

FINAL

Hampden K-41 Vertical Seismic Program Marine Mammal and Sea Turtle Mitigation Report

Submitted to:

ExxonMobil Canada Ltd.

20 Hebron Way St. John's, NL A1A 0L9

Submitted by:

Wood Environment & Infrastructure Solutions Canada Limited

36 Pippy Place PO Box 13216 St. John's, NL A1B 4A5

27 September 2022 Wood Project #: ME2278308



IMPORTANT NOTICE

This report was prepared exclusively for ExxonMobil Canada Limited by Wood Environment & Infrastructure Solutions Canada Limited (Wood). The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in Wood's services and based on: i) information available at the time of preparation, ii) data supplied by outside sources and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by ExxonMobil Canada Limited only, subject to the terms and conditions of its contract with Wood. Any other use of, or reliance on, this report by any third party is at that party's sole risk.



Document Name	Document No.	Rev No.	Prepared By	Reviewed By	Date (y-m-d)
Hampden K-41 Vertical Seismic Program Marine Mammal and Sea Turtle Mitigation Report	ME2278308-01	1.0	LM	MT	2022-09-18
Hampden K-41 Vertical Seismic Program Marine Mammal and Sea Turtle Mitigation Report	ME2278308-02	2.0	LM	DS	2022-09-23
Hampden K-41 Vertical Seismic Program Marine Mammal and Sea Turtle Mitigation Report	ME2278308-03	3.0	LM	DS	2022-09-27



TABLE OF CONTENTS

1.0	INTRODUCTION	5
2.0	PERSONNEL	7
3.0	OPERATION OVERVIEW	8 8
4.0	METHODS4.1 Schedule	
5.0	PROGRAM ACTIVITIES AND RESULTS	
6.0	CLOSURE	11
7.0	REFERENCES	12
Figure	LIST OF FIGURES e 1.1 Area map for Hampden K-41 in EL1165A	6
	LIST OF TABLES	
	4.1 Timeline of daily vessel activities with a brief description	

LIST OF APPENDICES

APPENDIX A: Operations
APPENDIX B: Observer Effort
APPENDIX C: Detections



1.0 INTRODUCTION

ExxonMobil Canada Ltd. (EMCL) contracted Wood Environment & Infrastructure Solutions Canada Limited (Wood), to conduct marine mammal and sea turtle monitoring and mitigation during vertical seismic profiling (VSP). VSP activities were conducted under the 2022 Eastern Newfoundland Offshore Exploration Drilling Project – EL 1165A Marine Mammal Monitoring Plan (the Plan) (EMCL 2022). The project area is located in the Flemish Pass off the Eastern Grand Banks of Newfoundland at Hampden K-41 in EL1165A (formerly located within EL 1134) in 2022 (Figure 1.1). The water depth of the Hampden K-41 wellsite is 1,180 m.

Monitoring for marine mammals and sea turtles during VSP operations is a requirement under ExxonMobil's EIS (EMCP 2017). The Plan was designed and conducted to fulfill requirements outlined in the "Geophysical, Geological, Environmental and Geotechnical Guidelines" (C-NLOPB 2019), the "Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment" (SOCP) (DFO 2012), and the Eastern Newfoundland Offshore Exploration Drilling Project EIS Decision Statement issued under the *Canadian Environmental Assessment Act*, 2012; Condition 3.9 (CEA Agency 2019). Condition 3.9 states:

"The Proponent shall develop, in consultation with Fisheries and Oceans Canada and the Board, a marine mammal monitoring plan that shall be submitted to the Board at least 30 days prior to the commencement of any vertical seismic survey. The Proponent shall implement the plan during the conduct of vertical seismic surveys. As part of the plan, the Proponent shall:

- 3.9.1 develop and implement marine mammal observation requirements, including the use of passive acoustic monitoring, or equivalent technology, and visual monitoring by marine mammal observers throughout vertical seismic surveys;
- 3.9.2 ensure that observation requirements specify the requirement for shut down of the seismic sound source if any marine mammal or sea turtle is observed within the 500 metre safety zone; and
- 3.9.3 submit the results of the activities undertaken as part of the marine mammal observation requirements to the board within 60 days of the end of the vertical seismic surveys."

