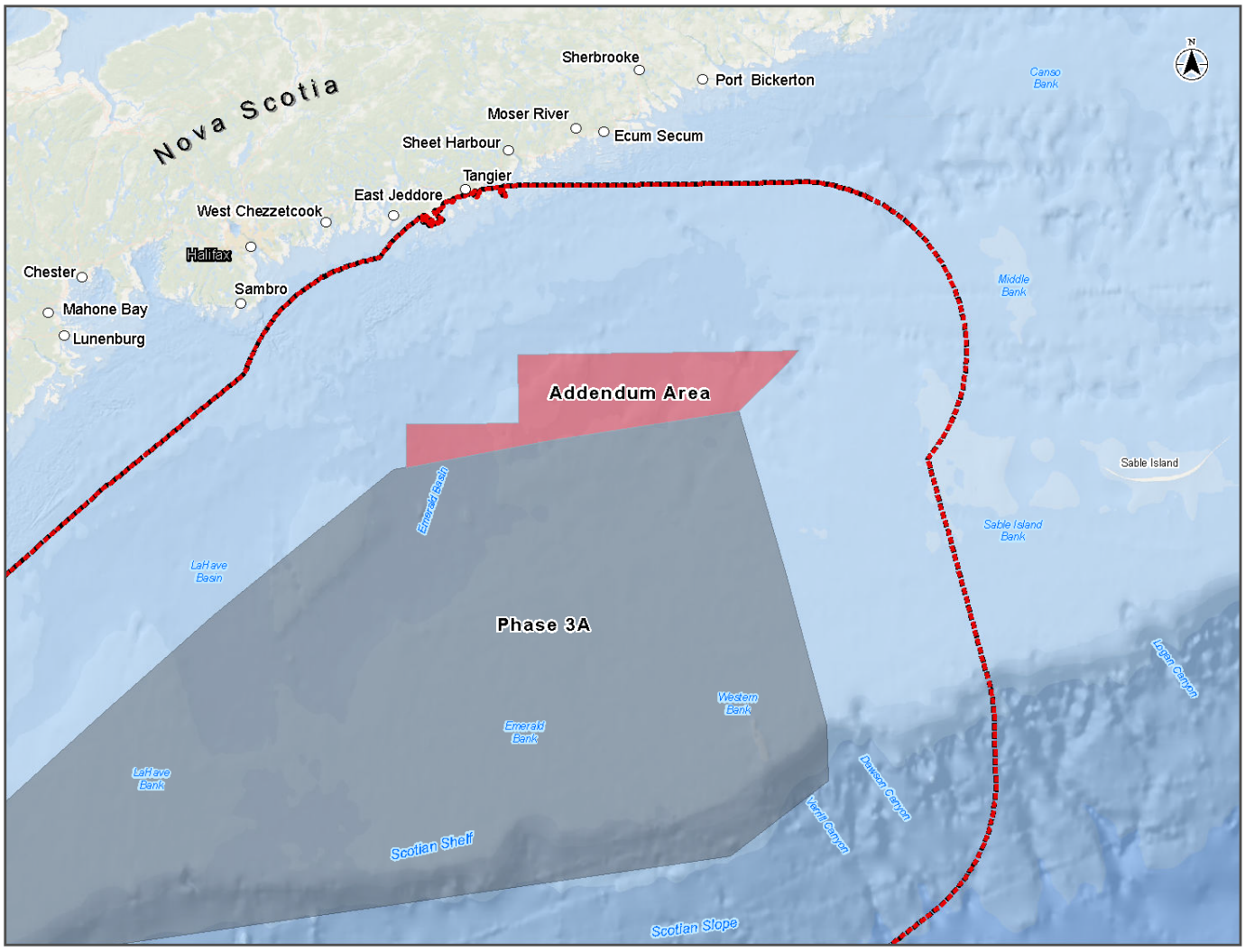
CNSOPB CANADA-NOVA SCOTIA OFFSHORE PETROLEUM BOARD

Final Report



STRATEGIC ENVIRONMENTAL ASSESSMENT FOR OFFSHORE PETROLEUM EXPLORATION ACTIVITIES

Western Scotian Shelf (Phase 3A Addendum)

Prepared for:

CANADA-NOVA SCOTIA OFFSHORE PETROLEUM BOARD

Submitted by:

Stantec Consulting Ltd.
102-40 Highfield Park Drive
Dartmouth NS B3A 0A3

January 2, 2017

Stantec
Design with community in mind

Western Scotian Shelf Strategic Environmental Assessment - Phase 3A Addendum

Final Report

Prepared for:
Canada-Nova Scotia Offshore Petroleum Board

Prepared by:
Stantec Consulting Ltd.

File: 121414167

January 2, 2017

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Executive Summary

This report is an addendum to the Phase 3A Strategic Environmental Assessment (SEA) which considered potential impacts of petroleum exploration activities on the Western Scotian Shelf. This addendum has been prepared to address the 2018 Call for Bids area which extends beyond the area previously delineated for assessment in the Phase 3A SEA and is intended to assist the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB) and potential future operators with respect to future applications and environmental management planning within the Phase 3A Addendum Project Area.

The "Addendum Project Area" represents the potential area within which exploration rights could be issued by the CNSOPB. The "Addendum Study Area" was established as a buffer around the Addendum Project Area to recognize a potential zone of influence of environmental effects from activities that could occur within the Project Area. The Addendum Project Area occurs within the Phase 3A SEA Study Area; the Addendum Study Area represents new areas not previously considered in former SEAs and is the focus of new information presented in this Addendum.

This Addendum adopts a similar approach to that used in the Phase 3A SEA, assessing effects of potential exploration activities on Valued Environmental Components (VECS) including:

- Species of Special Status (species listed by the *Species at Risk Act* and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and migratory birds);
- Special Areas (designated areas of special interest due to ecological/conservation sensitivities, including inshore and coastal designated areas); and
- Fisheries and Other Ocean Users (commercial, recreational and/or Aboriginal fisheries, other recreational activities).

Key interactions and effects between "the Project" (potential exploration activities) and VECs are very similar to that assessed in the Phase 3A SEA; the focus of the Addendum is on effects of potential spills which may extend outside of the Addendum Project Area and into the Addendum Study Area, thereby potentially interacting with nearshore and coastal resources.

Mitigation measures to reduce environmental effects and address data gaps and uncertainties with respect to the Phase 3A Study Area were presented in Section 9 of the Phase 3A SEA and have been adapted as applicable for the Addendum Study Area (refer to Table E.1). Additional mitigation measures specific to the Addendum Study Area (which do not appear in the Phase 3A SEA) are shown as bolded text.

Table E.1 Summary of Key Mitigation for Exploration Activities in Phase 3A Addendum Project Area

Exploration Activity	Proposed Mitigation
Seismic and Seabed Surveys	• Schedule surveying to reduce interaction with peak haddock spawning in the Haddock Box (April to May). • Use of trained wildlife observers to visually monitor and record marine mammal, sea turtle and marine bird interactions and to help enforce safe operating distances. • Seabird monitoring to be completed following the CWS pelagic seabird monitoring protocol provided in Appendix C of the Phase 3A SEA. • Fisheries Liaison Officer (FLO) familiar with NS offshore fisheries to be present on the seismic survey vessel(s) to communicate with fishing vessels in the area and to avoid potential conflict with fishing activities/gear. For conventional (single vessel) seismic programs FLOs may be trained as marine wildlife observers and perform both tasks. • Use of Passive Acoustic Monitoring (PAM) as per the "Statement of Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment". • Adherence to the CNSOPB "Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity". • Issuance of "Notice to Mariners" on location and scheduling of survey activities. • Commencement of seismic data acquisition only if survey area confirmed to be clear of fixed fishing gear (*e.g.*, lobster traps) or floating longline gear (*e.g.*, for large pelagics such as tuna and swordfish). • Consultation with key organizations representing fishing interests (including commercial and Aboriginal) in the area during the EA planning stage and just prior to commencement of any work to coordinate seismic program activities with fishing industry and to reduce potential conflict with fishing activity during peak fishing times. • Consultation with DFO Science Branch to ensure survey area and timing reduces the potential for conflict with research vessel program plans. • Consultation with DND to ensure survey areas and timing reduces the potential for conflict with exercises and/or training and to discuss the proximity of unexploded ordnances/explosive dumpsites.
Exploratory Drilling	• Conduct pre-drilling ROV investigation to determine presence of corals, sponges, or other sensitive features as required by the CNSOPB. • Areas with known aggregations of cold-water coral and other sensitive features shall be avoided during oil and gas drilling activities. If aggregations of cold-water coral are found to occur as the result of an environmental assessment that is conducted following an application for drilling or production, the CNSOPB requires mitigation to avoid harming these aggregations (DFO 2006). • Follow Canadian Wildlife Service mitigation measures when finding a dead or injured bird (*i.e.*, Williams and Chardine handling protocol). • Adherence to the CNSOPB "Offshore Waste Treatment Guidelines" and "Offshore Chemical Selection Guidelines" to reduce effects of drill waste discharges during drilling programs. • Adherence to Nova Scotia Offshore Drilling and Production Regulations. • Bulk transfer and hose handling procedures as per best available practice.

Table E.1 Summary of Key Mitigation for Exploration Activities in Phase 3A Addendum Project Area

Exploration Activity	Proposed Mitigation
	• Reduce flaring and ensure the use of high-efficiency igniters as per best management practice. • Focus all area lighting on the work areas of offshore platforms and down shade lights to reduce marine bird attraction. • Conduct a post-drilling ROV survey to verify that the muds and cuttings are within the predicted zone of influence. • Emergency contingency measures and response plans will be developed to address significant weather scenarios. • Monitor seabird interactions with the drilling rig/platform. • Enhanced mitigation and EEM programs may be required for activities within or adjacent to Special Areas, such as spawning areas (*e.g.*, the Haddock Box), the Roseway Basin Area to be Avoided/Critical Habitat, Northeast Channel Coral Conservation Area and/or Sambro Bank and Emerald Basin Vazella Closure areas. • Issuance of "Notice to Shipping" on location and scheduling of drilling activities. • Consultation with key organizations representing fishing interests (including commercial, Aboriginal and recreational) in the area during the EA planning stage.
Vessel Traffic	• Adherence to Transport Canada Guidelines for the Control of Ballast Water Discharge from Ships in Waters under Canadian Jurisdiction. • Use of existing vessel routes to the extent practical. • Use of common routes by supply vessels and alternate routes around key fishing grounds particularly when fishing is at its peak.
Well Abandonment	• Design of wells and casings to facilitate effective mechanical cutting and removal of the wellhead; avoiding explosive means of separation where possible. • If use of explosives is necessary, the recommendations set out in the *Guidelines for the use of Explosives in or near Canadian Fisheries Waters* (Wright and Hopky 1998) will be followed.
Accidental Spills	• Detailed spill probability and behaviour modelling as input to any project-specific EAs for a drilling project in **the Phase 3A Addendum Project Area**. • Engineering design and protocols to prevent spills from occurring and/or reaching the marine environment including but not limited to secondary containment, inspection and maintenance, spill response kits, and blowout safeguards. • **As part of Project-specific post-EA spill contingency planning, preparation of a Net Environmental Benefit Analysis (NEBA), which will consider sensitive coastal resources, fisheries, and other ocean users as applicable.** • Implement Emergency and Oil Spill Response Plan accepted by the CNSOPB to address spill prevention and response including interactions with fishers and other ocean users, and includes spill response exercises. • Outline an EEM Plan to address post-spill monitoring effects, with the scope of the EEM Plan directly related to the severity of the spill.

Table E.1 Summary of Key Mitigation for Exploration Activities in Phase 3A Addendum Project Area

Exploration Activity	Proposed Mitigation
	• Operator to establish ongoing communication with key fisheries stakeholders and other ocean users in the event of a spill and during spill response activities, including but not limited to issuance of a Notice to Shipping/Mariners. • Adherence to CNSOPB "Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity".

Various data gaps and uncertainties exist with respect to the understanding of environmental effects of accidental spills on the nearshore/coastal environment. Aboriginal and stakeholder engagement during Project-specific environmental assessments will play an important role in identifying and mitigating effects on nearshore resources and resource use.

Assuming adherence to applicable standards and regulations and the implementation of mitigation and monitoring as recommended, the issuance of exploration rights in the Phase 3A Addendum Project Area is not expected to result in unacceptable adverse environmental effects such that populations of species of special status or integrity of Special Areas would be compromised beyond sustainable levels. It should be noted that there is the potential requirement for additional or alternative mitigation measures on a case-by-case basis at the Project level and operators should establish appropriate study area boundaries for assessing effects of accidental spills such that potential effects on coastal resources can be adequately assessed. Effects of exploration on fisheries and other ocean users are also not expected to result in unacceptable effects provided the recommended mitigation and ongoing communication with applicable stakeholders is implemented. It should be noted that there is the potential requirement for additional or alternative mitigation measures on a case-by-case basis at the Project level.

Acronyms

CEA	cumulative effects assessment
CEAA, 2012	*Canadian Environmental Assessment Act, 2012*
CEPA	*Canadian Environmental Protection Act*
CFA	crab fishing area
CNSOPB	Canada-Nova Scotia Offshore Petroleum Board
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Fisheries and Oceans Canada
EA	environmental assessment
EBSA	ecologically and biologically significant area
EEM	environmental effects monitoring
FAC	Fisheries Advisory Committee
FSC	food, social and ceremonial
IBA	important bird area
IMO	International Maritime Organization
LFA	lobster fishing area
MODU	mobile offshore drilling unit
MPA	marine protected area
NAFO	Northwest Atlantic Fisheries Organization
NEB	National Energy Board
NEBA	net environmental benefit analysis
NSE	Nova Scotia Environment
OCSG	Offshore Chemical Selection Guidelines
OWTG	Offshore Waste Treatment Guidelines
PAM	passive acoustic monitoring
RMS	root mean square
ROV	remotely operated vehicle
SARA	*Species at Risk Act*
SEA	strategic environmental assessment
SFA	scallop fishing area
SOCP	Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment
VEC	valued environmental component
VSP	vertical seismic profiling
WAZ	wide azimuth seismic survey

1.0 INTRODUCTION

Petroleum activities in the Nova Scotia offshore are regulated by the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB), an independent joint agency of the federal and provincial governments. Under the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act* and the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation (Nova Scotia) Act,* collectively referred to as the Accord Acts, the CNSOPB is responsible for the management and conservation of the offshore petroleum resources, in a manner that protects the health and safety of offshore workers and the environment while maximizing employment and industrial benefits for Nova Scotians and Canadians.

The CNSOPB issues offshore petroleum rights through a competitive bidding process (Call for Bids) in which any person or company can submit a Work Expenditure Bid in an effort to secure exploration rights for approved parcels of Crown Reserve Lands. One of the tools that the CNSOPB uses in its determination with respect to the potential issuance of petroleum rights is the strategic environmental assessment (SEA).

SEA incorporates a broad-based approach to environmental assessment (EA) that examines potential environmental effects that may be associated with a plan, program or policy proposal and facilitates environmental management considerations at the earliest stages of exploration planning.

In particular, the SEA:

- defines general exploration activities;
- provides an overview of the existing environment within the Study Area;
- broadly describes potential adverse environmental effects associated with offshore oil and gas exploration;
- highlights relevant knowledge and data gaps; and
- recommends general mitigation measures for offshore petroleum exploration activities.

The SEA therefore identifies key environmental issues for the CNSOPB as well as for prospective future operators with interest in the parcels. The SEA is not intended to replace project-specific EAs that would be required for any proposed exploration program; rather it is intended to support and facilitate future project-specific EAs.

In 2014, the SEA for potential petroleum exploration activities on the Western Scotian Shelf (Western Bank to Browns Bank) was prepared to assist the CNSOPB in its determination with respect to the potential issuance of future exploration rights on the Western Scotian Shelf.

The *Strategic Environmental Assessment for the Western Scotian Shelf (Phase 3A)* (Stantec 2014), hereinafter referred to as the "Phase 3A SEA" focused on a defined area on the Western Scotian Shelf which was delineated at the time based on predicted acreage of Crown Reserve Lands to be subject to a future Call for Bids.

It is now known that the 2018 Call for Bids process will involve Crown Reserve Lands that extend beyond the Phase 3A SEA Project Area into an area not previously subject to the CNSOPB's SEA process (refer to Figure 1.1). This document is an Addendum to the Phase 3A SEA, focusing on the new area not previously assessed in the Phase 3A SEA. Using the same approach used in the Phase 3A SEA, the Addendum Project Area represents additional lands in which exploration activities could occur. A 54 km buffer has been applied to define a Study Area around the Project Area. Figure 1.2 presents the Project Areas and Study Areas for both the Phase 3A SEA and this Addendum.

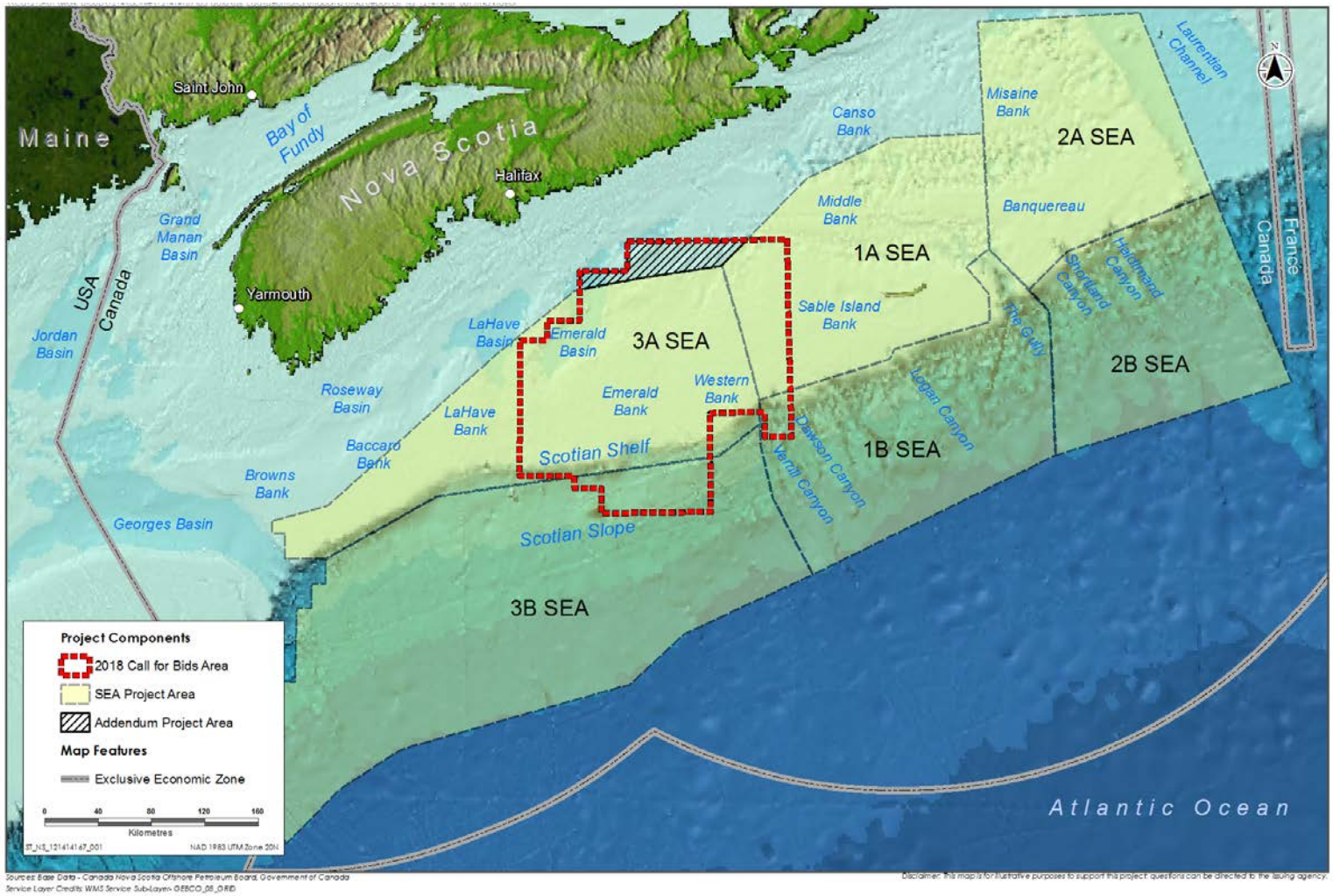


Figure 1.1 2018 Call for Bids Area

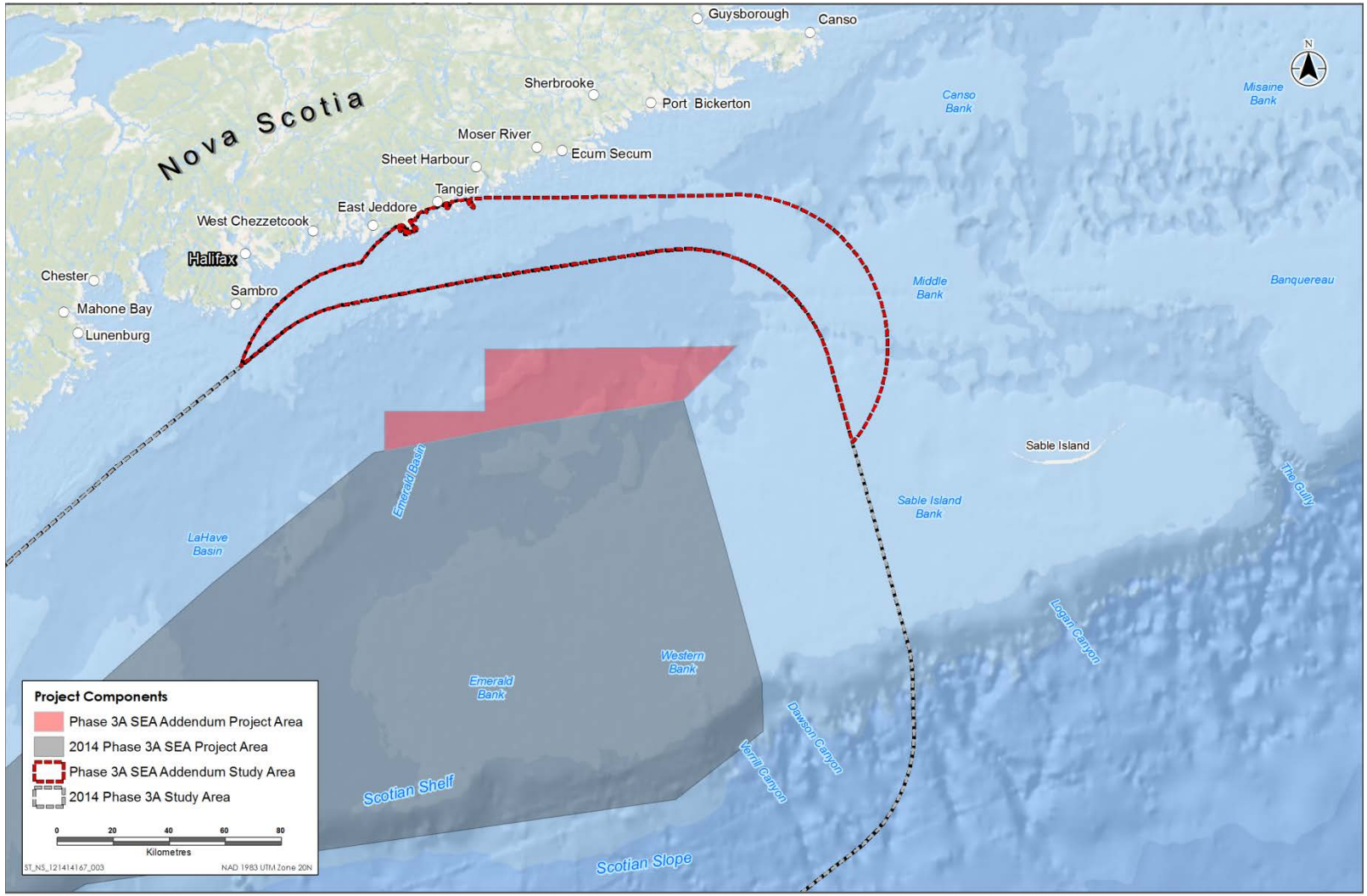


Figure 1.2 SEA Addendum Project Area and Study Area Boundaries

Introduction
January 2, 2017

This addendum focuses on new information specific to the Phase 3A Addendum Project Area (and respective Study Area). Except as noted, information contained in the Phase 3A SEA is assumed to apply to the Phase 3A SEA Addendum Project Area (and respective Study Area).

