sonar Use – 'Updated Environmental Baseline Study of the DRDC Atlantic Acoustic Calibration Barge', Stantec Consulting Ltd., DCC Project # DRDC1516-5, March 29, 2016	
Recreational Areas	1. Launch/Recovery Vessel Operations 2. Deployment/Recovery of DUSN Node, gateway buoy, Starfish Cubes, AUV 3. Underwater acoustic comms./source use	Operation of equipment and completion of trial activities may negatively impact VEC. – Based on the small scope of activities and in a busy working harbour, minimal impact to the recreational area is anticipated with the application of the recommended mitigation measures.	2., 4. Reduce: To reduce potential interactions with VECs, boats, AUVs, and acoustic sources will only be operated during trial activities. 1, 2, 3. Reduce: the Queen's Harbour Master (QHM) will be contacted and kept informed of daily trial plan to limit potential interference with recreational and commercial boats.	NO

List of symbols/abbreviations/acronyms/initialisms

AUV	autonomous underwater vehicles
dB	decibel
DD EED	Due Diligence Environmental Effects Determination
DND	Department of National Defence
DRDC	Defence Research and Development Canada
DUSN	Distributed Underwater Sensor Network
MAZ	Mitigation Avoidance Zone
R&D	Research & Development
RHIB	Rigid Hull Inflatable Boat
SL	sound level
SPL	sound pressure level
SOP	Standard Operating Procedure
TL	transmission loss
VEC	Valued Ecosystem Components

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13. ABSTRACT (When available in the document, the French version of the abstract must be included here.)

As part of the Canadian Arctic Underwater Sentinel Experimentation (CAUSE) Project 99ab and the Force ASW (Anti-submarine Warfare) project 01ca, the acoustic calibration of the DUSN (Distributed Underwater Sensor Network) hydrophone arrays must be calibrated at DRDC's Acoustic Calibration Barge (ACB).

A significant component of this trial involved the performance assessment of acoustic recording equipment, which required the use of acoustic projectors emitting underwater sounds. This report evaluates the environmental impact of transmitting such sounds on marine life, and in particular on marine mammals present in the area.

Dans le cadre du projet 99ab de Recherche expérimentale d'une sentinelle sous-marine pour l'Arctique canadien (RESSAC) et du projet 01ca de Guerre anti-sous-marine (GASM) de la force, l'étalonnage acoustique des réseaux d'hydrophones du réseau distribué de capteurs sous-marins (RDCS) doit être effectué à la barge d'étalonnage acoustique (BEA) de Recherche et développement pour la défense Canada (RDDC).

L'évaluation du rendement d'appareils d'enregistrement acoustique à l'aide de projecteurs acoustiques émettant des sons sous-marins a constitué une portion importante de ces essais. Le présent rapport évalue les incidences environnementales de l'émission de ces sons sur la vie marine, en particulier sur les mammifères marins dans la région.