The scope of work included monitoring the safety zone using both visual observations and real-time passive acoustic monitoring (PAM). As outlined in the Plan, mitigations (including a delay in the start-up or shutdown of the sound source) would be implemented should any marine mammal or sea turtle entered the safety zone during VSP operations.

The following report summarizes the monitoring program and events during the EL1165A VSP program.



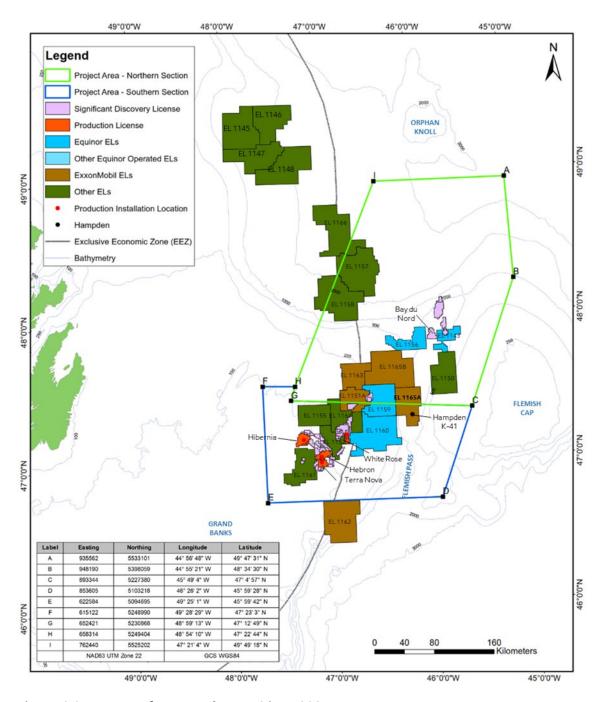


Figure 1.1 Area map for Hampden K-41 in EL1165A



2.0 PERSONNEL

As outlined in the Plan, the monitoring team consisted of 2 MMOs and 2 PAM operators. All monitoring (MMO and PAM) was conducted aboard the vessel *MV K. J. Gardner*. The monitoring team was comprised of Wood and Edgewise technical staff. Shore support consisted of Wood and JASCO personnel. The monitoring team consisted of the following personnel:

Wood

Lara Miles Team Lead/ Marine Mammal Observer

Daniel Windeler Passive Acoustic Monitor

Edgewise

Teresa Best Marine Mammal ObserverDevin Saunders Passive Acoustic Monitor

The following shore personnel were involved in the shore support, mobilization, and demobilization of the VSP monitoring program:

ExxonMobil Canada Limited

Derek Sullivan Exploration SSHE Lead

Wood

Kevin Baldwin Project Manager

Andrew Peddle Logistics

JASCO

Dr. Katie Kowarski Technical Advisor



3.0 OPERATION OVERVIEW

3.1 Mobilization/Demobilization

The mitigation team mobilized on July 28, 2022 and joined the *MV Maersk Mobilizer* (Table 4.1). Pre-boarding COVID-19 screenings were conducted by Cougar Helicopters. The mitigation team returned to St. John's on the *MV Paul A. Sacuta* on August 6, 2022. JASCO and Wood equipment was removed from the vessel and transported to Wood's warehouse on August 8, 2022.

3.2 Health and Safety

A hazard assessment and Health and Safety Plan was developed for the VSP monitoring program. These documents identified potential hazards associated with project activities, mitigation measures, and any residual risk. The Health and Safety Plan was reviewed by all personnel from Wood and Edgewise, which included all work instructions and safe operating procedures.