2.0 EXPLORATION ACTIVITIES

The scope of exploration activities presented in the Phase 3A SEA remain valid for the Addendum. These include the following:

- Geophysical surveys (*e.g.*, seismic, 3D seismic, 3D wide azimuth seismic)
- Seabed surveys (*e.g.*, geophysical surveys, geotechnical sampling, environmental sampling)
- Drilling activities (*e.g.*, exploration drilling, vertical seismic profiling, well evaluation and testing, delineation drilling, well abandonment)
- Vessel and helicopter traffic (*e.g.*, supply and servicing).

Refer to Section 2 of the Phase 3A SEA for activity descriptions.

Likewise, consideration of potential accidental events (focusing on unplanned accidental releases to the marine environment) remains valid for the Addendum. There have been no exploration wells drilled in the Addendum Project Area or respective Study Area and no accidental releases related to petroleum exploration (including seismic) in these areas.

3.0 KEY CHARACTERISTICS OF THE ENVIRONMENT

3.1 PHYSICAL CHARACTERISTICS

The Addendum Project Area extends from the Middle Scotian Shelf to the Inner Scotian Shelf, with water depths of approximately 100 m to 200 m, extending to 400 m in the Emerald Basin which overlaps with the Project Area. The Addendum Study Area extends as a 54-km wide buffer around the Addendum Project Area and extends to the Nova Scotia coastline.

The Inner Scotian Shelf borders the Nova Scotia mainland and extends approximately 25 km from shore to the Middle Scotian Shelf. Essentially a submarine extension of coastal areas with high relief of roughly eroded bedrock, the Inner Scotian Shelf is characterized by patchy distribution of bedrock, sand and gravel, creating a high surface relief and a variety of habitats (WWF 2009).

Wind and wave climate described for the Phase 3A SEA study area would be applicable to the Addendum Project Area. As reported in the Phase 3A SEA, there would be no expected occurrence of sea ice or icebergs in the Phase 3A Addendum Project Area or associated Study Area.

Movement of water within the Addendum Project Area is primarily influenced by the Nova Scotia Current which flows in a southwesterly direction close to the coastline. As it approaches the Halifax area, it branches offshore to join the Shelf Break Current where it continues to flow southwesterly along the Shelf Break (Breeze *et al.* 2002). Waters within the nearshore Addendum Study Area are primarily influenced by tidal currents. The Nova Scotia Current brings relatively cool and fresh (less saline) waters from the Gulf of St. Lawrence to the Middle and Inner Scotian Shelf. Coastal waters of the Addendum Study Area are characterized by variable water temperatures and lower salinity (due to freshwater influence) than waters further offshore.

3.2 BIOLOGICAL CHARACTERISTICS

Section 3.2 of the Phase 3A SEA describes the biological characteristics of the Phase 3A SEA Study Area. The description of biological characteristics provided therein is generally valid for the Addendum Project Area. Acknowledging the inshore nature of the Addendum Study Area, additional attention is given to nearshore marine plants, corals and sponges, marine mammals, migratory birds (*e.g.*, designated Important Bird Areas [IBAs], migratory bird sanctuaries, and seabird colonies), and Special Areas.

3.2.1 Plankton and Algal Communities

The overview of phytoplankton, zooplankton and ichthyoplankton presented in Section 3.2.1 of the Phase 3A SEA remains valid for the Addendum Project Area and associated Study Area.

However, it is acknowledged that the nearshore environment of the Addendum Study Area would contain a higher density and diversity of spawning areas and algal communities.

Species that are known to spawn in nearshore areas along the Nova Scotia coastline include: American plaice (*Hippoglossoides platessoides*), Atlantic cod (*Gadus morhua*), Atlantic wolffish (*Anarchichas lupus*), Atlantic herring (*Clupea harengus*), capelin (*Mallotus villosus*), haddock (*Melanogrammus aeglefinus*), pollock (*Pollachius virens*), witch flounder (*Urophycis tenuis*), yellowtail flounder (*Limanda ferruginea*), lobster (*Homarus americanus*), scallop (*Placopecten magellanicus*), northern shrimp (*Pandalus borealis*), and snow crab (*Chinoecetes opilio*) (refer to Table 3.13 of the Phase the 3A SEA). The Halifax-Eastern Shore area, just west of the Addendum Study Area, is one of ten known Atlantic herring spawning areas within the Atlantic coast sub-region (Hastings *et al.* 2014).

There are no unique characteristics in the Addendum Project Area or associated Study Area with respect to algal communities, although in general, macrophytic marine algae (*i.e.*, seaweeds) are more prevalent in the intertidal or shallow subtidal areas of the Addendum Study Area.

3.2.2 Corals and Sponges

Section 3.2.4 of the Phase 3A SEA discusses characteristics and distribution of cold-water corals and sponges found on the Scotian Shelf. Of particular relevance to the Addendum Project Area are globally unique sponge grounds containing large aggregations of *Vazella pourtalesi* (Russian hats) on the Sambro Bank and Emerald Basin. In 2013, DFO closed these areas to bottom-contact fishing in accordance with their Policy for Managing the Impacts of Fishing on Sensitive Benthic Areas (DFO 2009). Figure 3.1 shows sensitive benthic areas for corals and sponges as delineated by Fisheries and Oceans Canada (DFO) based on real data observations and species distribution modelling of corals and sponges on the Scotian Shelf (refer to Beazley *et al.* [2016] for more information on species distribution modelling for corals and sponges and its use in the identification of sensitive benthic areas). As shown in Figure 3.1, the Addendum Project Area contains sensitive benthic areas for sponges and sea pens. Figure 3.1 also shows the relative proximity of the Emerald Basin Sponge Conservation Area.

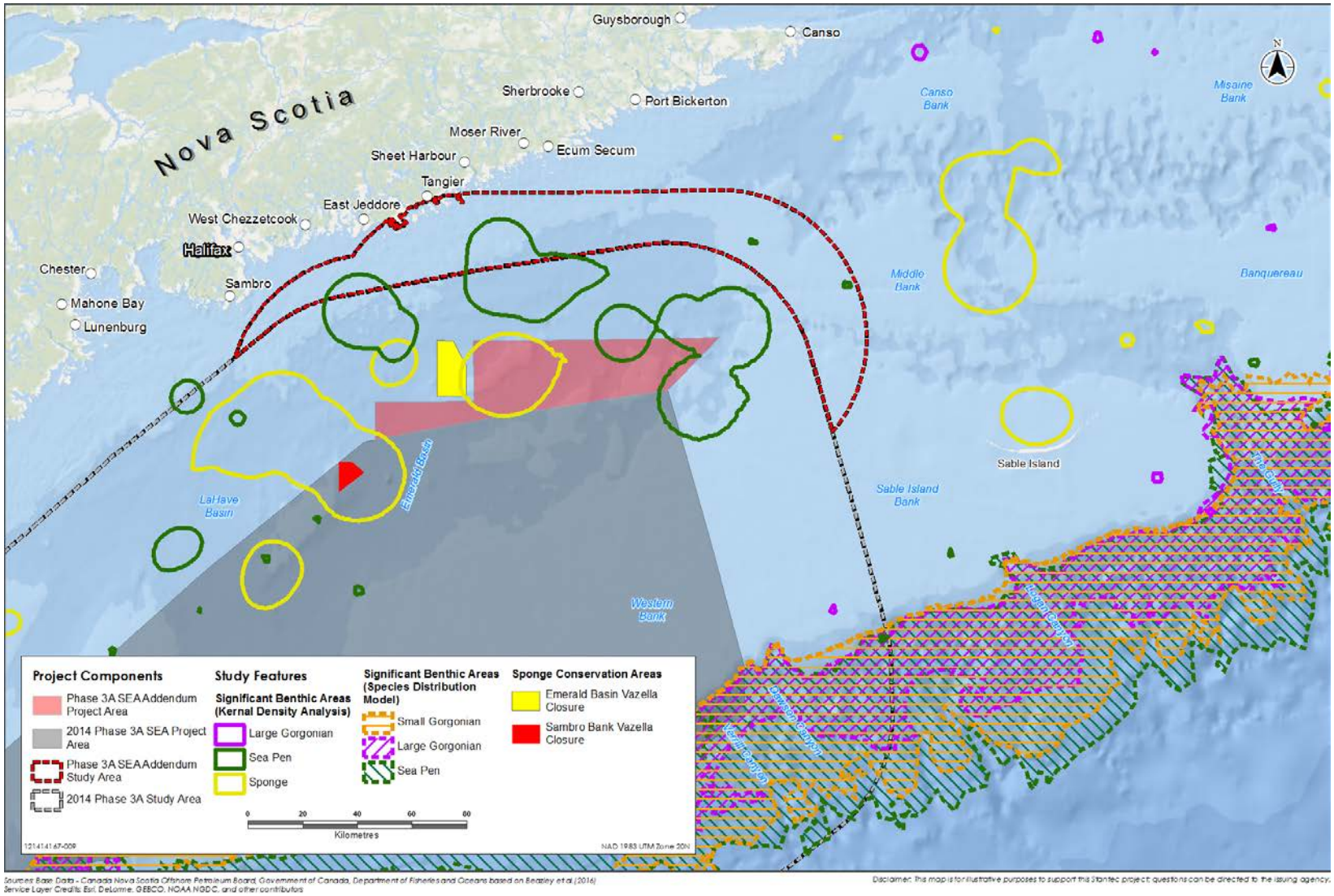


Figure 3.1 Coral and Sponge Sensitive Benthic Areas

3.2.3 Marine Mammals and Sea Turtles

There are no new marine mammal or sea turtle species expected to be present in the Addendum Project Area and associated Study Area that had not been previously identified in the Phase 3A SEA (refer to Section 3.2.6 of the Phase 3A SEA). However, given the proximity of the Addendum Study Area to mainland Nova Scotia, there is a greater potential of pinniped species being present in coastal waters than on the Scotian Shelf. Bowen's Ledge and White Island off the Eastern Shore are two of five inshore grey seal breeding colonies in the coastal region of Nova Scotia (Lidgard 2007). None of the five potential pinniped species found offshore Nova Scotia are considered to be species at risk. Figure 3.2 shows marine mammal sightings relative to the Addendum Project Area and associated Study Area.

3.2.4 Migratory Birds

As demonstrated by the establishment of Ecologically and Biologically Significant Areas (EBSAs) (refer to Section 3.2.5) and Important Bird Areas (IBAs), the coastal area of the Addendum Study Area hosts significant numbers of seabirds, waterfowl (including the Species of Special Concern Harlequin Duck), and shorebirds.

Seabirds, waterfowl, and shorebirds potentially present in the Phase 3A Study Area are identified in Section 3.2.7 of the Phase 3A SEA. These species and additional species known to congregate in the nearshore for breeding or during migration are important to consider in the Phase 3A Addendum. Figure 3.3 shows Important Bird Areas (IBAs) as well as seabird colonies along the coast in the Addendum Study Area. Table 3.1 summarizes the significance of the designated IBAs within and adjacent to the Addendum Study Area, noting key bird species. As shown on Figure 3.3, only IBA NS027 (Eastern Shore Islands) is located within the Addendum Study Area. This IBA is recognized for providing habitat to several species including Common Eider (spp. dresseri), Harlequin Duck (SARA – Species of Special Concern), scoter spp., and Leach's Storm-Petrel. In particular, this IBA is recognized as providing important overwintering habitat for Harlequin Duck and other waterbird species.

Table 3.2 lists the bird colonies shown on Figure 3.2.

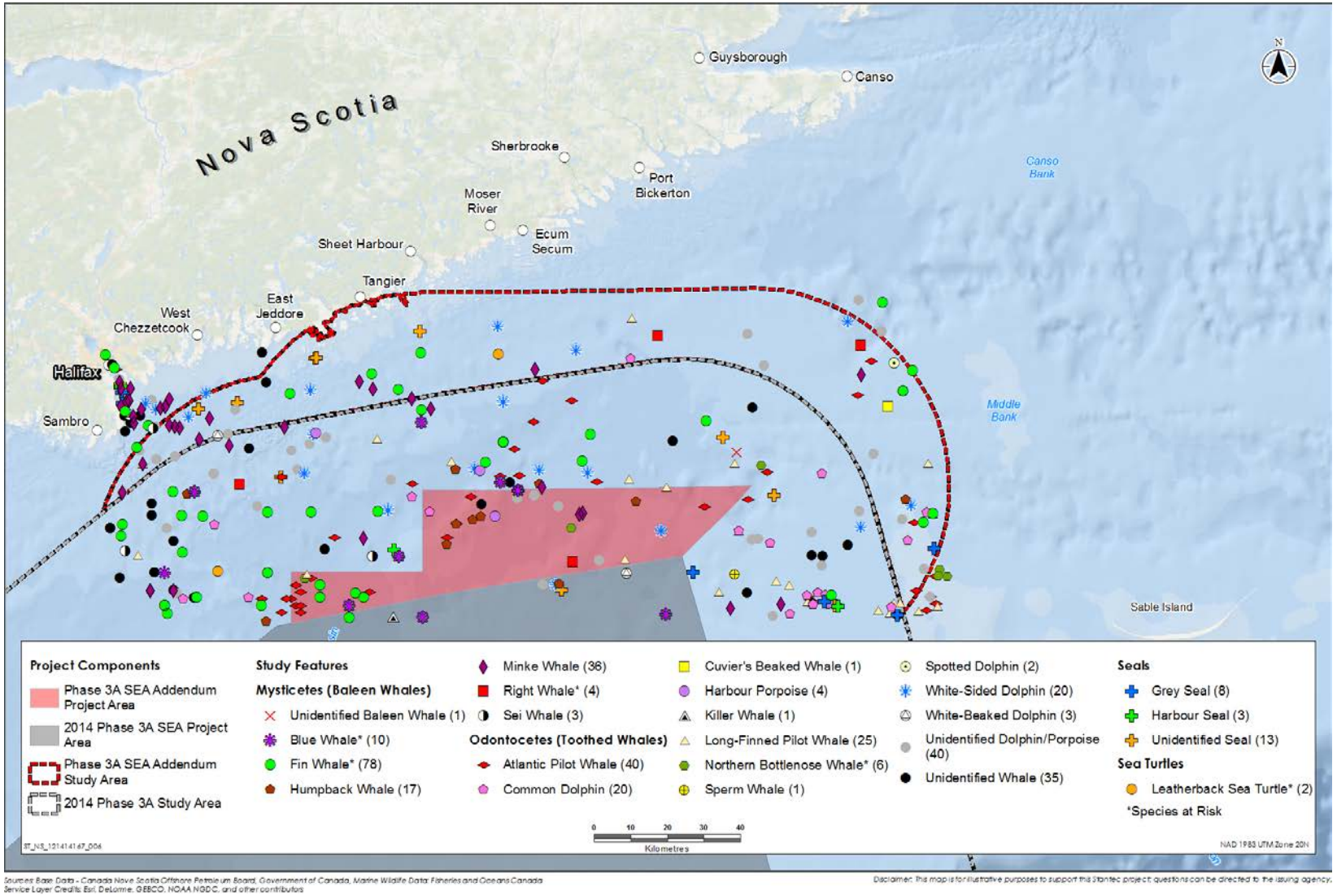


Figure 3.2 Marine Mammal and Sea Turtle Observations (1966-2014)

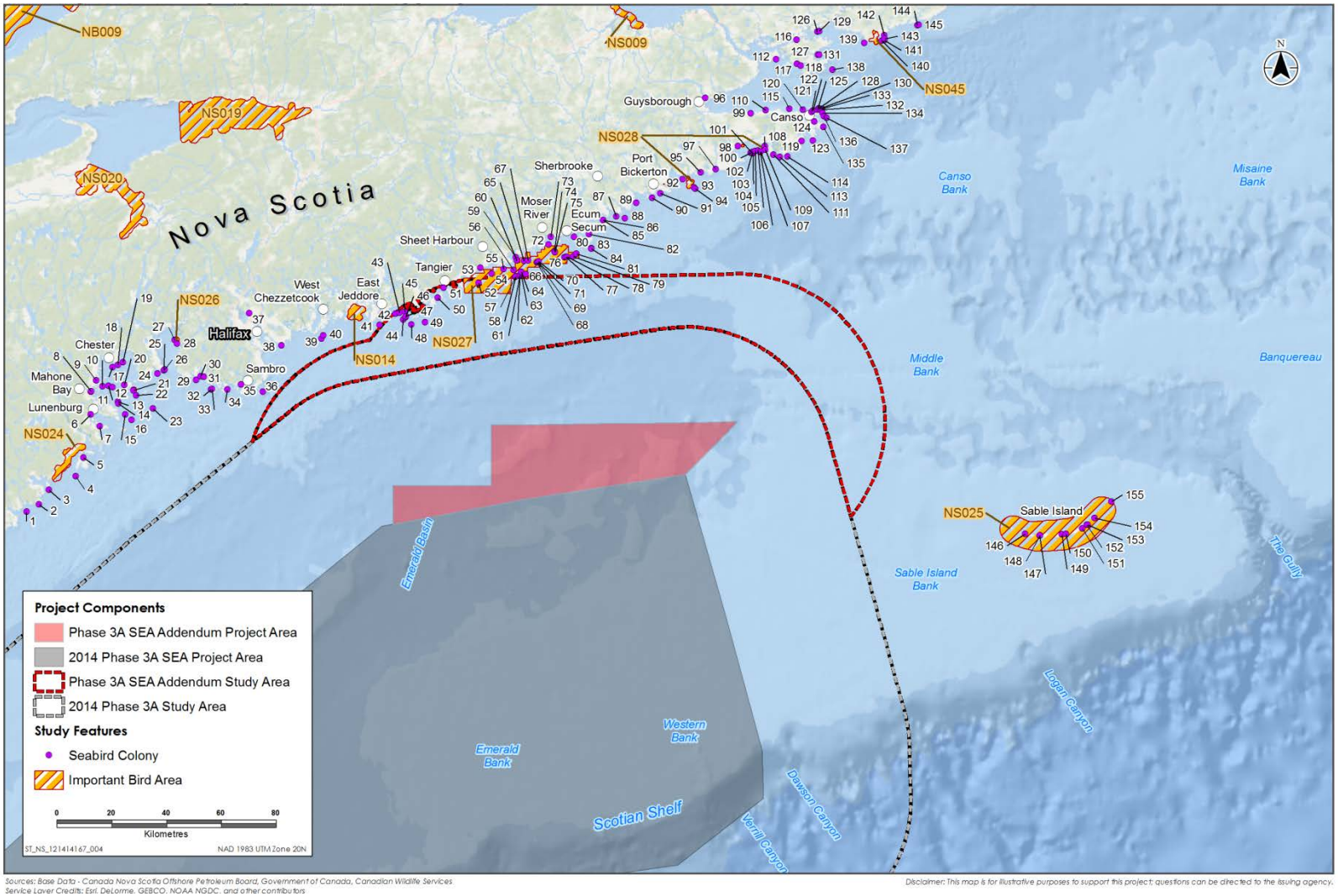


Figure 3.3 Important Bird Areas and Seabird Colonies

Table 3.1 Important Bird Areas in and Adjacent to the Addendum Study Area

Important Bird Area	Site ID[1]	Location	Size (km^2)	Status	Bird Species	Description	Conservation Status
Musquodoboit	NS014	Dartmouth, NS	28.54	Continentally Significant: Congregatory Species	Canada Goose, American Black Duck, Piping Plover	Supports migration and overwintering habitat for large congregations of geese, and breeding grounds for Piping Plovers.	Provincial Game Sanctuary, Provincial Park (including marine)
South Shore - East Queens Co. Sector	NS024	Bridgewater, NS	49.01	Globally Significant: Congregatory Species, Nationally Significant: Threatened Species, Congregatory Species	Piping Plover, Semi-palmated Plover and other shorebirds, Harlequin Duck.	Supports nesting Piping Plovers, important shorebird migration habitat, occasional overwintering grounds for Harlequin Ducks.	Provincial Park (including Marine)
Sable Island	NS025	Sable Island, NS	461.89	Globally Significant; Nationally Significant: Threatened Species, Restricted Range Species	Ispwich Savannah Sparrow *(ssp. princeps*), Herring Gull, Great Black-backed Gull, Common Tern, Roseate Tern, Arctic Tern, Leach's Storm-Petrel, Least Sandpiper	Supports the population of Ispwich Savannah Sparrow (*ssp. princeps*), Roseate Terns, and large numbers of nesting colonial waterbirds.	Migratory Bird Sanctuary (federal) and National Park Reserve
Grassy Island Complex	NS026	Mahone Bay and Margaret's Bay, NS	9.96	Nationally Significant: Threatened Species, Congregatory Species	Roseate Tern	Complex of three islands regularly support Roseate Terns.	IBA Conservation Plan written/being written
Eastern Shore Islands	NS027	Halifax, NS	269.06	Globally Significant: Congregatory Species; Continentally Significant: Congregatory Species; Nationally	Common Eider (*spp. dresseri*), Harlequin Duck, White-winged, Black and Surf Scoter, Leach's	Supports breeding, and large fall and spring congregations of Common Eiders. Also represents an important	Provincial Wildlife Management Area

Table 3.1 Important Bird Areas in and Adjacent to the Addendum Study Area

Important Bird Area	Site ID[1]	Location	Size (km²)	Status	Bird Species	Description	Conservation Status
				Significant: Threatened Species, Waterfowl Concentrations	Storm-Petrel	overwintering habitat for Harlequin Ducks and other waterfowl.	
Country Island Complex	NS028	Country Harbour/Tor Bay, NS	16.35	Globally Significant: Congregatory Species, Colonial Waterbirds/Seabird Concentrations; Nationally Significant: Threatened Species	Roseate Tern, Common Tern, Arctic Tern, Leach's Storm- Petrel	Supports an important nesting habitat for Roseate Terns and Common and Arctic Terns.	Tern Restoration Plan for Country Island. Environment Canada is considering Country Island as a potential Migratory Bird Sanctuary.
Basque Island and Michaud Point	NS045	Near Point Michaud, NS	11.21	Globally Significant: Congregatory Species	Great Cormorant, Common Eider, Canada Goose and a variety of shorebirds (Semi-palmated, Spotted and Least Sandpiper, Willets and Common Snipe).	Basque Island supports large congregations of Great Cormorants. Point Michaud supports a variety of shorebirds and provides nesting habitat for Common Eiders. The vicinity of Point Michaud supports migration habitat for geese and other waterfowl.	Provincial Park (including marine)
Rocks off Fourchu Head	NS047	Fourchu, NS	1.39	Globally Significant: Congregatory Species	Great Cormorant	Supports large congregations of Great Cormorants.	Not applicable

Note:
[1]Refer to Figure 3.3 for location.

Source: IBA Canada. n.d.

Table 3.2 Seabirds Recorded in Colonies Within or Adjacent to the Addendum Study Area

Colony #	Name	Atlantic Puffin (pairs)[1]	Black-legged Kittiwake (pairs)[1]	Common Eider[2]	Cormorants (nests)[3]	Great black-back Gull (pairs)[4]	Herring Gull (pairs)[4]	Leach's Storm-Petrel (pairs)[1]	Terns (individuals)[5]	Razor-bill (pairs)[1]
Mainland Nova Scotia										
1	Coffin Island					20				
2	Puddingpan Island					2				
3	Toby Island				na	58	19			
4	Indian Island			na	na	56	37			
5	Small unnamed island, near Round Island								24	
6	Unamed island beside Corkum Island causeway								32	
7	Gully Island, Lower South Cove								46	
8	Westhaver Island, Mahone Harbour								29	
9	Crow Island								80	
10	Spectacle Island								24	
11	Andrew Island								3	
12	Rafuse Island			na						
13	Chockle Cap Island				30	66	99			
14	Indian Island			na						
15	Little Duck Island			na	400	73	31			
16	Big Duck Island			na						
17	Quaker Island								26	
18	Tip of Woody Island								2	

Table 3.2 Seabirds Recorded in Colonies Within or Adjacent to the Addendum Study Area

Colony #	Name	Atlantic Puffin (pairs)[1]	Black-legged Kittiwake (pairs)[1]	Common Eider[2]	Cormorants (nests)[3]	Great black-back Gull (pairs)[4]	Herring Gull (pairs)[4]	Leach's Storm-Petrel (pairs)[1]	Terns (individuals)[5]	Razor-bill (pairs)[1]
19	Saddle Island			na						
20	Star Island				na		94			
21	Grassy Island, Mahone Bay								38	
22	Flat Island			na		21				
23	Pearl Island	100	5	na		84	125	9		5
24	Gravel Island			na						
25	Southwest Island					39	42			
26	North of Southwest Island				na					
27	Wedge Island				20	35	53		70	
28	Franks George Island, North			na						
29	Dover Castle					18				
30	High Island					31				
31	Gull Island, Inner				na	28				
32	Hopson Island					17				
33	Duck Island (PB)					4				
34	Woody Island				na	74	8			
35	Thrumcap Island				13	4				
36	Sambro Island				70	33	6			
37	Island off of Dartmouth Yacht Club								28	
38	Devil's Island					119	691			

Table 3.2 Seabirds Recorded in Colonies Within or Adjacent to the Addendum Study Area

Colony #	Name	Atlantic Puffin (pairs)[1]	Black-legged Kittiwake (pairs)[1]	Common Eider[2]	Cormorants (nests)[3]	Great black-back Gull (pairs)[4]	Herring Gull (pairs)[4]	Leach's Storm-Petrel (pairs)[1]	Terns (individuals)[5]	Razor-bill (pairs)[1]
39	Shut-in Island				present				85	
40	Rat Rock					0	10			
41	Jeddore Rock				50	20	0			
42	Duck Island				35				10	
43	Duck Island (CB)					55	0			
44	Long Island				present					
45	Sugarloaf					0	14			
46	Goose Island (CB)					7	0			
47	Goose Island								13	
48	Egg Island				17	9	35		12	
49	Bald Rock, Clam Bay					35	9			
50	Small unnamed island west of Tuckers Cove Borgles Island								8	
51	Gravel Island								4	
52	Taylor Head Spit								12	
53	Hen Island, Mushaboom Harbour								6	
54	Sheet Rock				75	28	0			
55	Hardwood Island sandspit								180	
56	Speck Island				39	15	0			
57	Pumpkin Island (SH)					9	0			
58	Pumpkin Island							78		
59	Sandy Island				80					

Table 3.2 Seabirds Recorded in Colonies Within or Adjacent to the Addendum Study Area

Colony #	Name	Atlantic Puffin (pairs)[1]	Black-legged Kittiwake (pairs)[1]	Common Eider[2]	Cormorants (nests)[3]	Great black-back Gull (pairs)[4]	Herring Gull (pairs)[4]	Leach's Storm-Petrel (pairs)[1]	Terns (individuals)[5]	Razor-bill (pairs)[1]
60	Sandy Island (BH)					44	0			
61	Brother Islands					25	3			
62	Brother Islands, West							4		
63	Brother Islands, East							25		
64	Horse Island Ledge					4	0			
65	west end of Big Harbour Island								5	
66	Beaver Island					0	17			
67	Inside Eastern Harbour Island							7		
68	Bird Islands, East					6	0	350		
69	Bird Islands							1201		
70	Bird Islands, West				60	25	0	793		
71	East Gunning Rock				11					
72	Harbour Rock Southeast of Ship Island				35					
73	Boson Island								52	
74	Little Halibut Island							39		
75	Middle Halibut Island				39	18	0	30		
76	Camp Island				present	40	59	88		
77	Unidentified Island east of Camp Island					3	0			
78	Long Island, White Islands, main					20	2			
79	Round Island					13	0			

Table 3.2 Seabirds Recorded in Colonies Within or Adjacent to the Addendum Study Area

Colony #	Name	Atlantic Puffin (pairs)[1]	Black-legged Kittiwake (pairs)[1]	Common Eider[2]	Cormorants (nests)[3]	Great black-back Gull (pairs)[4]	Herring Gull (pairs)[4]	Leach's Storm-Petrel (pairs)[1]	Terns (individuals)[5]	Razor-bill (pairs)[1]
80	Small island west of Hapes Point near shore								85	
81	Little White Island				30	41	0	616		
82	Thrumcap Island				13	3	0			
83	Gull Rock				75				24	
84	Gull Ledge					14	2			
85	Point of the Beach					1	15			
86	Spit, east side Liscomb Island								11	
87	Tobacco Island				50	0	22			
88	Wedge Island				35	6	15			
89	Walter Island				70	18	70			
90	Fiddler's Head					4	9			
91	Bickerton Island					11	0			
92	Harbour Island (CH)					66	132			
93	Frying Pan (CH)					21	0			
94	Country Island							12000	950	
95	Thrumcap Island				present	9	0			
96	Big Island				10					
97	Shoal Point					25	8			
98	Small unnamed island west of Forster Island, Tor Bay								16	
99	Rock Island					54	6			
100	Topstone Ledge					6	0			

Table 3.2 Seabirds Recorded in Colonies Within or Adjacent to the Addendum Study Area

Colony #	Name	Atlantic Puffin (pairs)[1]	Black-legged Kittiwake (pairs)[1]	Common Eider[2]	Cormorants (nests)[3]	Great black-back Gull (pairs)[4]	Herring Gull (pairs)[4]	Leach's Storm-Petrel (pairs)[1]	Terns (individuals)[5]	Razor-bill (pairs)[1]
101	Western Island				present					
102	Middle Sugar Harbour Island					20	0			
103	Sugar Harbour Island, West					39	0			
104	Sugar Harbour Island, East					66	0			
105	Unnamed island, Tor Bay								16	
106	Unnamed island beside Cook's Island								80	
107	Cooks Island					1	0			
108	Hog Island Spit, Tor Bay								32	
109	Harbour Ledge					4	0			
110	Half Island					0	6		12	
111	Inner Gull Ledge								160	
112	Green Island				present	62	92			
113	Middle Gammon Island					11	2			
114	Millstone Island				150	6	0			
115	Fox Island					31	13			
116	Berry Island				present	6	4			
117	Crid Islands, East					6	0			
118	Rocks off Jerseyman Island					5	4			
119	Small unmed island, Dover Bay								12	

Table 3.2 Seabirds Recorded in Colonies Within or Adjacent to the Addendum Study Area

Colony #	Name	Atlantic Puffin (pairs)[1]	Black-legged Kittiwake (pairs)[1]	Common Eider[2]	Cormorants (nests)[3]	Great black-back Gull (pairs)[4]	Herring Gull (pairs)[4]	Leach's Storm-Petrel (pairs)[1]	Terns (individuals)[5]	Razor-bill (pairs)[1]
120	Tickle Island					28	0		1	
121	Davis Island								4	
122	Bald Rock				50					
123	Unidentified island south of Dover Bay					3	2			
124	Small unnamed island,Spinney Gully								16	
125	Pigeon Island					29	0			
126	Ouetique Island				present					
127	Islet, Bay of Rocks				present					
128	Derabies Bar					15	0			
129	Quetique Island					31	123			
130	Unidentified island northwest of Derabies Island					17	0			
131	Les Rochers					61	0			
132	Derabie Island					11	0			
133	Gunning Rocks (East)					8	1			
134	Crow Island				10	50	6			
135	Gull Island, Canso					2	0			
136	Frying Pan Shoal					41	10			
137	Cranberry Islands				present				8	
138	Green Island off Little Anse Cape Breton					139	59			
139	Red Island				present	4	0			

Table 3.2 Seabirds Recorded in Colonies Within or Adjacent to the Addendum Study Area

Colony #	Name	Atlantic Puffin (pairs)[1]	Black-legged Kittiwake (pairs)[1]	Common Eider[2]	Cormorants (nests)[3]	Great black-back Gull (pairs)[4]	Herring Gull (pairs)[4]	Leach's Storm-Petrel (pairs)[1]	Terns (individuals)[5]	Razor-bill (pairs)[1]
140	South Basque Island					14	0			
141	East Basque Island					12	0			
142	Flat Rock				present					
143	Basques Islands - Green Island				present					
144	St. Esprit Island				45					
145	Guyon Island					66	0			
Sable Island										
Colony #	**Name**	**Atlantic Puffin (pairs)[1]**	**Black-legged Kittiwake (pairs)[1]**	**Common Eider[2]**	**Cormorants (nests)[3]**	**Great black-back Gull (individuals)[6]**	**Herring Gull (individuals)[6]**	**Leach's Storm-Petrel (pairs)[1]**	**Terns (nests)[6]**	**Razor-bill (pairs)[1]**
146	Sable Island-6-eastern Spit					81	82			
147	Sable Island-5					131	183			
148	Main Station								2211	
149	Sable Island (general)							100		
150	Sable Island-4					134	163			
151	Sable Island-3					236	349			
152	Old East Light								13	
153	East Light								2018	
154	Sable Island-2					225	436			
155	Sable Island-1					171	208			

Table 3.2 Seabirds Recorded in Colonies Within or Adjacent to the Addendum Study Area

Colony #	Name	Atlantic Puffin (pairs)[1]	Black-legged Kittiwake (pairs)[1]	Common Eider[2]	Cormorants (nests)[3]	Great black-back Gull (pairs)[4]	Herring Gull (pairs)[4]	Leach's Storm-Petrel (pairs)[1]	Terns (individuals)[5]	Razor-bill (pairs)[1]

[1]Environment Canada 2013a
[2]NSDNR 2013a
[3]NSDNR 2011
[4]Environment Canada 2013b
[5]CWS 2013
[6]Ronconi 2013, Herring Gull and Great Black-backed Gull counts on Sable Island are for sectors and do not represent individual colonies

3.2.5 Special Areas

The Addendum Project Area overlaps with the Emerald Basin Ecologically and Biologically Significant Area (EBSA). Among other things, the Emerald Basin is recognized as a 'hotspot' for large glass sponges (*Vazella pourtalesi*) and an area closed to bottom-contact fishing has been designated within this EBSA to protect this unique aggregation of glass sponges. The Emerald Basin EBSA and the Emerald Basin Vazella Closure Area (located just outside the Addendum Project Area) are described in the Phase 3A SEA. The Addendum Study Area also overlaps with the Middle Bank EBSA and the Emerald, Western and Sable Bank Complex EBSA. In the nearshore/coastal environment, the Addendum Study Area overlaps with the Eastern Shore Archipelago, a coastal EBSA which extends along nearly 100 km of coastline between Clam Bay and Liscomb Point on the Eastern Shore, as well as three coastal provincial parks and a provincial wilderness area administered by Nova Scotia Environment (NSE). Figure 3.4 shows the Special Areas in and around the Addendum Project Area and associated Study Area. A summary of relevant Special Areas is provided in Table 3.3 below. Important Bird Areas are discussed above in Section 3.2.4.

Table 3.3 Special Areas

Special Area	Relative Location	Key Features
Emerald Basin EBSA	Overlaps with Addendum Project Area and Phase 3A SEA Project Area (previously assessed in Phase 3A SEA)	• Emerald Basin is a 'hotspot' for large glass sponges, *Vazella pourtalesi* (Class Hexactinellida, Family Porsillidae), also known as Russian Hats, and is the only known monospecific population of *Vazella pourtalesi* on the Scotian Shelf. They are globally unique with 100% of the known population found in this area. These sponges are vulnerable to fishing disturbance (*e.g.*, trawling). • Primary residence and spawning ground of silver hake • Overwintering ground of basking sharks (primary) and porbeagle sharks • Residence for whales and dolphins • Summer residence of tuna and swordfish • Important overwintering area of *Calanus* copepods • Important aggregation for krill • High species richness • Fields of pockmarks that likely have chemosynthetic cold seep communities • Unique benthic diversity on bottom of pockmarks that is fed by venting hydrocarbon gas

Table 3.3 Special Areas

Special Area	Relative Location	Key Features
Emerald, Western and Sable Bank Complex EBSA	Overlaps with Addendum Study Area and Phase 3A SEA Project Area (previously assessed in Phase 3A SEA)	• Seasonally high diversity of copepods. • The combination of gravel and sandy seabeds supports higher concentrations of fish, particularly juvenile fish. • Area of highest larval fish diversity perhaps due to a gyre • Area of concentration of spawning fish (*e.g.*, gadoids) • Juvenile nursery area for haddock, cod, monkfish, yellowtail, skate, flounder • Includes the defined 4W Haddock Box Nursery Area • Important overwintering area in the slope waters • Confirmed diversity of species (*e.g.*, haddock, sea cucumbers, possible mussel beds). • Hard gravel/boulder seabed
Middle Bank EBSA	Overlaps with eastern extent of Addendum Study Area (previously assessed in Phase 1A SEA)	• Important area for groundfish (Atlantic cod spawning and nursery area) • High larval fish genus richness and high small fish species richness • High invertebrate diversity and biomass • Important seabird habitat
Eastern Shore Archipelago EBSA	Overlaps with Addendum Study Area (nearshore)	• Comprises very complex shoreline with more than 100 islands (size and extent of archipelago is provincially rare) • Hosts globally significant numbers of breeding common eider during the summer months and globally significant numbers during migratory seasons • Significant aggregations of scoter spp., merganser spp., goldeneye spp. and Canada Goose • Significant numbers of overwintering Harlequin Duck (Special Concern - SARA) and Purple Sandpiper in winter • Significant Great Blue Heron and Great Black-backed Gull colonies • Clustering of Leach's Storm-petrel colonies not observed elsewhere in the Maritime Provinces • Two grey seal colonies (Bowen's Ledge and White Island)
Emerald Basin Vazella Closure Area	Located just west of the Addendum Project Area within the Phase 3A Study Area (previously assessed	• Designated 197 km^2 as area closed to bottom-contact fishing • Globally-unique aggregation of glass sponge (*Vazella pourtalesi*)

Table 3.3 Special Areas

Special Area	Relative Location	Key Features
	in the Phase 3A SEA)	
Clam Harbour Beach Provincial Park	Overlaps with the Addendum Study Area (coastal)	• Recreational beach
Owls Head Provincial Park	Overlaps with the Addendum Study Area (coastal)	• Coastal habitat features include beaches, barrens and wetlands • Piping plover nesting habitat
Taylor Head Provincial Park	Overlaps with the Addendum Study Area (coastal)	• Coastal habitat features include forests, beaches, sand dunes, and marshes • Breeding bird species include gulls, Arctic and common terns, black guillemot, Leach's petrel and common eider • Spring and fall migrating bird species include scooters, black ducks, oldsquaw and Canada geese • Mammal species include red squirrel, red-backed vole, short-tailed shrew, hare, mink, raccoons, muskrats, and whitetailed deer
Martinique Beach Game Sanctuary	Overlaps with Addendum Study Area (coastal)	• Important staging and wintering area for waterfowl • Sanctuary's 507 ha is part of the 1925 ha Muquodoboit Harbour Outer Estuary designated in 1987 as a wetland of international importance and includes alt water and coastal wetlands, several islands and upland habitat
Eastern Shore Islands Wilderness Area	Overlaps with the Addendum Study Area (coastal)	• 400 large and small provincially-owned islands, stretching 75 km from Clam Harbour in Halifax Regional Municipality to Marie Joseph in Guysborough County • Coastal habitat features include numerous beaches, spits, headlands, saltmarshes, estuarine flats, coastal barrens, and coastal spruce/fir forests • support numerous colonies of nesting seabirds, and staging and feeding areas for waterfowl • Exceptional tourism and coastal recreation value

Source: DFO 2014, Hastings *et al.* 2014, Stantec 2014, NSE n.d., NSE 2009, NSE 2013, NSE 2016, NSDNR 2013b

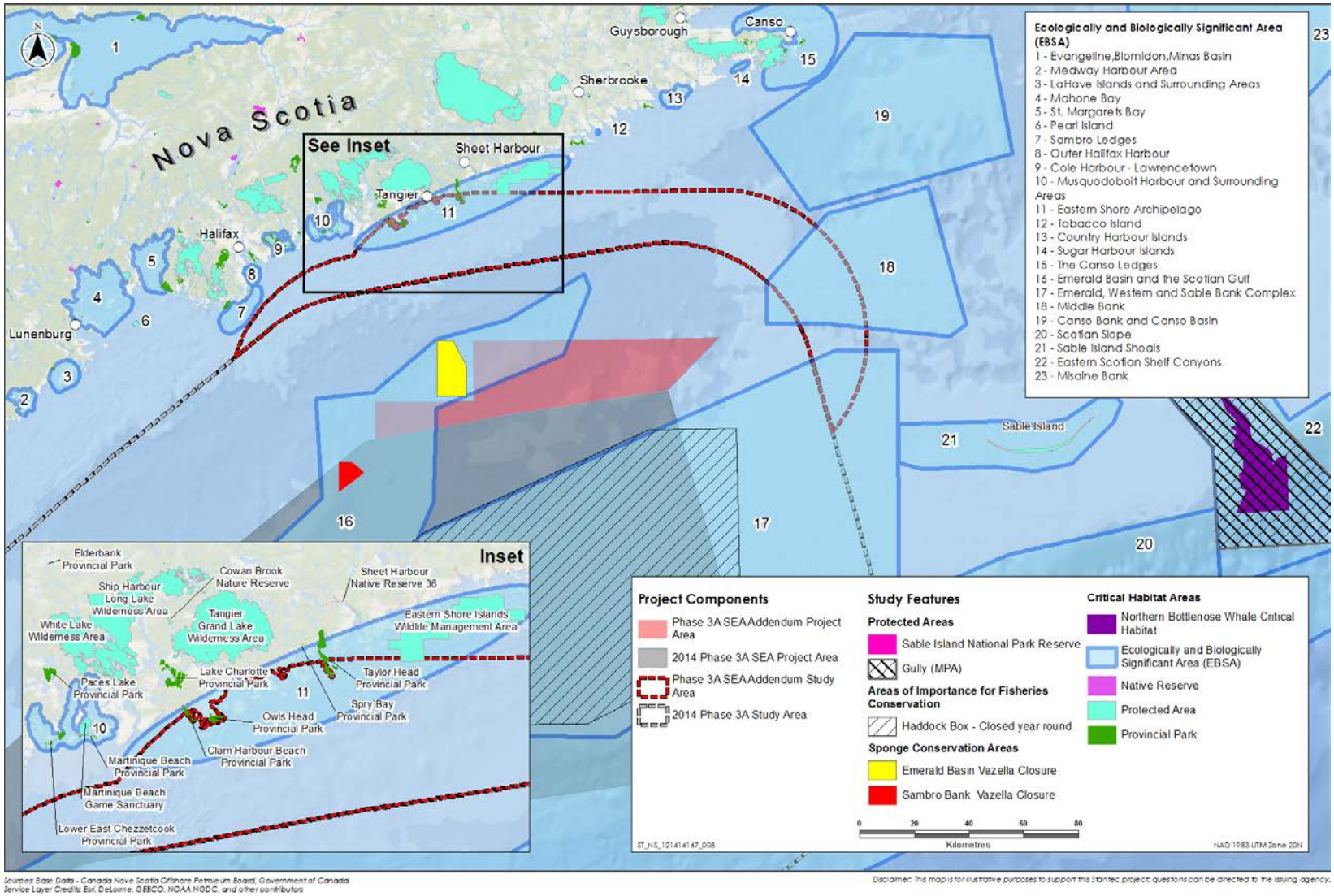


Figure 3.4 Special Areas

In addition to designated conservation/protected areas, it should be also noted that there are sensitive coastal habitat features in the nearshore Addendum Study Area including salt marsh and eelgrass (*Zostera marina*) which provide important habitat to fish, migratory birds, and/or terrestrial wildlife.