3.3 Communications

The MV K. J. Gardner maintained scheduled communications with onshore personnel and Stena Forth personnel via e-mail. JASCO personnel were available for technical support during VSP operations. Daily status updates were sent by the Wood team lead outlining departure and return dates, program progress, projected timelines, and sea state conditions. Updates were sent to the following personnel:

Wood

Kevin Baldwin Project Manager



4.0 METHODS

During VSP, one airgun array was deployed by crane from the drilling installation with an estimated duration of 12 hours. Marine mammal observers (MMO) and PAM operators would monitor the safety zone from the MV K. J. Gardner.

The crew of the MV K. J. Gardner were responsible for the vessel operations and the assisting with the deployment and retrieval of the passive acoustic equipment including hydrophones under the direction of Wood personnel. The vessel captain had authority in matters of safety and the duty officer ensured the vessel was travelling within the PAM and MMO directed specifications. The survey specifications included towing the PAM hydrophones on a 2 km long transect offset 750 m from the airgun array. The hydrophones were approximately 480 m behind the vessel at 40 m water depth.

Wood personnel were responsible for the setup, deployment, and retrieval of the passive acoustic equipment. The team lead was responsible for the overall implementation of the VSP marine mammal and sea turtle monitoring plan. The PAM operators (Wood and Edgewise personnel) were responsible for the acoustically monitoring the 500-m safety zone and the MMOs (Wood and Edgewise personnel) were responsible for visually monitoring the safety zone and communicating with the gunners on the *Stena Forth*.

4.1 Schedule

Table 4.1 Timeline of daily vessel activities with a brief description.

Date	Description
28-07-2022	Mobilization and Departure, Mitigation team joins the MV Maersk Mobilizer
29-07-2022	In transit to the Stena Forth
29-07-2022	Mitigation team transferred to the MV K. J. Gardner via the Stena Forth (transferred via frog)
30-07-2022	PAM gear transferred to MV K. J. Gardner from the MV Avalon Sea via the Stena Forth
31-07-2022	JASCO PAM equipment setup and deployed, communications established with the
	Schlumberger Wireline engineers, VSP commenced
01-08-2022	VSP completed at approximately 0000, PAM gear retrieved and stowed for transport
05-08-2022	Mitigation team transferred to the MV Paul A. Sacuta via the Stena Forth, Begin Transit to St.
	John's
06-08-2022	Transit and Arrival in St. John's Harbour and Demobilization
08-08-2022	PAM equipment transported to Wood facilities



5.0 PROGRAM ACTIVITIES AND RESULTS

VSP operations occurred from 31 July 2022 to 1 August 2022. As outlined in the Plan, a 500-m safety zone was monitored for marine mammals and sea turtles using both visual and acoustic monitoring during VSP operations. VSP operations occurred during both day and night periods. Approximately 2 hours occurred after daylight hours when only PAM was used to monitor the safety zone.

There were four detections of marine mammals during the VSP program. Northern bottlenose whales and short-beaked common dolphins were visually observed during VSP operations (3 separate detections). A pod of unidentified dolphins was detected acoustically. As per the Plan, biological shutdowns would be implemented if any marine mammal or sea turtle species entered the safety zone during VSP operations. Mitigation was required twice during VSP operations (See Section 5.1). Table 5.1 is a summarization of all detections during VSP operations.

Table 5.1 Real-time Marine mammal detections during the EL1165A Hampden K-41 VSP 2022 Program

Date	Species	Detection Method	Number of Individuals	Range of animal to airgun array (metres)	Mitigation Required	Comment
31/07/22	Northern Bottlenose Whale	Visual	2	300	Yes	Soft start stopped due to marine mammals in the safety zone
31/07/22	Short-Beaked Common Dolphin	Visual	7	250	Yes	Soft start stopped due to marine mammals in the safety zone
31/07/22	Northern Bottlenose Whale	Visual	2	1400	No	
31/07/22	Unidentified Dolphin	Acoustic	a	800	No	

^a Exact number of animals detected acoustically could not be determined due to overlapping acoustic signals from dolphin pods and distance from the hydrophone.