3.3 SOCIO-ECONOMIC CHARACTERISTICS

3.3.1 Commercial Fisheries and Aquaculture

The Addendum Project Area and associated Study Area falls within NAFO Division 4W. The Addendum Project Area falls within NAFO Unit Areas 4Wk and 4Wh. The Addendum Study Area falls primarily within NAFO Unit Areas 4Wk, 4Wh, and 4We, all of which were included in the Phase 3A SEA. The Addendum Project Area also falls within Lobster Fishing Area (LFA) 32, Scallop Fishing Area (SFA) 25 and Crab Fishing Area (CFA) 24E. All of these fisheries management areas were assessed as part of the Phase 3A SEA. Figure 3.5 presents the Fisheries Management Areas relative to the Addendum Project Area and associated Study Area.

As indicated in Section 3.3.1 of the Phase 3A SEA, shellfish fisheries dominate the commercial catch value within 4W. Table 3.4 summarizes the landings weight and value for the NAFO Unit Areas 4We, 4Wh, 4Wk from 2010 to 2014. 4Wu is shown to represent those landings which were recorded for 4W and not assigned to a specific Unit Area and therefore could potentially have occurred within the Addendum Project Area and/or associated Study Area. Table 3.4 shows that shellfish fisheries dominate the commercial catch value within the relevant Unit Areas of the Addendum Project Area and associated Study Area. These higher values are primarily a result of the lobster catch in LFA 32, although scallop, sea urchin, snow crab, and squid are also harvested in these Unit Areas. Table 3.4 also shows the active licence count for groundfish have generally increased in recent years, whereas the licence count for pelagics and shellfish in these Unit Areas has generally decreased.

Appendix A contains composite fishery landings maps for select fisheries which may have higher landings in the Addendum Study Area compared to those landings focused in the Phase 3A SEA Project Area and associated Study Area. These include fisheries for: halibut, bluefin tuna, cod, haddock, pollock, herring, and mackerel.

Aquaculture operations were not previously assessed in the Phase 3A SEA due to their coastal locations and distance from the Phase 3A Study Area. However, the inshore location of the Addendum Study Area necessitates consideration of aquaculture operations that are present in or in close proximity to the Addendum Study Area. This includes two finfish operations in the outer reaches of Ship Harbour which farm Atlantic salmon (*Salmo salar*) and rainbow trout (*Oncorhynchus mykiss*). Further inland within Ship Harbour (just outside the Addendum Study Area) there are eight shellfish leases operated by one aquaculture operator farming blue mussel (*Mytilus edulis*), American and European oyster (*Crassostrea virginica* and *Ostrea edulis*), and Atlantic sea scallop (*Placopecten magellanicus*) (NSDFA 2013).

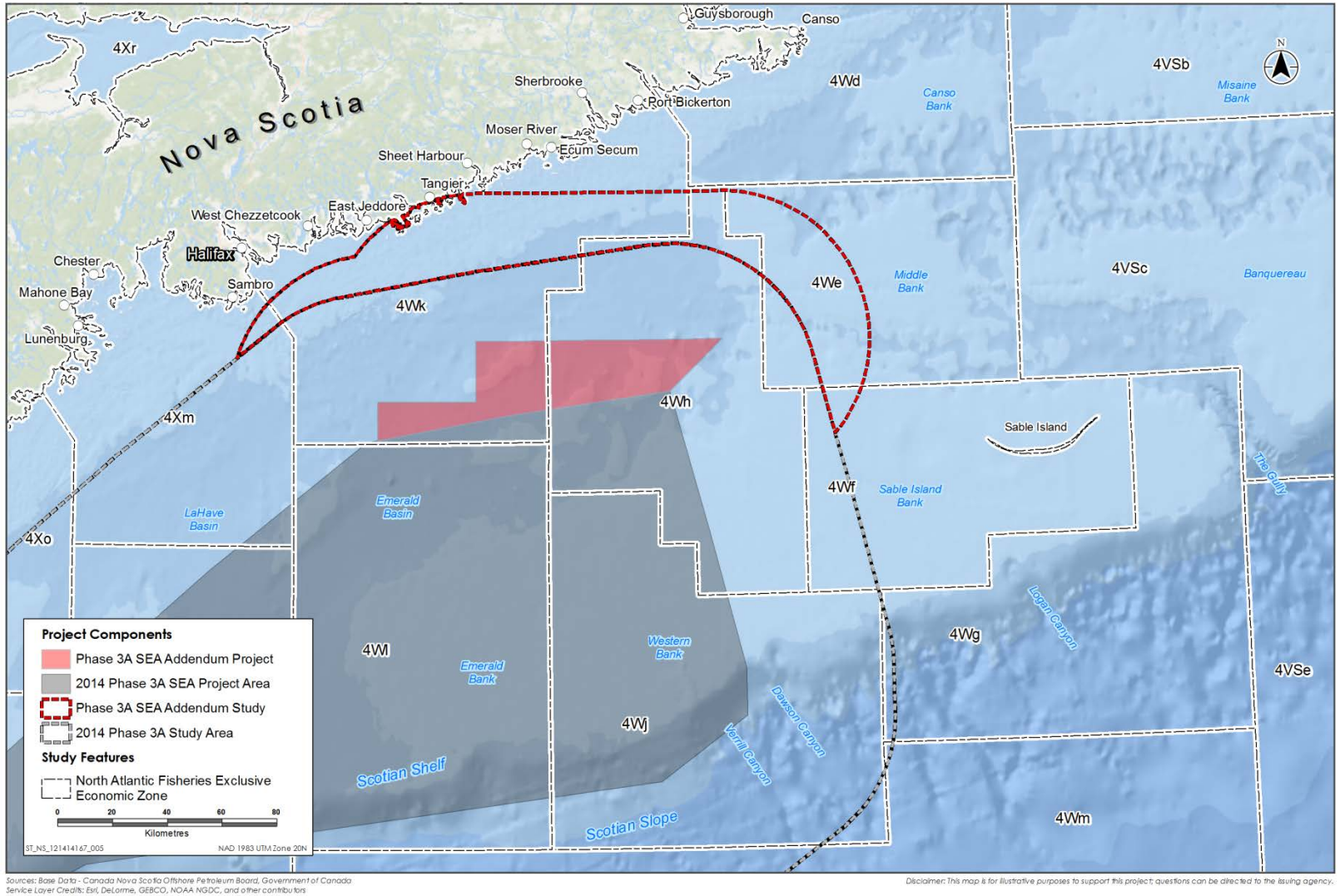


Figure 3.5 Fisheries Management Areas

Table 3.4 DFO Landings - All Regions - Year Landed 2010-2014 - NAFO Unit Area 4We, 4Wh, 4Wk & 4Wu - Landings, Value and Unique Licence Counts

Species Category	NAFO Unit Area	Year Landed													
		2010			2011			2012			2013			2014P[3]		
		Weight Landed (Round KG)	Value ($)	Active Licence Count - Unique	Weight Landed (Round KG)	Value ($)	Active Licence Count - Unique	Weight Landed (Round KG)	Value ($)	Active Licence Count - Unique	Weight Landed (Round KG)	Value ($)	Active Licence Count - Unique	Weight Landed (Round KG)	Value ($)	Active Licence Count - Unique
Groundfish	**4We**	28,113	120,739	15	24,207	275,992	20	54,065	429,795	21	94,369	627,847	30	48,712	613,776	34
	4Wh	2,236,130	1,690,623	48	2,446,573	2,124,796	47	4,819,175	3,558,698	47	3,245,131	2,853,457	41	1,807,808	1,712,958	50
	4Wk	4,159,517	3,547,808	77	3,623,771	3,468,371	70	3,183,202	2,878,761	73	4,190,621	4,539,320	84	3,880,670	4,571,978	87
	4Wu[1]	60,726	111,456	16	140,272	239,808	21	93,308	178,065	19	63,626	284,892	30	24,945	106,376	21
	Total	**6,484,486**	**5,470,626**	**90**	**6,234,823**	**6,108,968**	**88**	**8,149,750**	**7,045,319**	**89**	**7,593,747**	**8,305,515**	**109**	**5,762,135**	**7,005,088**	**112**
Pelagics	**4We & 4Wh[2]**	125,215	298,045	29	105,162	90,184	20	297,932	1,572,096	37	311,921	827,598	38	168,725	1,045,484	36
	4Wk	9,757,428	4,168,967	170	11,284,212	4,729,269	153	1,936,949	6,408,601	143	2,731,641	8,023,372	137	1,316,849	5,178,979	147
	4Wu	416,194	440,274	45	130,606	142,676	22	61,088	220,550	29	221,200	237,143	31	155,392	254,332	32
	Total	**10,298,837**	**4,907,286**	**192**	**11,519,980**	**4,962,130**	**169**	**2,295,969**	**8,201,247**	**161**	**3,264,762**	**9,088,113**	**153**	**1,640,966**	**6,478,795**	**160**
Shellfish, Mollusc	**4We**	5,977,396	17,595,852	56	5,520,937	23,989,004	52	4,854,394	16,211,991	51	3,894,208	8,827,060	46	2,827,256	13,806,275	45
	4Wh	188,771	277,431	10	107,685	213,201	13	151,024	325,209	16	48,208	111,247	16	313,463	820,935	13
	4Wk	1,333,728	10,923,232	238	1,675,398	15,048,628	263	1,833,344	17,577,839	259	1,506,489	13,965,117	260	2,075,795	21,152,793	247
	4Wu	64,232	215,481	12	87,202	493,598	11	37,693	150,471	10	258,385	1,007,688	15	99,445	535,827	16
	Total	**7,564,127**	**29,011,997**	**297**	**7,391,222**	**39,744,432**	**317**	**6,876,455**	**34,265,511**	**313**	**5,707,290**	**23,911,113**	**311**	**5,315,959**	**36,315,831**	**303**
Total		**24,347,450**	**39,389,909**	**540**	**25,146,025**	**50,815,529**	**547**	**17,322,174**	**49,512,076**	**521**	**16,565,799**	**41,304,740**	**527**	**12,719,060**	**49,799,715**	**535**

Notes:

[1] NAFO Unit Area 4Wu is for catch that is in NAFO Division 4W, but the specific Unit Area within 4W is not defined.

[2] NAFO Unit Areas 4We and 4Wh were combined for the Pelagic species group to maintain participant confidentiality.

[3] Data for the year 2014 is preliminary and as such may be incomplete and/or subject to change without notice.

Source: Data courtesy of DFO

Marine plant harvesting, including rockweed (*Ascophyllum nodosum*), is another marine resource use inshore and that was not previously assessed in the Phase 3A SEA. Rockweed harvesting, for example, occurs in sheltered bays on the Eastern Shore and can be for commercial purposes (licenced by Nova Scotia Fisheries and Aquaculture) or personal use (no licence required). Within the Addendum Study Area, Irish moss (*Chondrus crispus*) and kelp may also be harvested, albeit to a lesser extent than rockweed (DFO 2013).

3.3.2 Aboriginal Fisheries and Resource Use

As indicated in Section 3.3.2 of the Phase 3A SEA, there are 16 Aboriginal organizations that have access to inland and inshore areas to conduct food, social and ceremonial (FSC) fishing (11 in Nova Scotia, 5 in New Brunswick). Due to the inshore location of the Addendum Study Area, there would likely be more FSC fishing occurring inland and in tidal waters in the Addendum Study Area than previously assessed in the Phase 3A SEA Study Area. FSC fishing may involve harvesting of several different species in offshore, nearshore and/or tidal waters and may include, but not be limited to: cod, herring, halibut, Atlantic salmon, gaspereau (Alewife), American eel, haddock, monkfish, pollock, red hake, silver hake, white perch, American lobster, crab spp., scallop, mussel, quahog, and marine worms (MGS and UINR 2014; DFO 2016). Additionally, hunting and gathering activities (*e.g.*, seal hunting, periwinkle gathering) may occur for FSC purposes.

Commercial fishing (under communal commercial licences issued to Aboriginal organizations) may occur inshore and offshore Nova Scotia. Communal commercial licences for fishing in waters offshore Nova Scotia are issued through DFO Maritimes Region and Gulf Region, giving access to 34 different Aboriginal organizations to waters offshore Nova Scotia. Landings reported under these licences occurring in the Addendum Project Area and associated Study Area would be captured in Table 3.4 and the composite landing maps shown in Appendix A.

3.3.3 Other Ocean Users

Recreational fisheries in the offshore area may include fishing charters and tournaments for large pelagics (*e.g.*, tuna, swordfish). In the nearshore Addendum Study Area, additional recreational activities may include recreational fishing (including shellfish harvesting), boating (*e.g.*, sailing, kayaking, and yachting), whale watching, snorkeling/scuba diving, and use of coastal provincial parks, beaches, and wilderness areas (refer to Figure 3.4).

There are several abandoned submarine cables that pass through the Addendum Project Area and associated Study Area and one active cable (Hibernia Canada Express Cable) that passes through the Addendum Study Area (refer to Figure 3.6). This cable was newly installed in 2015 and is a low-latency, high-capacity transatlantic subsea fibre optic telecommunications cable extending from Halifax, Nova Scotia to England and Ireland. Figure 3.6 also shows the relative proximity of an explosive dumpsite adjacent to the Addendum Project Area. There are no known shipwrecks in the Addendum Project Area but two potential shipwreck sites exist within the Addendum Study Area (refer to Figure 3.6). Other ocean uses in and around the Addendum

Project Area and associated Study Area include commercial shipping, scientific research, and military activity. These types of users are also active in and around the Phase 3A Project Area and associated Study Area and were therefore assessed as part of the Phase 3A SEA.

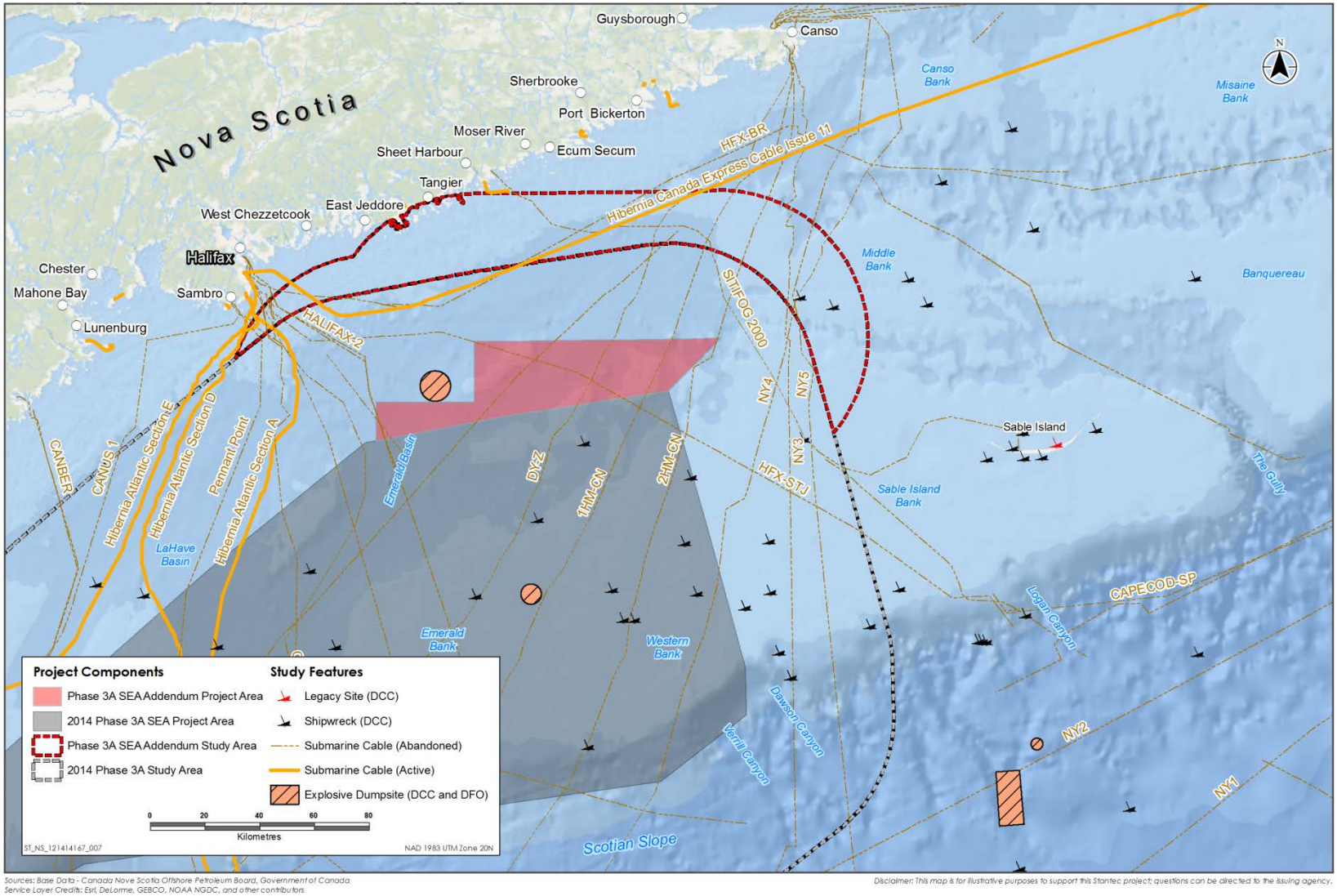


Figure 3.6 Seabed Hazards

4.0 STRATEGIC ENVIRONMENTAL ASSESSMENT APPROACH

4.1 OVERVIEW OF SEA APPROACH

As discussed in Section 1, the CNSOPB uses SEAs as a tool to assist with the potential issuance of future exploration rights and identify general restrictions or mitigation measures that should be considered for application to potential exploration activities. The approach and methods used in the Phase 3A SEA were chosen to help deliver a focused SEA which would be useful to the CNSOPB in its decision making, but also for operators in their future project planning and approval processes. This Addendum uses the same approach as outlined in Section 4 of the Phase 3A SEA with the intent of focusing the review of the Addendum Project Area and associated Study Area.

4.2 SCOPING CONSIDERATIONS

The scope of the Addendum for the Phase 3A SEA is based on a consideration of regulatory requirements, stakeholder and Aboriginal engagement, and a review of data and publications relevant to the Addendum Project Area and associated Study Area.

4.2.1 Regulatory Considerations

Section 2.1 of the Phase 3A SEA provides a description of the regulatory context for exploration activities. During preparation of this Addendum, DFO was consulted for fisheries and environmental data pertaining to the Addendum Study Area. During these discussions it was communicated that DFO is considering enhanced mitigation measures for the Haddock Box as part of the federal MPA strategy under the *Oceans Act*. The Haddock Box falls within the Phase 3A SEA Project Area and any additional mitigation requirements will be reported within the Phase 3A update which is scheduled to occur in 2018-2019.

4.2.2 Stakeholder and Aboriginal Engagement

A presentation of the draft Phase 3A SEA Addendum was given to the CNSOPB Fisheries Advisory Committee (FAC) on September 21, 2016. Membership of the FAC comprises representatives from Nova Scotia fisheries industries associations, provincial and federal government departments, and Aboriginal organizations. Key issues raised during the presentation to the FAC included consideration of the ongoing evolution of the MPA framework. It was also noted that it was important to be aware of nearshore and land-based sensitive and protected areas, where exploration projects could potentially interact with these areas in the event of an accidental spill. Comments were also raised by FAC members about Aboriginal FSC activities in the nearshore/coastal areas (not limited to fishing), and also potential for aquaculture and marine plant harvesting activities in the nearshore.

A draft of the Phase 3A SEA Addendum is being posted on the CNSOPB website for public review and comment.

4.3 SCOPE OF ACTIVITIES TO BE ASSESSED

The scope of the activities to be assessed in this Addendum are the same as those referenced in Section 4.3 of the Phase 3A SEA. In particular, the scope of activities to be considered include:

- seismic surveying (2D, 3D, and 3D WAZ);
- seabed surveying (*i.e.*, geophysical, geotechnical data collection);
- exploratory and delineation drilling and associated activities (*e.g.*, VSP, well abandonment);
- vessel traffic (supply vessels, seismic vessels, helicopters); and
- well abandonment.

Accidental spills, which may include a seismic streamer break, accidental large spill of diesel, blowout of condensate/oil or SBM release during drilling are considered separately from routine exploration activities.

4.4 SPATIAL AND TEMPORAL BOUNDARIES

The approach for defining spatial and temporal boundaries in this Addendum is consistent with the approach used in the Phase 3 SEA. A 54 km buffer has been applied to the Addendum Project Area to account for potential zones of influence from potential exploration activities occurring within the Addendum Project Area, as well as from any potential accidental spills associated with these activities. Temporal boundaries include consideration of all components and activities that may be associated with exploration programs and assume these activities could occur year-round. Oil and gas production activities are not addressed in the Phase 3A SEA or the Addendum except to the extent that they may contribute to cumulative effects.

4.5 SELECTION OF VALUED ENVIRONMENTAL COMPONENTS

This Addendum generally focuses on the same Valued Environmental Components (VECs) as selected in Section 4.5 of the Phase 3A SEA; however, within each of these VECs there is more of a focus on nearshore attributes given the location of the Addendum Study Area. Table 4.2 presents the VECs which form the basis of the assessment within this Addendum and highlights the focus of each VEC.

Table 4.1 Selection of Valued Environmental Components

Valued Environmental Component	Scoping Considerations
Species of Special Status	Species of Special Status includes consideration of the following species and their critical habitat which may be present in the SEA Study Area and determined to be potentially affected during exploration activities: species designated as at-risk under the *Species at Risk Act* (SARA); species assessed as endangered, threatened, or of special concern by the Committee on the Status of Endangered Wildlife of Canada (COSEWIC) and/or migratory birds protected by the *Migratory Birds Convention Act, 1994*. With specific regard for this Addendum, the Species of Special Status VEC will focus on migratory birds that may be present in the Addendum Study Area including species which may be present in nearshore and coastal areas.
Special Areas	Designated areas of special interest due to their ecological and/or conservation sensitivities (*i.e.*, marine protected areas, existing or future coral conservation zones, fish conservation areas, *etc.*) could be potentially affected by exploration activities in the Addendum Study Area. This VEC includes consideration of the Emerald Basin Vazella Closure, coastal EBSAs, IBAs, and parks and protected areas. The scope of the VEC also includes species inhabiting Special Areas which may not be covered under the Species of Special Status VEC (*e.g.*, sponge and coral species).
Fisheries and Other Ocean User	Commercial, recreational and Aboriginal fisheries (including relevant fish species) that could be affected by exploration activities in the Addendum Study Area will be considered, along with aquaculture and other ocean users that may be occurring in the nearshore/coastal environment. Other ocean uses may include marine shipping, military use, research surveys, tourism and recreation, and subsea telecommunications.

4.6 POTENTIAL EXPLORATION ACTIVITIES – ENVIRONMENT INTERACTIONS

Table 4.3 considers potential interactions between selected VECs and exploration activities. These interactions are explored in greater depth for each VEC in Section 5, drawing on existing literature and professional knowledge of the Study Team to provide a current understanding of environmental effects and mitigation, indicating data gaps and uncertainties where applicable. Interactions presented in the Phase 3A SEA (Section 4) and shown below in Table 4.3 remain applicable for the Addendum Project Area and associated Study Area.

Table 4.2 Potential Environmental Interactions of Petroleum Exploration Activities and Selected VECs

Exploration Activity	VEC			Nature of Interactions
	Species of Special Status	Special Areas	Fisheries and Other Ocean Uses	
Seismic surveying	✓	✓	✓	• Interference with fisheries and other ocean users during routine operations • Underwater noise issues (*e.g.*, hearing loss, behavioural effects, *etc.*) on species of special status, fisheries species and spawning areas, and species which may be inhabiting Special Areas • Underwater noise can also result in degradation of habitat quality of Special Areas
Seabed surveying (*i.e.*, geophysical, geotechnical data collection)	✓	✓	✓	• Localized disturbance to marine benthos, potentially affecting benthic species of special status and commercial, Aboriginal, and/or recreational fish species
Exploratory/delineation drilling, testing (*e.g.*, VSP) and well abandonment	✓	✓	✓	• Attraction (due to lights and/or flares) of bird species of special status and fish species to platform structures or support vessels • Effects (*e.g.*, smothering, toxicity, reduced growth or reproductive potential) of operational discharges (*i.e.*, drill wastes) on species of special status and fisheries species, particularly bottom-dwelling fish and invertebrates • Underwater noise issues (*e.g.*, hearing loss, behavioural effects, *etc.*) on species of special status and fisheries species • Interference with fisheries and other ocean users (*e.g.*, loss of access due to safety zone)
Vessel traffic (*e.g.*, supply vessels, helicopters)	✓	✓		• Noise disturbance to Special Areas and species of special status depending on proximity of traffic • Interactions with fisheries and other ocean users
Accidental events	✓	✓	✓	• Effects of accidental events on all VECs (*e.g.*, contamination, oiling and mortality of biological VECs, shoreline contamination, and fouling of gear/equipment)

5.0 POTENTIAL EFFECTS OF EXPLORATION ACTIVITIES

5.1 SPECIES OF SPECIAL STATUS

5.1.1 Potential Effects and Existing Knowledge

Potential effects of exploration activities on species of special status include a change in mortality risk (*e.g.*, physical injury, increase in individual mortality, effects on species population level success) and effects on change of habitat (*e.g.*, displacement from important spawning, feeding, nursery areas).

The Phase 3A SEA assessed physiological and behavioural effects of exploration activities on marine fish (including fish eggs and larvae), marine mammals, sea turtles, and marine birds of special status. With specific regard to the Addendum Project Area and associated Study Area, the increased presence of spawning areas and migratory birds in the nearshore/coastal environment may result in increased risk of interaction with these species of special status.

Exploration activities in the Addendum Project Area may interact with species of special status in the Addendum Project Area and associated Study Area due to:

- underwater sound propagation of seismic and exploration drilling noise potentially affecting fish, marine mammal, sea turtle, and marine bird species of special status, as well as spawning areas for fish species of special status;
- artificial lighting and flaring potentially affecting bird species of special status;
- drilling discharges potentially affecting fish species of special status;
- contaminants from waste disposal, operational discharges, and spills potentially affecting species of special status;
- vessel traffic potentially affecting marine mammal and sea turtle species of special status; and
- well abandonment potentially affecting fish, marine mammal, and sea turtle species of special status.

These potential environmental effects are similar enough in nature and extent to those assessed with respect to the Species of Special Status VEC in the Phase 3A SEA that further characterization is not warranted in this Addendum.

Accidental spills during exploration activities also have potential to interact with species of special status, including those in the nearshore/coastal environment. The Phase 3A SEA describes the ways that accidental spills could adversely affect fish, marine mammal, sea turtle,

and marine bird species of special status. Because birds are especially vulnerable to potential injury or mortality from oiling, accidental spills are an issue of particular concern with respect to potential interactions with bird species of special status that are known to congregate in the nearshore/coastal environment of the Addendum Study Area.

5.1.2 Mitigation and Planning Considerations

Table 5.1 summarizes mitigation and planning considerations to mitigate potential effects of exploration activities on species of special status such that residual effects would be considered to be minor, short-term and localized. All of the mitigation and planning considerations presented in the Phase 3A SEA remain applicable for the Addendum Project Area and are therefore included below. Additional considerations specific to the Addendum Project Area (which do not appear in the Phase 3A SEA) are shown as bolded text.

Table 5.1 Mitigation and Planning Considerations for Species of Special Status

Seismic and Seabed Surveys	• Adherence (at minimum) to the SOCP and consideration of additional enhanced measures for seismic activities planned in proximity to the Roseway Basin Critical Habitat for North Atlantic right whales. • Use of trained wildlife observers to visually monitor and record marine mammal, sea turtle and marine bird interactions and help enforce safe operating distances. • Sea turtle observers on vessels can be ineffective. A more appropriate mitigation tool with respect to marine turtles may be considering the temporal distribution of these species and schedule development surveys /activities to occur at these times of year when turtles are not present in the area. • Seabird monitoring to be completed following the CWS pelagic seabird monitoring protocol provided in Appendix C of the Phase 3A SEA. • Use of non-fluid filled streamers for seismic surveys where possible.
Exploratory Drilling	• Conduct a pre-spud survey to verify characterization of benthic habitat, in particular the absence of coral **or sponge** formations. • Adherence to the OWTG with regard to waste streams such as drilling muds and cuttings, deck drainage, desalinization brine, sewage and grey water. • Chemicals will be screened through the most recent version of the CNSOPB *Offshore Chemical Selection Guidelines (OSCG) for Drilling and Production Activities on Frontier Lands*. • Adherence to CNSOPB Drilling and Production Regulations. • Environmental Protection Plans will be required for exploratory drilling activities. • Bulk transfer and hose handling procedures as per best management practice. • Reduce flaring and ensure the use of high efficiency igniters as per best available practice. • Focus all area lighting on the work areas of offshore platforms and down shade lights as feasible to reduce marine bird attraction. • Conduct a post-drilling ROV survey to verify that the muds and cuttings are within the predicted zone of influence. • Emergency contingency measures and response plans will be developed to address significant weather scenarios.
Vessel Traffic	• Adherence to Transport Canada Guidelines for the Control of Ballast Water Discharge from Ships in Waters under Canadian Jurisdiction.

Table 5.1 Mitigation and Planning Considerations for Species of Special Status

	• Use of existing vessel routes to the extent practical.
Well Abandonment	• Mechanical separation of wellhead to the extent practical. • If use of explosives is necessary, the recommendations set out in the Guidelines for the use of Explosives in or near Canadian Fisheries Waters (Wright and Hopky 1998) will be followed.
Accidental Spills	• Detailed spill probability and behaviour modelling as input to any project-specific EAs for drilling projects in the **Addendum Project Area.** • **As part of Project-specific post-EA spill contingency planning, preparation of a Net Environmental Benefit Analysis (NEBA) as part of spill response planning to include consideration of coastal species.** • Implement Emergency and Oil Spill Response Plan to address spill prevention and response, including routine spill response exercises. The type of product spilled can affect decisions on the response options. • Engineering design and process safety management protocols to prevent spills from occurring and/or reaching the marine environment including but not limited to secondary containment, inspection and maintenance, spill response kits, and blowout safeguards. • Outline an EEM Plan to address post-spill monitoring effects in the Spill Response Plan, with the scope of the EEM Plan directly related to the severity of potential spills.

As noted in the Phase 3A SEA, the SOCP specifies minimum requirements and enhanced project-specific mitigation may be required, particularly with regard to protection of species of special status. Project-specific EAs will need to address the issue of compliance with section 32 of SARA for listed species under SARA and include mitigation specific to their proposed exploratory activities and/or location to prevent these effects. DFO may be consulted to help assess this risk and identify appropriate mitigation.

5.1.3 Data Gaps and Uncertainties

As noted in the Phase 3A SEA, most data gaps and uncertainties relate to effects and monitoring of underwater noise associated with exploration activities. Site-specific acoustic modelling will inform project-specific effects assessments and appropriate mitigation (including delineation of buffers or seismic shut-down zones) as necessary. Pre-drill surveys of the benthic environment at proposed wellsites will also help improve an understanding of the benthic habitat (particularly coral and sponge presence) on the Scotian Shelf and inform project-specific planning and mitigation.

5.2 SPECIAL AREAS

5.2.1 Potential Effects and Existing Knowledge

Exploratory oil and gas activities may have long- or short-term environmental effects on Special Areas, affecting the biodiversity, abundance and/or presence of species within these areas, ecological integrity and habitat value, and/or socio-economic value. The analysis of potential

environmental effects on Special Areas is closely linked to effects on Species of Special Status (Section 5.1) and Fisheries (Section 5.3).

The Phase 3A SEA focused on potential effects of exploration activities on habitat quality and use of Special Areas, focusing on critical habitat for endangered species (*e.g.*, Roseway Basin Critical Habitat for the North Atlantic right whale), sensitive benthic areas (*e.g.*, areas known to host coral and sponge communities), EBSAs (*e.g.*, the Scotian Slope EBSA), and the Georges Bank Moratorium Area.

Of particular relevance to the Addendum Study Area are the following Special Areas, which are located entirely outside of the spatial boundaries of the Phase 3A Study Area and were therefore not assessed in the Phase 3A SEA:

- the nearshore Eastern Shore Archipelago EBSA;
- the coastal Eastern Shore Islands IBA (NS027);
- seabird colonies within the Addendum Study Area; and
- coastal provincial parks and protected areas within the Addendum Study Area (*i.e.*, Clam Harbour Beach Provincial Park, Owls Head Provincial Park, Taylor Head Provincial Park, and Eastern Shore Islands Wilderness Area).

Additionally, the spatial boundaries of the Middle Bank EBSA (which was assessed in the Phase 1A SEA [Stantec 2012]) have been revised in recent years such that the EBSA now partially overlaps with the Addendum Study Area (as well as the Phase 3A Study Area, which was not the case at the time that the Phase 3A SEA was prepared in 2014).

Exploration activities in the Addendum Project Area may interact with the Special Areas identified above, and the other Special Areas (*i.e.*, EBSAs and sensitive benthic areas) in the Addendum Project Area and associated Study Area, due to:

- underwater sound propagation of seismic and exploration drilling noise potentially affecting areas of significance for marine mammals, sea turtles, fish, and invertebrates;
- localized disturbance of the seabed and benthos during seabed surveys, drilling, and well abandonment potentially affecting sensitive benthic areas;
- vessel traffic potentially affecting marine mammals and sea turtles using Special Areas;
- artificial lighting and flaring potentially affecting seabirds using Special Areas; and
- contaminants from waste disposal, operational discharges, and spills potentially affecting Special Areas and the species that use them.

These potential environmental effects are similar enough in nature and extent to those assessed with respect to the Special Areas VEC in the Phase 3A SEA that further characterization is not warranted in this Addendum.

Accidental spills during exploration activities also have potential to interact with Special Areas, including those in the nearshore/coastal environment. As stated in the Phase 3A SEA, accidental spills could adversely affect the biodiversity, abundance and/or presence of species within Special Areas, ecological integrity and habitat value, and/or socio-economic value. In addition to the potential effects of accidental spills on offshore Special Areas containing fish, corals, seabirds, and marine mammals that were assessed in the Phase 3A SEA, an accidental spill that reaches the nearshore/coastal environment also has potential to interact with nearshore spawning area (*e.g.*, Emerald, Western and Sable Bank Complex EBSA) and/or cause shoreline oiling of coastal Special Areas within the Addendum Study Area. Because birds are especially vulnerable to potential injury or mortality from oiling, accidental spills are an issue of particular concern with respect to potential interactions with those nearshore/coastal Special Areas where birds are known to congregate in the Addendum Study Area.

5.2.2 Mitigation and Planning Considerations

Table 5.2 summarizes mitigation and planning considerations to mitigate potential effects of exploration activities on Special Areas such that residual effects would be considered to be minor, short-term and localized. The mitigation and planning considerations from the Phase 3A SEA are included below where they remain applicable for the Addendum Project Area. Additional considerations specific to the Addendum Project Area (which do not appear in the Phase 3A SEA) are shown as bolded text.

Table 5.2 Mitigation and Planning Considerations for Special Areas

Seismic and Seabed Surveys	• Apply mitigation measures required as per the Statement of Canadian Practice with Respect to Mitigation of Seismic Sound in the Marine Environment (at minimum) such as increasing safety zones near gun arrays and shut down when whales are present or during limited visibility. Enhanced mitigation measures may be required **in proximity to the Emerald Basin EBSA due to the likelihood of marine mammal presence.** • Use of trained wildlife observers to visually monitor and record marine mammal, sea turtle and marine bird interactions and help enforce safe operating distances. • Schedule surveying to reduce interaction with peak haddock spawning (*e.g.*, in the vicinity of the Haddock Box (April/May)). • Seabed surveys using extractive methods should avoid areas with known concentrations and/or high diversity of corals or sponges, **particularly in the vicinity of sensitive benthic areas**. • Use of non-fluid filled streamers during seismic surveys where possible.
Exploratory Drilling	• Enhanced mitigation and EEM programs may be required for activities within or adjacent to Special Areas, such as spawning areas (*e.g.*, the Haddock Box). • Known aggregations of cold-water coral, **sponges**, and other sensitive features shall be avoided during oil and gas drilling activities. If aggregations of cold-water corals **or sponges** are found to occur as the result of an environmental assessment or seabed survey, the CNSOPB requires mitigation to avoid harming these aggregations (DFO 2006). • Conduct pre-drilling ROV investigation to determine presence of corals,

Table 5.2 Mitigation and Planning Considerations for Special Areas

	sponges, or other sensitive features as required by the CNSOPB. • Follow Canadian Wildlife Service instructions outlined in Williams and Chardine's protocol, "The Leach's Storm Petrel: General Information and Handling Instructions (n.d.)", including the associated permit when finding a dead or injured bird. • Adhere to regulatory guidelines (MARPOL and Offshore Waste Treatment Guidelines) for the treatment and disposal of various operational waste streams and emissions.
Vessel Traffic	• Reduce discharges in accordance with the *Canada Shipping Act* and other relevant regulations and apply best practices when transiting through or in the vicinity of all Special Areas.
Well Abandonment	• Apply standard mitigation measures during well abandonment (*e.g.*, mechanical separation of wellhead whenever possible).
Accidental Spills	• Detailed spill probability and behavior modelling as input to any project-specific EAs for drilling projects. • **Preparation of a NEBA as part of spill response planning to include consideration of inshore and coastal Special Areas.** • Apply standard preventative measures to avoid accidental spills. • Implement Emergency and Oil Spill Response Plan accepted by the CNSOPB, which includes routine spill response exercises. • Outline an EEM Plan to address post-spill monitoring effects, with the scope of the EEM program directly related to the severity of the spill.

5.2.3 Data Gaps and Uncertainties

All of the data gaps and uncertainties identified with respect to Special Areas in the Phase 3A remain applicable, including the ongoing potential for additional Special Areas to be identified within the Addendum Project Area and/or associated Study Area. In addition to uncertainty regarding the potential identification of additional EBSAs through the Scotian Shelf/Bay of Fundy MPA Network planning process being led by DFO, there is also uncertainty regarding the potential identification of other types of nearshore/coastal Special Areas within the Addendum Study Area, including the potential designation of additional provincial parks and protected areas by NSE. Although NSE has met its goal of legally protecting at least 12% of the province's land mass by 2015, it has also committed to continue considering other areas for future protection (NSE 2015).

Attention should be given in project-specific EAs to review and update the knowledge and status of EBSAs, sensitive benthic areas, coastal provincial parks and protected areas, and other Special Areas within the Addendum Study Area, as additional mitigation and planning may be required. Given the abundance of seabird colonies along the Eastern Shore of Nova Scotia and the large size of the area, further research should be conducted to more accurately delineate key areas of ecological importance to marine and migratory bird species.

As noted in the Phase 3A SEA, despite the uncertainties pertaining to environmental effects from oil and gas activities, it is important to take a precautionary approach in the vicinity of Special Areas, particularly those of well-known ecological importance, while research continues.

5.3 FISHERIES AND OTHER OCEAN USERS

5.3.1 Potential Effects and Existing Knowledge

Potential environmental effects of exploration activities on fisheries include effects on the fisheries resource (*e.g.*, direct effects on fished species indirectly affecting fishing success) and effects on fishing activity (*e.g.*, displacement from current or traditional fishing areas, gear loss or damage resulting in a demonstrated financial loss to commercial fishing interests). Although this VEC focuses primarily on commercial, recreational and Aboriginal fisheries, research-related fishing activities are also considered as applicable.

The Phase 3A SEA assessed potential physiological and behavioural effects on fisheries resources (*i.e.*, commercial and recreational fish species) which may affect catchability, fisheries gear loss or damage (including fouling in the event of an accidental spill), fishing exclusion/loss of access to fishing grounds, and reduced marketability of fisheries resources (due to real or perceived taint in the event of an accidental spill).

In addition to consideration of fishing activities within the Addendum Project Area and associated Study Area, this VEC has been expanded to acknowledge aquaculture operations and other ocean users that make use of the coastal/nearshore environment. Of particular relevance to the Addendum Study Area are the following fisheries and other ocean users, which are located entirely outside of the spatial boundaries of the Phase 3A Study Area and were therefore not assessed in the Phase 3A SEA:

- two marine finfish aquaculture operations;
- the active Hibernia Canada Express subsea fibre optic telecommunications cable;
- two shipwrecks; and
- recreational fishers (including recreational shellfish harvesters) and other recreational ocean users in the coastal/nearshore environment.

Additionally, there is a higher potential for FSC fisheries to occur in the Addendum Study Area given the inshore nature.

Exploration activities in the Addendum Project Area may interact with the fisheries and other ocean users identified above, as well as the other fisheries and ocean users in the Addendum Project Area and associated Study Area, due to:

- underwater sound propagation of seismic and exploration drilling noise potentially affecting fisheries resources or other ocean users (*e.g.*, divers, scientific users);

- risk of contact with seismic vessels and equipment, supply vessels, and drilling equipment potentially causing gear loss or damage for fishers or other ocean users;
- establishment of a 500-m radius safety exclusion zone around exploration drilling activities potentially affecting access to the area by fishers and other ocean users;
- drilling discharges potentially affecting fisheries resources; and
- localized disturbance of the seabed during seabed surveys, drilling, and well abandonment potentially affecting abandoned subsea cables.

These potential environmental effects are similar enough in nature and extent to those assessed with respect to the Fisheries VEC in the Phase 3A SEA that further characterization is not warranted in this Addendum.

Accidental spills during exploration activities also have potential to interact with fisheries and other ocean users, including those in the nearshore/coastal environment. As stated in the Phase 3A SEA, accidental spills could result in adverse effects to fisheries resources, fishing exclusion (*e.g.*, during spill and clean-up), fouling of gear (*e.g.*, through oiling), or reduced marketability (*e.g.*, real or perceived taint). These effects could reach fisheries and aquaculture operations in the nearshore/coastal environment of the Addendum Study Area. Spill response activities also have the potential to temporarily restrict access for other ocean users, including access to active subsea cables (*e.g.*, access for cable maintenance/repair) and access to shipwrecks (*e.g.*, access by researchers or recreational divers).