5.1 Biological Shutdowns

Two biological shutdowns occurred during the soft start (i.e., slow ramp-up of power) of the guns at the start of VSP operations. Both were detected visually by the MMO on duty. Soft start began at 16:30 UTC, the first encounter began at 16:51 UTC. Two Northern bottlenose whales entered the safety-zone at 16:51 UTC. The MMO on duty alerted the gunners to shutdown the guns. The whales appeared curious, came alongside the *MV K.J. Gardner* and then proceeded towards the guns. The whales dove and resurfaced at 17:20 (UTC). The closest distance to the guns was 300 m. The two whales left the safety zone at 17:54 UTC (as determined by visual monitoring) and pre-watch recommenced at this time. A second biological shutdown occurred during the



second soft start when a pod of Short-beaked common dolphins (n=7) entered the safety zone. The MMO on duty notified the gunners to shutdown the guns. The pod was in transit, moving quickly (porpoising) through the safety zone. The pod entered the safety zone at 18:14 UTC and left the mitigation zone at 18:15 (as determined by visual monitoring). They continued to transit out of the area quickly. The VSP program was resumed as soon as possible following the shutdown.

6.0 CLOSURE

This report has been prepared for the exclusive use by EMCL. The project was conducted using standard practices by qualified Wood staff and in accordance with verbal and written requests from the client.

Yours sincerely,

Wood Environment & Infrastructure Solutions Canada Limited

Prepared by:

Lara Miles, MSc.

Biologist

Reviewed by:

Michael Teasdale, MSc.

Senior Biologist



7.0 REFERENCES

- CEA Agency (Canadian Environmental Assessment Agency). 2019. Decision statement issued under Section 54 of the Canadian Environmental Assessment Act, 2012
- C-NLOPB (Canada-Newfoundland and Labrador Offshore Petroleum Board). 2019. Geophysical, Geological, Environmental and Geotechnical Guidelines.
- DFO (Fisheries and Oceans Canada). 2012. Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment. Accessed April 2022. http://dfompo.gc.ca/oceans/publications/seismic-sismique/index-eng.html
- EMCL (ExxonMobil Canada Ltd.). 2022. 2022 Eastern Newfoundland Offshore Exploration Drilling Project EL 1165A Marine Mammal Monitoring Plan. File Code CAEL-EF-OOPRO-01-006-5002-000
- EMCL (ExxonMobil Canada Ltd.). 2017. Eastern Newfoundland Offshore Exploration Drilling Project Environmental Impact Statement. https://www.ceaa-acee.gc.ca/050/documents/p80132/121318E.pdf



APPENDIX A: OPERATIONS

wood.

27 September 2022

-																		
	Regulatory	Ship/ platform name	Date	Reason for	Time soft	Time of	Time of	Time of	Time of	Time	Time pre-	Time	Time	Time	Depth	Was it day	Was any	Comments
	reference			firing	start/	full power	start of	end of	reduced	airguns/	shooting	search	PAM	PAM	range	or night in	mitigating	
	number				ramp-up	(UTC)	line (UTC)	line (UTC)	output	source	search	ended	began	ended		the period	action required?	
					began				(UTC) (if	stopped	began	(UTC)	(UTC)	(UTC)		prior to		
					(UTC)				relevant)	(UTC)	(UTC)					firing?		
	EL1165A	K.J. Gardner/ StenaForth	2022-07-31	I	16:30					16:51			11:21		d	d	у	NBW came alongside Stena, All stop
	EL1165A	K.J. Gardner/ StenaForth	2022-07-31	I	18:06					18:14					d	d	у	SBCD in transit through mitigation zone
	EL1165A	K.J. Gardner/ StenaForth	2022-07-31	I	18:16	18:45	18:45								d	d	n	No other mitigations need during VSP
	EL1165A	K.J. Gardner/ StenaForth	2022-08-01	I				2:40						2:40				