5.3.2 Mitigation and Planning Considerations

Table 5.3 summarizes mitigation and planning considerations to mitigate potential effects of exploration activities on fisheries and other ocean users such that residual effects would be considered to be minor, short-term and localized. All of the mitigation and planning considerations presented in the Phase 3A SEA remain applicable for the Addendum Project Area and are therefore included below. Additional considerations specific to the Addendum Project Area (which do not appear in the Phase 3A SEA) are shown as bolded text.

Table 5.3 Mitigation and Planning Considerations for Fisheries

Seismic and Seabed Surveys	• Fisheries Liaison Officer familiar with NS offshore fisheries to be present on seismic survey vessel(s) to communicate with fishing vessels in the area to avoid potential conflict with fishing activities/gear. • Adherence (at minimum) to the Statement of Canadian Practice with Respect to Mitigation of Seismic Noise in the Marine Environment and other regulatory guidelines. Enhanced mitigation may be required. • Adherence to the CNSOPB Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity. • Issuance of “Notice to Shipping” on location and scheduling of survey activities. • Commencement of seismic data acquisition in daylight hours and only if survey area confirmed to be clear of fixed fishing gear (*e.g.*, snow crab traps) or floating

Table 5.3 Mitigation and Planning Considerations for Fisheries

	longline gear (*e.g.*, for large pelagics such as porbeagle shark, swordfish). • Consultation with key organizations representing fishing interests (including commercial and Aboriginal) in the area during the EA planning stage and just prior to activity start. • Consultation with DFO Science Branch to ensure survey area and timing does not overlap with research vessel programs. • Coordination of seismic program activities with fishing industry to reduce potential conflict with commercial fishing activity and DFO survey vessels. • Coordination of program activities with fishing industry to reduce potential conflict during peak fishing times. • Use of non-fluid filled streamers during seismic surveys where possible.
Exploratory Drilling	• Adherence to the CNSOPB Offshore Waste Treatment Guidelines and Offshore Chemical Selection Guidelines to reduce effects of drill waste discharges. • Issuance of Notice to Shipping on location and scheduling of drilling activities. • Consultation with key organizations representing fishing interests (including commercial and Aboriginal) in the area during the EA planning stage. • An Environmental Protection Plan must be submitted prior to drilling activity.
Vessel Traffic	• Use of common routes by supply vessels and alternate routes around key fishing grounds particularly when fishing is at its peak.
Well Abandonment	• Design of wells and casings to facilitate effective mechanical cutting and removal of the wellhead; avoiding explosive means of separation where possible.
Accidental Spills	• Preparation and implementation of an Emergency Response Plan to address spill prevention and response including interactions with fishers, **aquaculture operators**, and other ocean users. • **As part of Project-specific post-EA spill contingency planning, preparation of a NEBA to include consideration of inshore fisheries, coastal aquaculture, and other inshore/coastal recreational use.** • Engineering design and process safety management protocols to prevent spills from occurring and/or reaching the marine environment including but not limited to secondary containment, inspection and maintenance, spill response kits, and blowout safeguards. • Operator to establish ongoing communication with key fisheries stakeholders, **aquaculture operators**, and other ocean users in the event of a spill and during spill response activities, including but not limited to issuance of a Notice to Shipping/Mariners. • Outline an EEM Plan to address post-spill monitoring effects, with the scope of the EEM program directly related to the severity of the spill. • Adherence to CNSOPB Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity.

5.3.3 Data Gaps and Uncertainties

The Phase 3A SEA acknowledges that there are large data gaps associated with the understanding of areas and timing of critical life-cycle stages of various species and that the understanding of these areas could potentially change during the lifetime of the SEA; therefore, project-specific EAs should reference updated information as applicable. Ongoing consultation

with Aboriginal organizations and fisheries stakeholders is important to confirm specific fishing locations and seasons. DFO data should be consulted for the latest fisheries licence and landings information. Data from the Nova Scotia Department of Fisheries and Aquaculture should be consulted for the latest information regarding aquaculture leases and licences.

Information regarding the activities carried out by other ocean users should be reviewed and updated in project-specific EAs. These activities have potential to change constantly and additional mitigation and planning may be required.

6.0 POTENTIAL EFFECTS OF THE ENVIRONMENT ON EXPLORATION ACTIVITIES

Aspects of the environment potentially affecting offshore exploration activities include:

- Fog and ice
- Seismic events and tsunamis
- Hurricanes, winds, and extreme weather events
- Marine life (biofouling and presence of species of special status); and
- Sediment and seafloor stability.

The interactions between these physical and biological forces and exploration activities are discussed in Section 6 of the Phase 3A SEA. There are no special considerations specific to the Addendum Project Area that would change the analysis presented in the Phase 3A SEA. As indicated therein, it is expected that vessels and equipment would be designed and installed (where applicable) based on appropriate environmental design criteria to maintain integrity of facilities and safety and protection of workers and the natural environment. Effects of the environment require consideration in project-specific design and environmental assessment and monitoring plans; however, these effects are not expected to be significant assuming appropriate planning and design criteria are followed.

7.0 POTENTIAL CUMULATIVE EFFECTS

SEA employs cumulative effects assessment (CEA) at a broad scale before individual project development to assist with planning and environmental management on a regional basis and to inform project-specific assessments. The CEA presented in the Phase 3A SEA (Section 7) considered past, present and likely future projects and activities which could potentially interact in combination with proposed exploration activities as scoped in the SEA. Past, present and likely future oil and gas development, as well as other ocean users and infrastructure (*e.g.*, fisheries, military training, shipping, research, subsea cables, shipwrecks and other legacy sites) were considered in terms of potential residual effects that could potentially overlap with residual effects of petroleum exploration to result in cumulative environmental effects on each of the assessed VECs. Section 3.3 of this Addendum discusses these other ocean users relative to the Addendum Project Area and respective study area.

Figure 7.1 maps the updated forecasted Call for Bids areas and currently held petroleum rights relative to the previous SEA areas, thereby giving an indication of present and likely future petroleum development and exploration activities which could potentially contribute residual environmental effects that could combine with effects from exploration activities to potentially result in adverse cumulative effects.

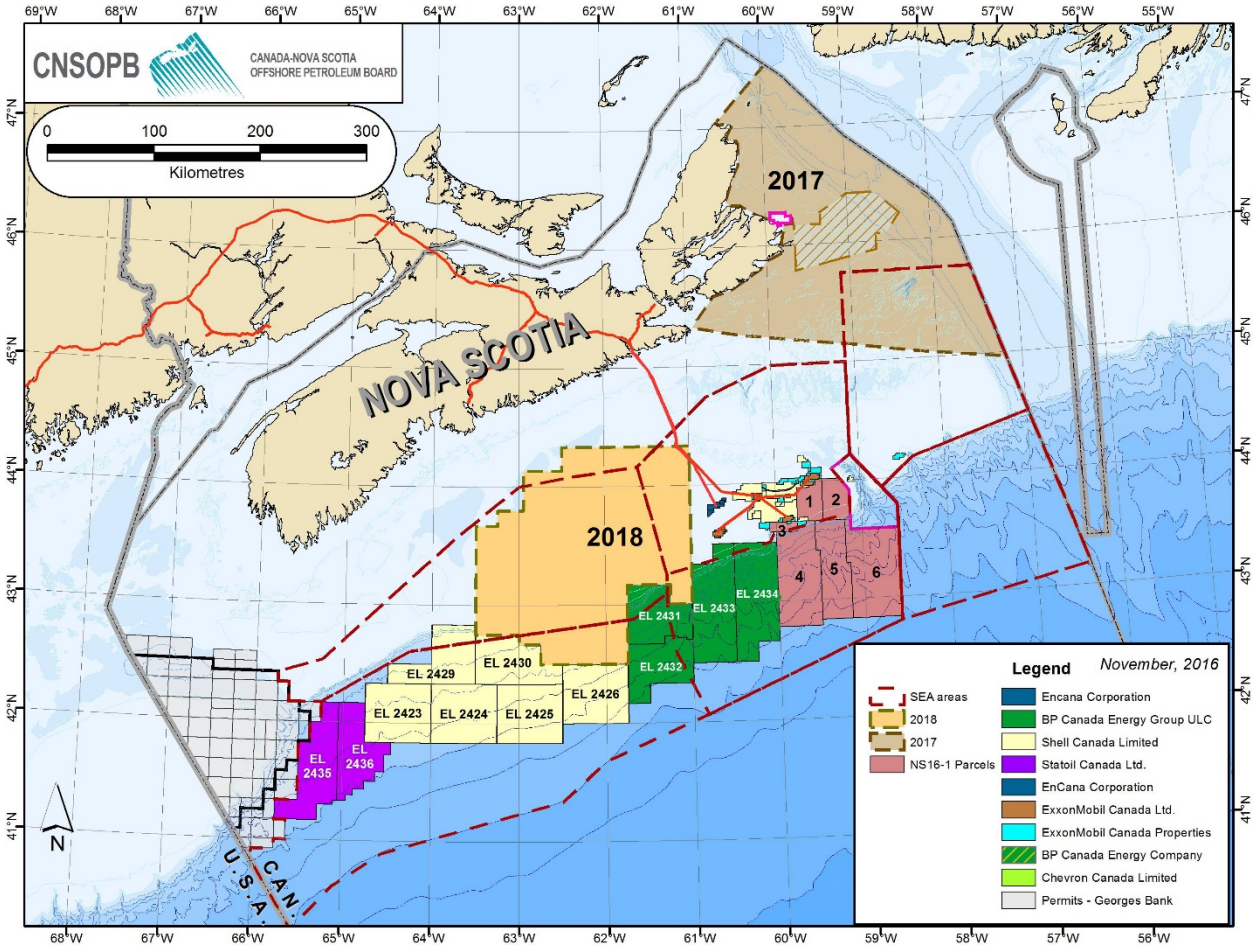


Figure 7.1 2016-2018 Call for Bids Forecast Map

The CEA presented in the Phase 3A SEA remains valid for the Addendum; however, given the nearshore nature of the Phase 3A Addendum Study Area and additional activities (refer to Section 3.3) which could potentially interact with residual effects of exploration, the previous CEA for the Phase 3A SEA has been updated accordingly.

Table 7.1 Cumulative Effects Assessment

Environmental Component and Associated Residual Effects of Exploration Activities	Residual Effects of Other Past, Existing or Future Projects/Activities	Potential Cumulative Effects	Mitigation Measures for Exploration Activities
Species of Special Status	Existing marine activities in the Study Area (including military training, shipping, oil and gas developments) result in a noisy underwater environment which can potentially affect marine mammal and sea turtle behaviour. Entrapment and entanglement in fishing gear (including bycatch) and collision with ships contribute to adverse effects on species of special status. Changes to the marine environment, can affect species behaviour and distribution, thereby potentially affecting interactions with other marine activities and resilience to adverse cumulative effects.	Potential increase in underwater noise. Potential increase in mortality risk. Potential change in habitat use.	Adherence to SOCP, including soft ramp-up and use of Marine Mammal Observers. Use of established vessel routes for supply vessels and avoidance of known sensitive areas. **Spill prevention and response planning (including NEBA) to consider effects on coastal species of special status.**
Special Areas	Other ocean uses generate noise and traffic in and around Special Areas although residual effects are expected to be limited given implementation of codes of practice for operating in proximity to some Special Areas (*e.g.*, Roseway Basin). Chronic hydrocarbon discharges from vessels result in oiling of species (particularly diving birds) and Special Areas (*e.g.*, shoreline of Sable Island). Fishing activities, particularly bottom trawling, can adversely affect areas of benthic ecological significance. **Coastal Special Areas (*e.g.*, provincial beaches, wildlife management areas) are also subject to land development pressures and effects associated with tourism and recreation.**	Potential increase in underwater noise. Potential increase in hydrocarbon contamination as a result of chronic discharges or accidental spills. **Potential degradation of coastal Special Areas.**	Development and implementation of Codes of Practice to reduce interaction with Special Areas. **Spill prevention and response planning (including NEBA) to consider effects on coastal resources.**

Table 7.1 Cumulative Effects Assessment

Environmental Component and Associated Residual Effects of Exploration Activities	Residual Effects of Other Past, Existing or Future Projects/Activities	Potential Cumulative Effects	Mitigation Measures for Exploration Activities
Fisheries and Other Ocean Users	Past and existing petroleum exploration and development projects have resulted in loss of fishing access due to establishment of safety zones (typically 500 m) around operational survey vessels and/or platforms. Historic overfishing has resulted in reduction of fish stocks and in some cases prompted the establishment of fisheries conservation areas which restrict fishing activity. Climate change-related effects on the marine environment have influenced species distribution and abundance, thereby affecting catchability.	Potential cumulative effect of loss of access and gear conflict with addition of new drilling and/or seismic programs. Potential reduced catchability and increased fishing effort, reducing net income. **In the event of a spill with oil reaching coastal habitats, aquaculture operations could realize cumulative adverse effects on their operations.**	Use of Fisheries Liaison Officer (seismic programs) and ongoing communication with stakeholders and coordination of program activities with fishing industry to reduce potential conflict during peak fishing times. Financial compensation for damage to fishing gear **(and aquaculture facilities as applicable)**. **Spill prevention and response planning (including NEBA) to consider effects on coastal resources.**

8.0 DATA GAPS AND RECOMMENDATIONS

As part of the SEA process, data gaps which may have contributed to uncertainty around the prediction of effects were identified, along with a brief discussion of the implications of these gaps and in some cases, recommendations for future studies to help address these gaps. Data gaps and recommendations presented in the Phase 3A SEA (Section 8) have been adapted below in Table 8.1 as applicable for the Addendum Study Area. Additional gaps/uncertainties specific to the Addendum Project Area (which do not appear in the Phase 3A SEA) are shown as bolded text.

Table 8.1 Summary of Data Gaps and Recommendations

Data Gap/Uncertainty	Implications/Recommendations
General lack of site-specific information on the distribution of species of special status including migratory birds in the Study Area.	Monitoring and observation programs of species of special status during operator-specific exploration programs can increase knowledge, particularly if the data can be collected and analyzed using standardized methods. **Given the abundance of seabird colonies along the Eastern Shore of Nova Scotia, further research should be conducted to more accurately delineate key areas of ecological importance to marine and migratory bird species.**
Uncertainty regarding MPA Network planning process – additional AOIs/MPAs could be identified; the boundaries of existing AOIs/MPAs could be changed; some EBSAs require further investigation of their ecological importance and sensitivity to petroleum exploration activities; management approaches have not been finalized (*e.g.*, allowable and prohibited activities).	Additional MPAs may be identified in the Study Area thereby requiring additional planning and mitigation considerations. The CNSOPB is committed to reviewing and updating SEAs on a regular basis to ensure validity; therefore it is likely that any change to EBSA and/or MPA designations would be addressed in these updates accordingly.
Coastal land use designations should be reviewed regularly for updates where projects may potentially interact with them as a result of an accidental spill.	**Attention should be given in project-specific EAs to review and update the knowledge and status of EBSAs, sensitive benthic areas, coastal provincial parks and protected areas, and other Special Areas within the Addendum Study Area, as additional mitigation and planning may be required. This information should be considered, as applicable, in NEBAs conducted for spill response planning, following the EA process.**
Uncertainty around marine plant harvesting activities and effects of an accidental spill on marine plant resources.	**Project-specific EAs should characterize marine plants and resource use in the potentially affected area (*e.g.*, based on predictive spill modelling) and assess biological and socio-economic effects of a spill on marine plants.**
Uncertainty around Aboriginal fishing (commercial and FSC) and other current use of lands and resources by Aboriginal persons.	**Project-specific EAs should engage Aboriginal organizations to characterize use of lands and resources as applicable to better understand and mitigate potential effects on Aboriginal and Treaty rights.**

Table 8.1 Summary of Data Gaps and Recommendations

Data Gap/Uncertainty	Implications/Recommendations
Uncertainty around sublethal effects of seismic sound on marine animals and in particular, behavioural effects.	Research programs have studies underway to address sound source characterization and propagation; physical and physiological effects and hearing; behavioural reactions and biologically significant effects; and mitigation and monitoring. The most relevant studies are those that are conducted while the species are exposed to actual seismic surveys. Future seismic surveys on the Western Scotian Shelf would present an important research opportunity to fill knowledge gaps regarding seismic noise and North Atlantic right whales and blue whales. DFO held a National Canadian Scientific Advisory process to review mitigation and monitoring measures for addressing seismic impacts on SARA-listed whale species in March 2014.
Uncertainty around effects of underwater noise (including seismic and drilling sound) and drilling discharges on coral and sponge communities.	**Pre-drill surveys should be conducted to confirm the absence of aggregations of habitat-forming corals and sponges, and species at risk.** Exploration activities near sensitive benthic areas will avoid known concentrations of coral and sponges. However, exploration activities in the vicinity of these concentrations could involve EEM activities to document potential effects of exploration activities on coral and sponge communities.
There are large data gaps associated with the understanding of areas and timing of critical life-cycle stages of various species.	As knowledge increases about areas and timing of critical life stages over the life of the SEA, project-specific EAs should reference updated information as applicable.
Consequences of seismic exploration (sound levels) and accidental spills on Special Areas in the Study Area.	Site-specific acoustic and spill fate modelling should be conducted for project-specific EAs for exploration projects proposed in the **Phase 3A Addendum Project Area** with mitigation and monitoring plans implemented as appropriate.
Environmental assessments for exploration drilling and development projects on the Scotian Shelf and/or Slope have historically modelled blowout scenarios involving condensate from gas fields that are known to be present**. Recent modelling conducted for the Shelburne Basin Venture Exploration Drilling Project have demonstrated a larger potential spatial extent for oil spills, with some potential (albeit low) for coastline interactions (Shell 2014).**	Oil spill trajectory modelling should be conducted for potential well locations within the **Phase 3A Addendum Project Area**, with product properties and flow estimates based on the spill scenario involving a well blowout in the event an oil reservoir is likely to be discovered. This may be project-specific and/or site-specific and will provide information on expected behaviour of a crude oil spill on the Scotian Shelf/Slope.
Consequences and lessons learned from past oil and gas accidents and malfunction incidents.	Project-specific EAs for exploratory drilling should include discussions on lessons learned from the Gulf of Mexico oil spill (Macondo incident) that may be relevant to the specific project.

Table 8.1 Summary of Data Gaps and Recommendations

Data Gap/Uncertainty	Implications/Recommendations
Detection of presence and behavioural effects of marine mammals (particularly beaked whales) and sea turtles associated with seismic exploration and drilling.	Continuous use of PAM (and trained marine mammal observers as well as adherence to (and in some cases enhancement of) the Statement of Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment. The use of a marine mammal observer with experience in identifying beaked whales is an important factor for increasing probability of sighting these whales. Trained observers and improved data will enhance understanding of distribution and behaviour of species of special status.

9.0 SUMMARY AND CONCLUSIONS

This report is an addendum to the Phase 3A SEA which considered potential impacts of petroleum exploration activities on the Western Scotian Shelf. This addendum has been prepared to address the 2018 Call for Bids area that extends beyond the area previously delineated for assessment in the Phase 3A SEA and is intended to assist the CNSOPB and potential future operators with respect to future applications and environmental management planning within the Phase 3A Addendum Project Area.

Mitigation measures to reduce environmental effects and address data gaps and uncertainties with respect to the Phase 3A Study Area were presented in Section 9 of the Phase 3A SEA and have been adapted below as applicable for the Addendum Study Area in Table 9.1. Additional mitigation measures specific to the Addendum Study Area (which do not appear in the Phase 3A SEA) are shown as bolded text.

Table 9.1 Summary of Key Mitigation for Exploration Activities in the Addendum Project Area

Exploration Activity	Proposed Mitigation
Seismic and Seabed Surveys	• Schedule surveying to reduce interaction with peak haddock spawning in the Haddock Box (April to May). • Use of trained wildlife observers to visually monitor and record marine mammal, sea turtle and marine bird interactions and to help enforce safe operating distances. • Seabird monitoring to be completed following the CWS pelagic seabird monitoring protocol provided in Appendix C of the Phase 3A SEA. • Fisheries Liaison Officer (FLO) familiar with NS offshore fisheries to be present on the seismic survey vessel(s) to communicate with fishing vessels in the area and to avoid potential conflict with fishing activities/gear. For conventional (single vessel) seismic programs FLOs may be trained as marine wildlife observers and perform both tasks. • Use of Passive Acoustic Monitoring (PAM) as per the "Statement of Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment". • Adherence to the CNSOPB "Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity". • Issuance of "Notice to Mariners" on location and scheduling of survey activities. • Commencement of seismic data acquisition only if survey area confirmed to be clear of fixed fishing gear (*e.g.*, lobster traps) or floating longline gear (*e.g.*, for large pelagics such as tuna and swordfish). • Consultation with key organizations representing fishing interests (including commercial and Aboriginal) in the area during the EA planning stage and just prior to commencement of any work to coordinate seismic program activities with fishing industry and to reduce potential conflict with fishing activity during peak fishing times. • Consultation with DFO Science Branch to ensure survey area and timing reduces

Table 9.1 Summary of Key Mitigation for Exploration Activities in the Addendum Project Area

Exploration Activity	Proposed Mitigation
	the potential for conflict with research vessel program plans. • Consultation with DND to ensure survey areas and timing reduces the potential for conflict with exercises and/or training and to discuss the proximity of unexploded ordnances/explosive dumpsites.
Exploratory Drilling	• Conduct pre-drilling ROV investigation to determine presence of corals, sponges, or other sensitive features as required by the CNSOPB. • Areas with known aggregations of cold-water corals **and sponges** and other sensitive features shall be avoided during oil and gas drilling activities. If aggregations of cold-water corals **and sponges** are found to occur as the result of an environmental assessment that is conducted following an application for drilling or production, the CNSOPB requires mitigation to avoid harming these aggregations (DFO 2006). • Follow Canadian Wildlife Service mitigation measures when finding a dead or injured bird (*i.e.*, Williams and Chardine handling protocol). • Adherence to the CNSOPB "Offshore Waste Treatment Guidelines" and "Offshore Chemical Selection Guidelines" to reduce effects of drill waste discharges during drilling programs. • Adherence to Nova Scotia Offshore Drilling and Production Regulations. • Bulk transfer and hose handling procedures as per best available practice. • Reduce flaring and ensure the use of high-efficiency igniters as per best management practice. • Focus all area lighting on the work areas of offshore platforms and down shade lights to reduce marine bird attraction. • Conduct a post-drilling ROV survey to verify that the muds and cuttings are within the predicted zone of influence. • Emergency contingency measures and response plans will be developed to address significant weather scenarios. • Monitor seabird interactions with the drilling rig/platform. • Enhanced mitigation and EEM programs may be required for activities within or adjacent to Special Areas, such as spawning areas (*e.g.*, the Haddock Box), the Roseway Basin Area to be Avoided/Critical Habitat, Northeast Channel Coral Conservation Area and/or Sambro Bank and Emerald Basin Vazella Closure areas. • Issuance of "Notice to Shipping" on location and scheduling of drilling activities. • Consultation with key organizations representing fishing interests (including commercial, Aboriginal and recreational) in the area during the EA planning stage.
Vessel Traffic	• Adherence to Transport Canada Guidelines for the Control of Ballast Water Discharge from Ships in Waters under Canadian Jurisdiction. • Use of existing vessel routes to the extent practical. • Use of common routes by supply vessels and alternate routes around key fishing grounds particularly when fishing is at its peak.

Table 9.1 Summary of Key Mitigation for Exploration Activities in the Addendum Project Area

Exploration Activity	Proposed Mitigation
Well Abandonment	• Design of wells and casings to facilitate effective mechanical cutting and removal of the wellhead; avoiding explosive means of separation where possible. • If use of explosives is necessary, the recommendations set out in the *Guidelines for the use of Explosives in or near Canadian Fisheries Waters* (Wright and Hopky 1998) will be followed.
Accidental Spills	• Detailed spill probability and behaviour modelling as input to any project-specific EAs for a drilling project in **the Phase 3A Addendum Project Area**. • Engineering design and protocols to prevent spills from occurring and/or reaching the marine environment including but not limited to secondary containment, inspection and maintenance, spill response kits, and blowout safeguards. • **As part of Project-specific post-EA spill contingency planning, preparation of a NEBA, which will consider sensitive coastal resources, fisheries, and other ocean users as applicable.** • Implement Emergency and Oil Spill Response Plan accepted by the CNSOPB to address spill prevention and response including interactions with fishers and other ocean users, and includes spill response exercises. • Outline an EEM Plan to address post-spill monitoring effects, with the scope of the EEM Plan directly related to the severity of the spill. • Operator to establish ongoing communication with key fisheries stakeholders and other ocean users in the event of a spill and during spill response activities, including but not limited to issuance of a Notice to Shipping/Mariners. • Adherence to CNSOPB "Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity".

Stakeholder consultation will continue to play an important role in mitigating effects on fisheries and other ocean users. Assuming adherence to applicable standards and regulations and implementation of mitigation and monitoring as recommended, the issuance of exploration rights in the Phase 3A Addendum Project Area is not expected to result in unacceptable adverse environmental effects such that populations of species of special status or integrity of Special Areas would be compromised beyond sustainable levels. It should be noted that there is the potential requirement for additional or alternative mitigation measures on a case-by-case basis at the Project level and operators should establish appropriate study area boundaries for assessing effects of accidental spills such that potential effects on coastal resources can be adequately assessed. Effects of exploration on fisheries and other ocean users are also not expected to result in unacceptable effects provided the implementation of recommended mitigation and ongoing communication with applicable stakeholders. It should be noted that there is the potential requirement for additional or alternative mitigation measures on a case-by-case basis at the Project level.

10.0 REFERENCES

Beazley, L., E. Kenchington, F.J. Murillo, C. Lirette, J. Guijarro, A. McMillan, and A. Knudby. 2016. Species Distribution Modelling of Corals and Sponges in the Maritimes Region for Use in the Identification of Significant Benthic Areas. Can. Tech. Rep. Fish. Aquat. Sci. 3172: vi + 189p. Available online: http://waves-vagues.dfo-mpo.gc.ca/Library/364127.pdf

Breeze, H., D. Fenton, R.J. Rutherford, and M.A. Silva. 2002. The Scotian Shelf: An ecological overview for ocean planning. Ca. Tech. Rep. Fish. Aquat. Sci. 2393.

Coffen-Smout, S. D. Shervill, D. Sam, C. Denton, and J. Tremblay. 2013. Mapping Inshore Lobser Landings and Fishing Effort on a Maritimes Region Modified Grid System. Can Tech. Rep. Fish. Aquat. Sci. 3024: 33 pp.

CWS [Canadian Wildlife Service]. 2013. Monitoring Terns in Nova Scotia: Census Techniques, Population Trends, and Colony Dynamics. Draft technical report obtained from CWS December 2013.

DFO [Fisheries and Oceans Canada]. 2006. Coral Conservation Plan (2006-2010). Oceans and Coastal Management Report 2006-01. ESSIM Planning Office, Fisheries and Oceans Canada (Maritimes Region).

DFO [Fisheries and Oceans Canada]. 2009. Policy for Managing the Impacts of Fishing on Sensitive Benthic Areas. Available online: http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/benthi-eng.htm

DFO [Fisheries and Oceans Canada]. 2013. Assessment of Information on Irish Moss, Rockweed and Kelp Harvests in Nova Scotia. DFO. Can. Sci. Advis. Sec. Sci. Advis. Rep. 2013/004.

DFO [Fisheries and Oceans Canada]. 2014. Offshore Ecologically and Biologically Significant Areas in the Scotian Shelf Bioregion. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/041.

DFO [Fisheries and Oceans Canada]. 2016. Food Social and Ceremonial Gear and Fishing Locations. Database provided by DFO Maritimes Region.

Environment Canada. 2013a. Canadian Wildlife Service, Atlantic Canada Colonial Waterbird database. Spreadsheet titled “Other seabirds and colonies Nova Scotia-Bay of Fundy” obtained December 2013.

Environment Canada. 2013b. Canadian Wildlife Service, Atlantic Canada Colonial Waterbird database. Spreadsheet titled “Gull survey Nova Scotia 2013” obtained December 2013.

Hastings, K., M. King, and K. Allard. 2014. Ecologically and Biologically Significant Areas in the Atlantic Coastal Region of Nova Scotia. Can. Tech. Rep. Fish. Aquat. Sci. 3107: xii + 74 p.

IBA Canada [Important Bird Areas Canada]. n.d. IBA Site Directory. Available online: http://www.ibacanada.com/explore.jsp?lang=en

Lidgard, D. 2007. Nova Scotian shore grey seal pup survey. In DFO. 2007b. DFO/FSRS Inshore Ecosystem Project Data Synthesis Workshop; 19-20 March 2007. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2007/028: vii + 57 pp.

MGS [Membertou Geomatics Solutions] and UINR [Unama'ki Institute of Natural Resources]. 2014. Traditional Use and Mi'kmaq Fisheries of the Shelburne Basin, Nova Scotia. Prepared for the Shelburne Basin Venture Exploration Drilling Project Environmental Impact Statement.

NSDFA [Nova Scotia Department of Fisheries and Aquaculture]. 2013. Aquaculture Site Mapping Tool. Available online: http://novascotia.ca/fish/aquaculture/site-mapping-tool/

NSDNR [Nova Scotia Department of Natural Resources]. 2009. Taylor Head Provincial Park. Printed August 2009. Available online: http://parks.novascotia.ca/sites/default/files/TaylorHead.pdf

NSDNR [Nova Scotia Department of Natural Resources]. 2011. Shapefile titled "cormorant_colonies_2011_survey". Obtained January 2014.

NSDNR [Nova Scotia Department of Natural Resources]. 2013a. Shapefile titled "eider_islands". Obtained January 2014.

NSDNR [Nova Scotia Department of Natural Resources]. 2013b. Game Sanctuaries and Wildlife Management Areas. Available online: http://novascotia.ca/natr/wildlife/habitats/sanctuaries/existing.asp

NSE [Nova Scotia Environment]. n.d. Clam Harbour. Available online: http://parks.novascotia.ca/content/clam-harbour-beach

NSE [Nova Scotia Environment]. 2013. Owls Head Provincial Park. Updated October 24, 2013. Available online: https://www.novascotia.ca/nse/protectedareas/consult/AreaHandler.ashx?id=847&type=html

NSE [Nova Scotia Environment]. 2015. Province Reaches Land Protection Goal. Updated December 29, 2015. Available online: http://novascotia.ca/news/release/?id=20151229002

NSE [Nova Scotia Environment]. 2016. Eastern Shore Islands Wilderness Area. Updated June 24, 2016. Available online: https://www.novascotia.ca/nse/protectedareas/wa_easternshoreislands.asp

Ronconi, R. 2013. A report on the latest status and trends of terns and gulls breeding on Sable Island. Prepared for Parks Canada; Contract # 13-2009.

Shell [Shell Canada Limited]. 2014. Shelburne Basin Venture Exploration Drilling Project Environmental Impact Assessment. Prepared by Stantec Consulting Ltd.

Stantec [Stantec Consulting Ltd.]. 2012. Strategic Environmental Assessment for Offshore Petroleum Exploration Activities. Eastern Scotian Shelf – Middle and Sable Island Banks (Phase 1A). Prepared for the Canada-Nova Scotia Offshore Petroleum Board, Halifax, NS.

Stantec [Stantec Consulting Ltd.]. 2014. Strategic Environmental Assessment for Offshore Petroleum Exploration Activities. Western Scotian Shelf (Phase 3A). Prepared for the Canada-Nova Scotia Offshore Petroleum Board, Halifax, NS.

Williams, U., and Chardine, J. 1999. The Leach's Storm Petrel: General Information and Handling Instructions. 4 pp. Available from: http://www.cnlopb.nl.ca/pdfs/mkiseislab/mki_app_h.pdf.

Wright, D.G. and G.E. Hopky. 1998. Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters. Can. Tech. Rep. Fish. Aquat. Sci. 3107: iv + 34p.

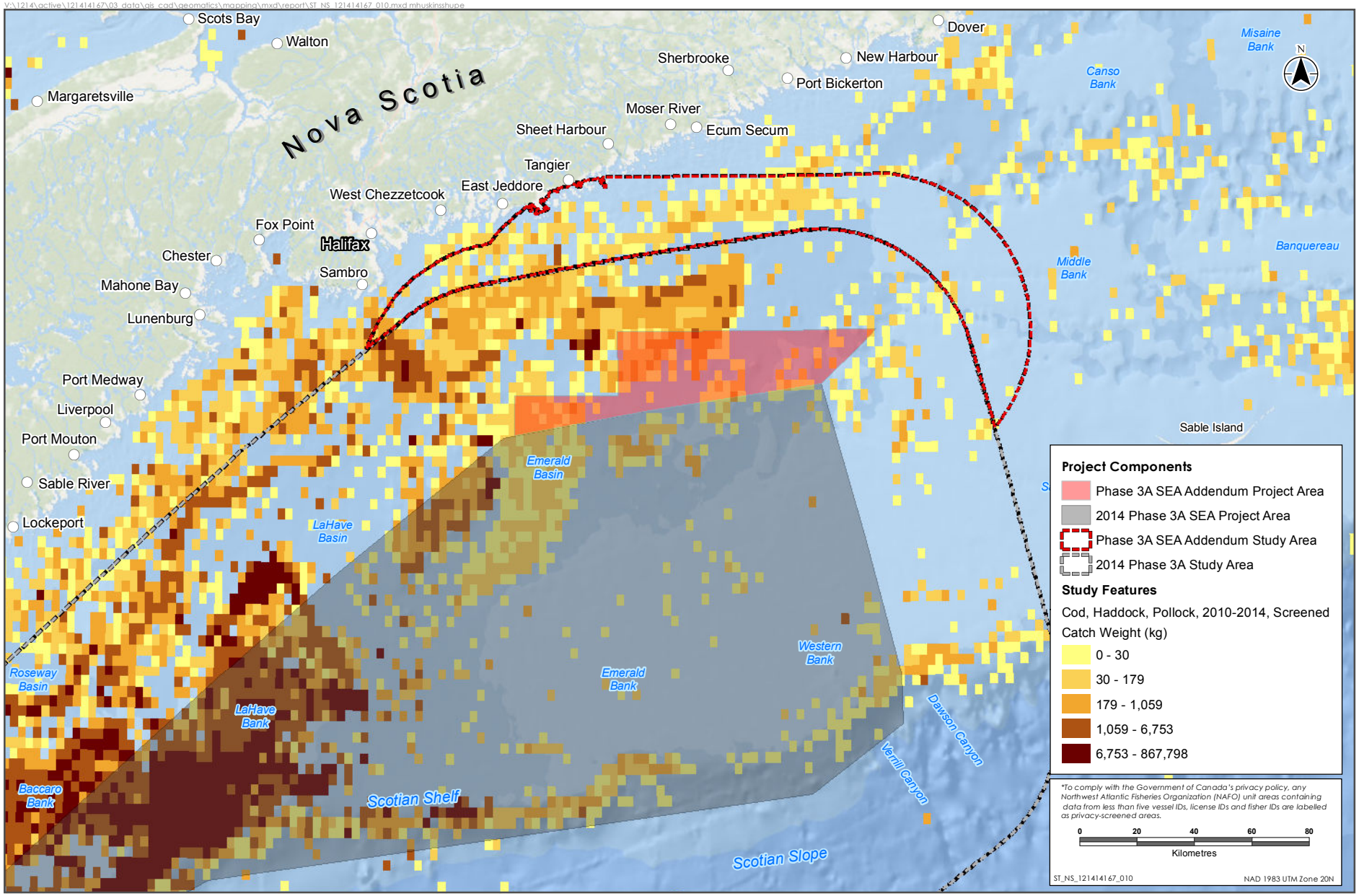
WWF [World Wildlife Organization]. 2009. An Ocean of Diversity: The Seabeds of the Canadian Scotian Shelf and Bay of Fundy. Available online: http://awsassets.wwf.ca/downloads/oceanofdiversity.pdf

January 2, 2017

APPENDIX A
COMPOSITE FISHERY LANDINGS MAPS FOR SELECT FISHERIES

Stantec

V:\1214\active\121414167\03_data\gis_cad\geomatics\mapping\mxd\report\ST_NS_121414167_010.mxd mhuskinsshupe



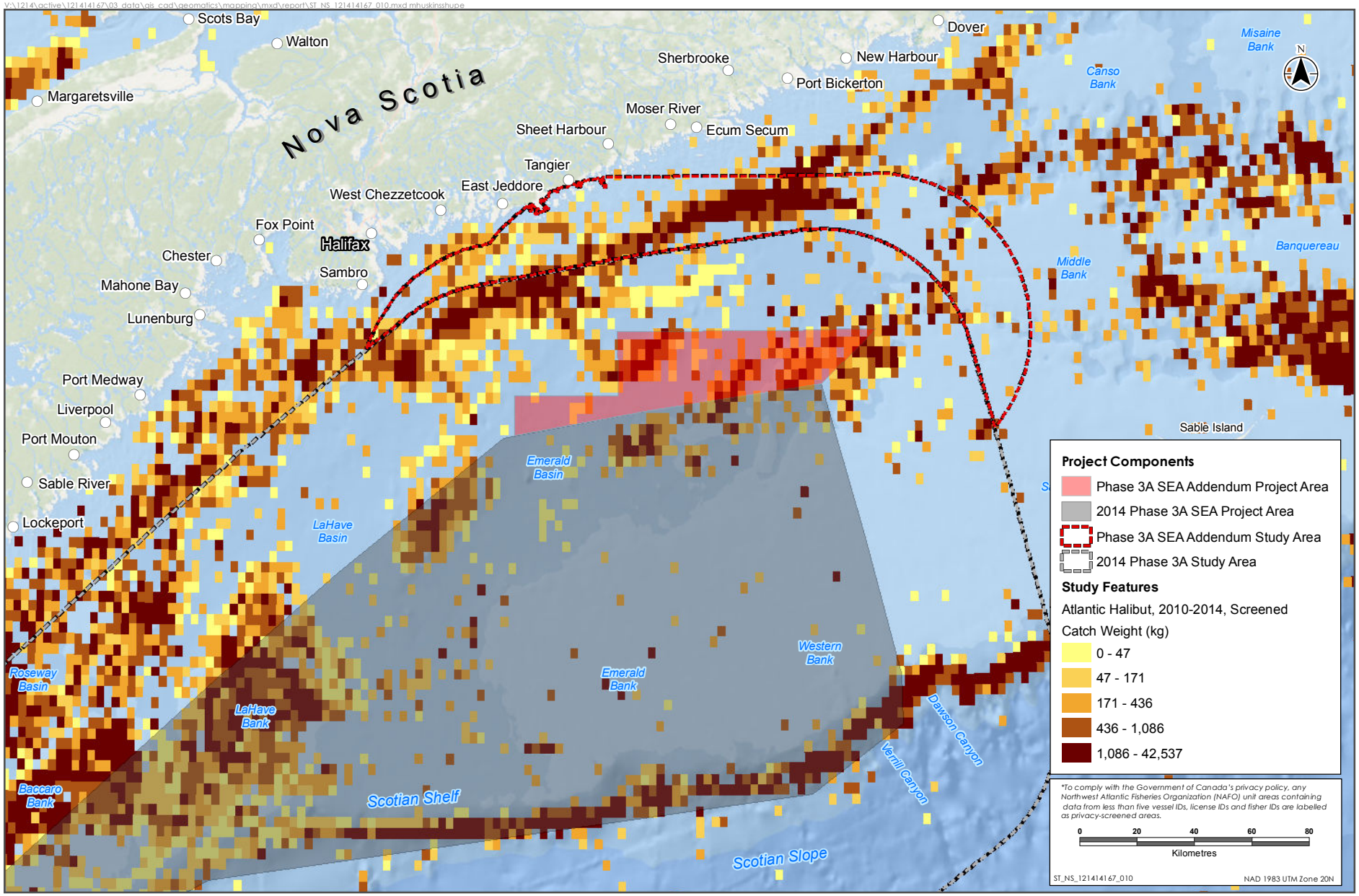
Sources: Base Data - Canada Nova Scotia Offshore Petroleum Board, Government of Canada, Fisheries and Oceans Canada. Service Layer Credits: Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

Disclaimer: This map is for illustrative purposes to support this project; questions can be directed to the issuing agency.

Atlantic Halibut Landings

Stantec

V:\1214\active\121414167\03_data\gis_cad\geomatics\mapping\mxd\report\ST_NS_121414167_010.mxd mhuskinsshupe



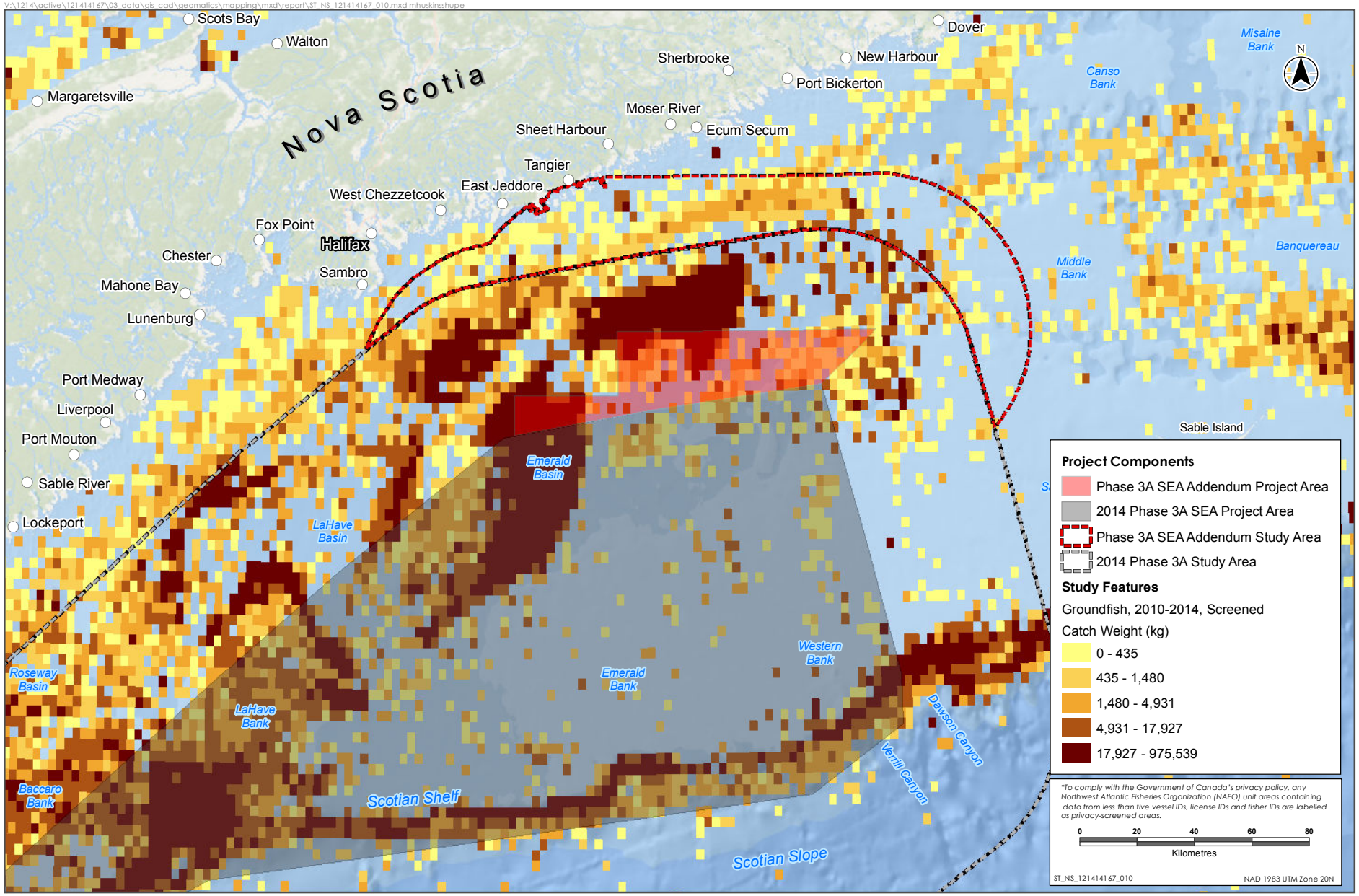
Sources: Base Data - Canada Nova Scotia Offshore Petroleum Board, Government of Canada, Fisheries and Oceans Canada. Service Layer Credits: Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

Disclaimer: This map is for illustrative purposes to support this project; questions can be directed to the issuing agency.

Bluefin Tuna Landings

Stantec

V:\1214\active\121414167\03_data\gis_cad\geomatics\mapping\mxd\report\ST_NS_121414167_010.mxd mhuskinsshupe



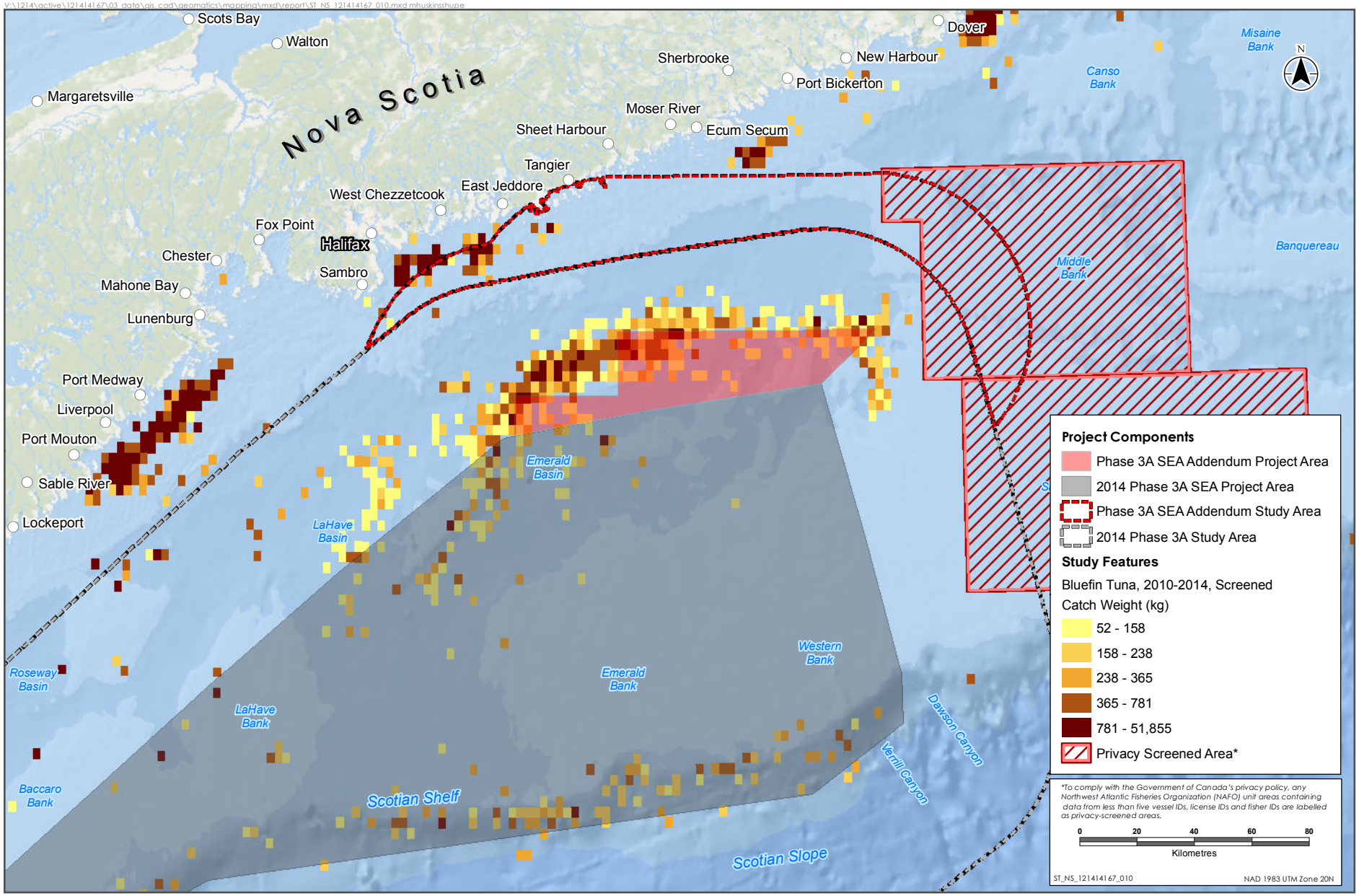
Sources: Base Data - Canada Nova Scotia Offshore Petroleum Board, Government of Canada, Fisheries and Oceans Canada. Service Layer Credits: Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

Disclaimer: This map is for illustrative purposes to support this project; questions can be directed to the issuing agency.

Cod, Haddock, and Pollock Landings

Stantec

V:\1214\active\121414167\03_data\gis_cad\geomatics\mapping\mxd\report\ST_NS_121414167_010.mxd mhuskinsshupe



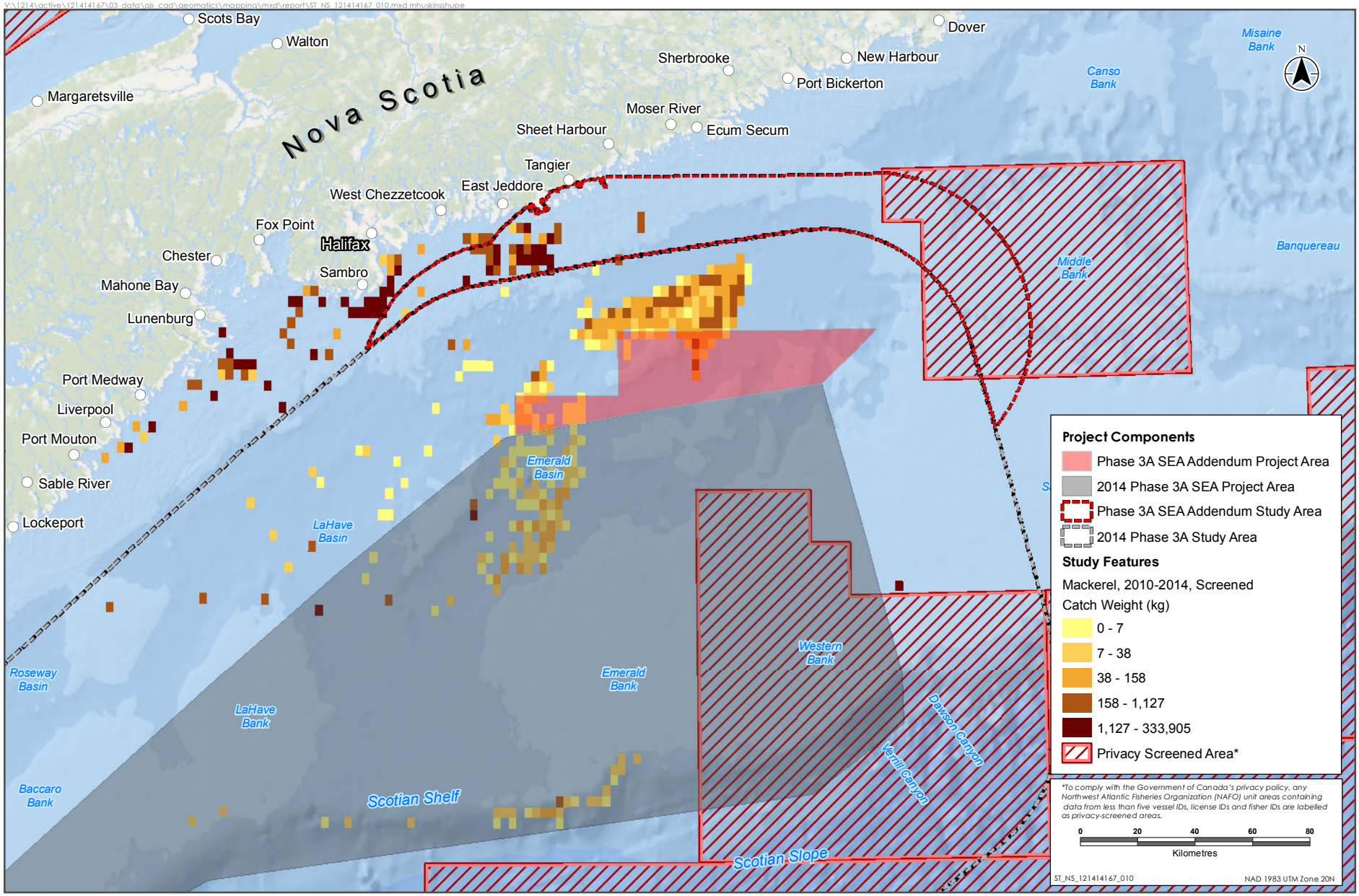
Sources: Base Data - Canada Nova Scotia Offshore Petroleum Board, Government of Canada, Fisheries and Oceans Canada. Service Layer Credits: Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

Disclaimer: This map is for illustrative purposes to support this project; questions can be directed to the issuing agency.

Groundfish Landings

Stantec

V:\1214\active\121414167\03_data\gis_cad\geomatics\mapping\mxd\report\ST_NS_121414167_010.mxd mhuskinsshupe

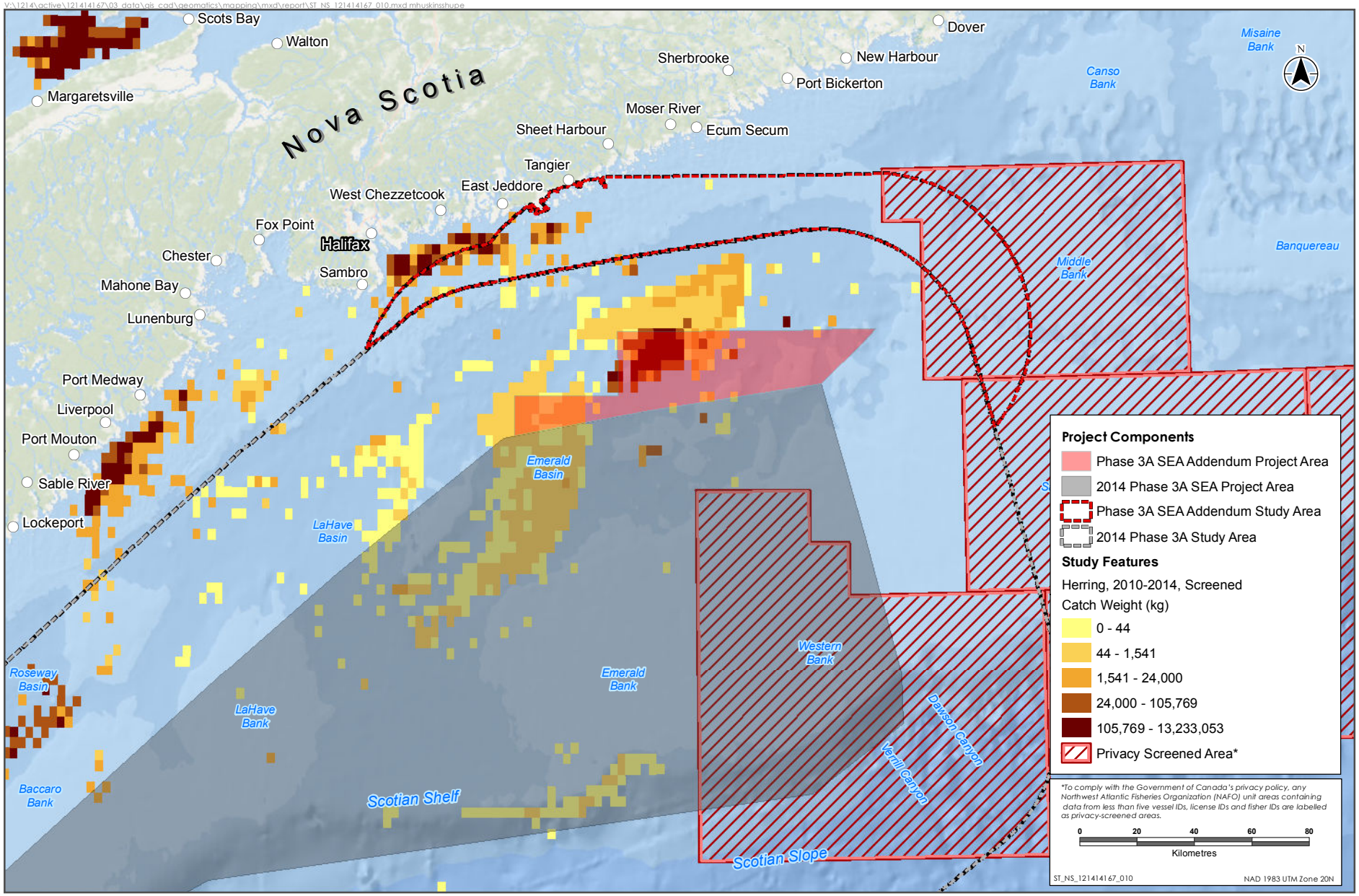


Sources: Base Data - Canada Nova Scotia Offshore Petroleum Board, Government of Canada, Fisheries and Oceans Canada. Service Layer Credits: Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

Disclaimer: This map is for illustrative purposes to support this project; questions can be directed to the issuing agency.

Herring Landings

Stantec

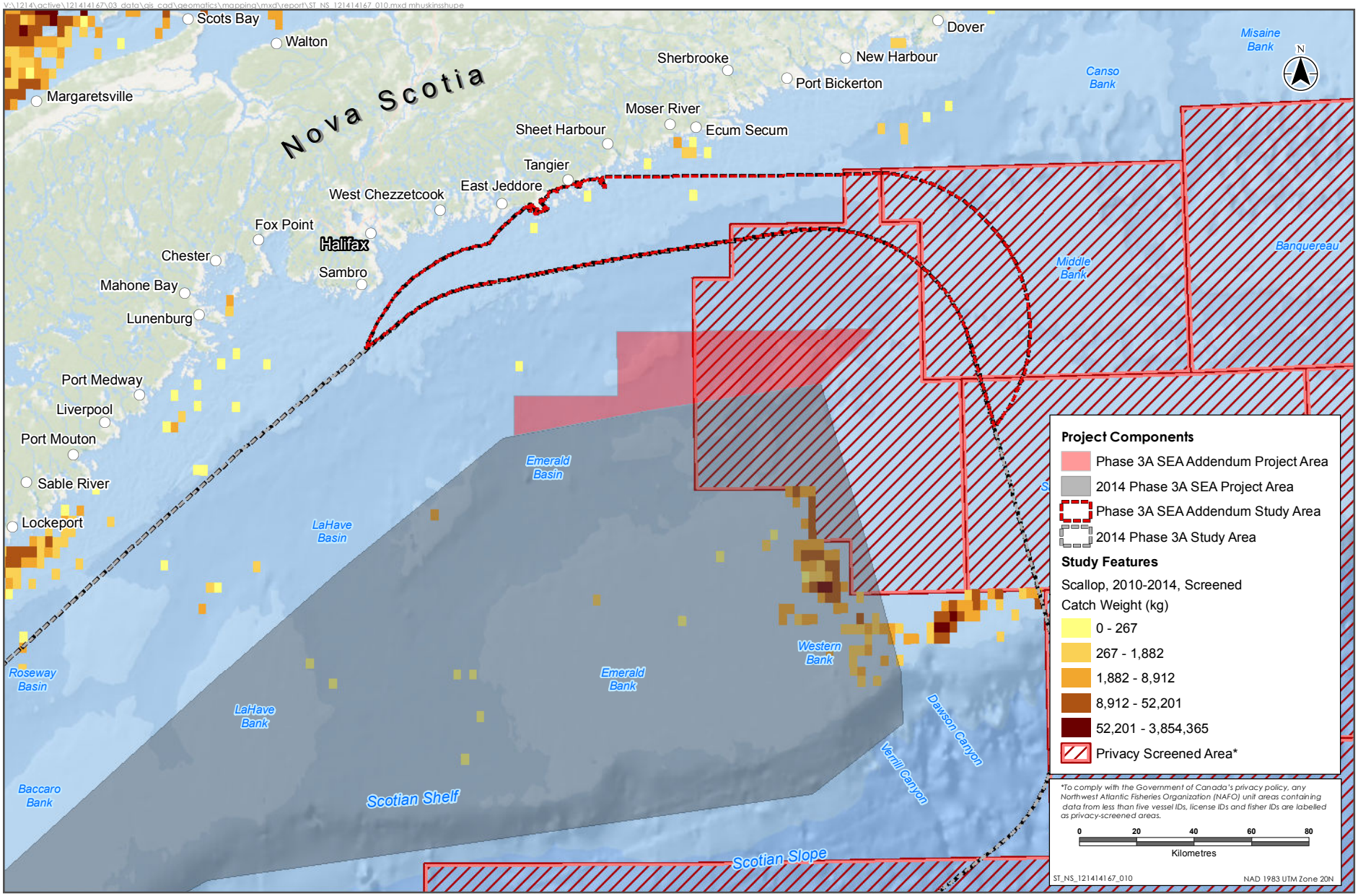


Sources: Base Data - Canada Nova Scotia Offshore Petroleum Board, Government of Canada, Fisheries and Oceans Canada. Service Layer Credits: Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

Disclaimer: This map is for illustrative purposes to support this project; questions can be directed to the issuing agency.

Mackerel Landings

Stantec

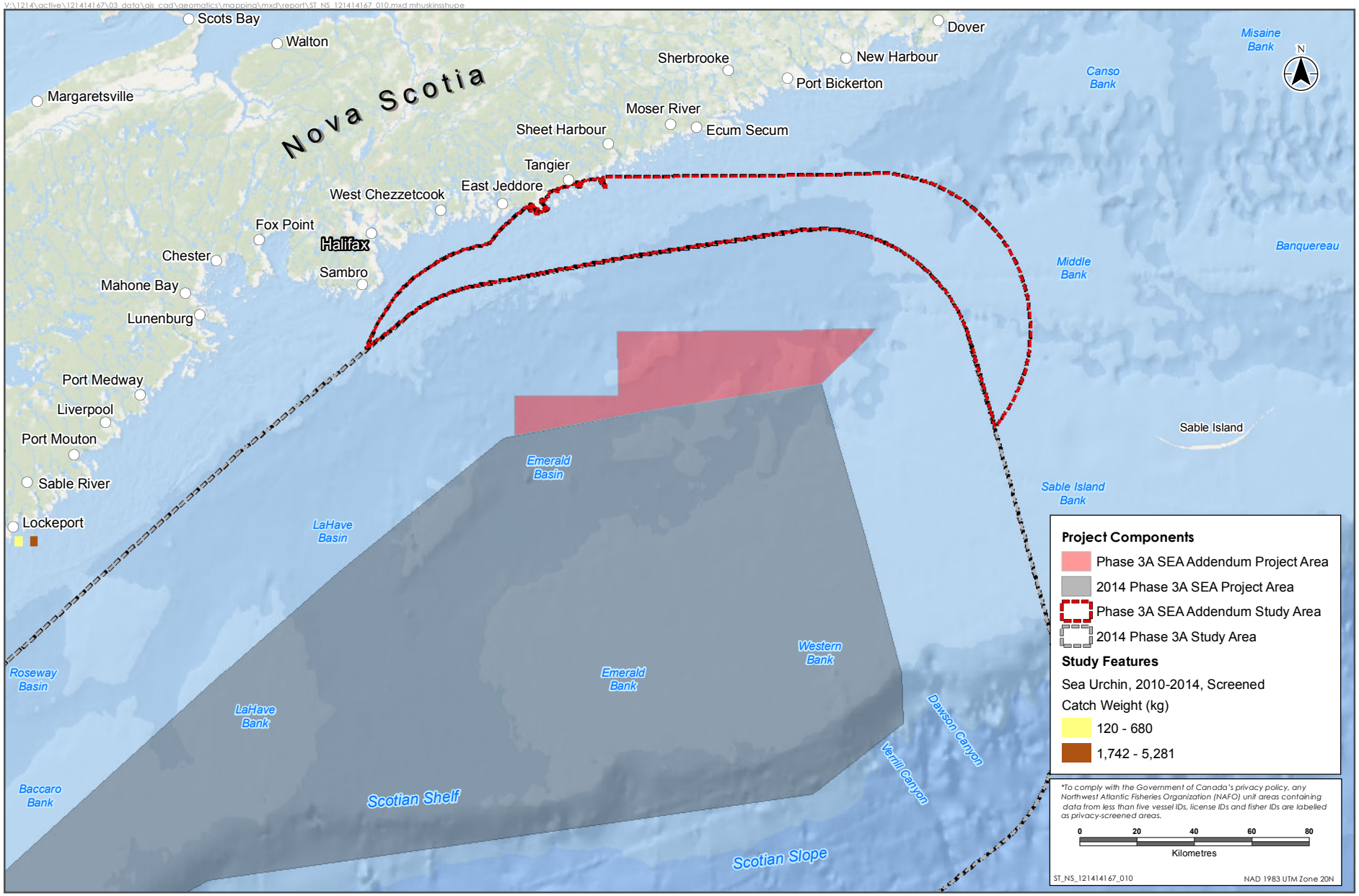


Sources: Base Data - Canada Nova Scotia Offshore Petroleum Board, Government of Canada, Fisheries and Oceans Canada. Service Layer Credits: Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

Disclaimer: This map is for illustrative purposes to support this project; questions can be directed to the issuing agency.

Scallop Landings

Stantec



Sources: Base Data - Canada Nova Scotia Offshore Petroleum Board, Government of Canada, Fisheries and Oceans Canada. Service Layer Credits: Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

Disclaimer: This map is for illustrative purposes to support this project; questions can be directed to the issuing agency.

Shrimp Landings

Stantec