APPENDIX B: OBSERVER EFFORT



Demoteters	Ship/ platform name	Date	Mana	Observer's / operator's	Irima at	Time of	Source	los	Start	Start	Start	Start	Start	Depth of	desa	End	End	End	End	End	Depth of	04	Miland	Wind	Sea state	Cours II	Marie IIIe	· Io	Precipitatio	C
reference	Snip/ piatiorm name	Date		name(s)	start of	end of			position -			position						position -			water at		direction		Sea state			glare	n	Comments
number			or	nume (s)	section of	f section of				north/		minutes			degrees					east/		vessel		(Beaufort				(visual		1
			PAM?		watch	watch			latitude	south		Ionaltud			latitude		south	longitude				(knots))			only)	watch		1
					(UTC)	(UTC)		lautade	iuutuuc	5000	longituut	longituu		(metres)	iuutuuc	iutituuc	Journ	iongitado	iongituuc		(metres)	(101013)		,			Jy,	only)		1
EL1165A	K.J. Gardner/ StenaForth	2022-07-3	1 v	Teresa Best	10:45	11:45	n	47	0.23	n	46	49.94	w	1000.0	47	0.23	n	46	49.94	w	1000.0	1.5	w	3	8	0	a	n n		
EL1165A	K.J. Gardner/ StenaForth	2022-07-3	1 v	T. Best	11:45	12:07	n	47	0.23	n	46	49.94	w	1000.0	46	59.81	n	46	52.79	w	1000.0	1.8	w	4	8	0	a	n	_	
EL1165A	K.J. Gardner/ StenaForth	2022-07-3	1 v	T. Best	12:07	12:46	n	46	59.81	n	46	52.79	w	1000.0	47	0.28	n	46	50.94	w	1000.0	2.2	w	3	8	0	a	n	_	i
EL1165A	K.J. Gardner/ StenaForth	2022-07-3	1 v	T. Best	12:46	13:28	n	47	0.28	n	46	50.94	w	1000.0	47	0.05	n	46	52.74	w	1000.0	2.3	sw	3	8	0	g	sb	n	i e
EL1165A	K.J. Gardner/ StenaForth	2022-07-3	1 v	T. Best	13:28	14:13	n	47	0.05	n	46	52.74	w	1000.0	47	0.24	n	46	50.96	w	1000.0	1.9	sw	3	s	0	g	sf	n	1
EL1165A	K.J. Gardner/ StenaForth	2022-07-3	1 v	T. Best	14:13	14:27	n	47	0.24	n	46	50.96	W	1000.0	47	0.61	n	46	51.91	w	1000.0	2.2	SW	4	8	0	g	sb	n	ı
EL1165A		2022-07-3		Lara Miles	14:27	15:40	n	47	0.61	n	46	51.91	w	1000.0	46	59.92	n	46	52.55	w	1000.0	2.2	sw	4	8	0	g	sf	n	
EL1165A	K.J. Gardner/ StenaForth	2022-07-3	1 v	T. Best	15:40	16:30	s	46	59.92	n	46	52.55	w	1000.0	47	0.12	n	46	51.52	w	1000.0	2.1	w	4	8	0	g	sb	n	1
EL1165A	K.J. Gardner/ StenaForth	2022-07-3	1 v	T. Best	16:30	16:51	n	47	0.12	n	46	51.52	w	1000.0	46	59.95	n	46	52.68	w	1000.0	2.1	w	4	s	0	g	sb	n	shut down NBW and Dolphins inside the zone
EL1165A	K.J. Gardner/ StenaForth	2022-07-3	1 v	T. Best	16:51	18:06	n	46	59.95	n	46	52.68	w	1000.0	46	59.95	n	46	52.68	w	1000.0	2.3	sw	4	s	0	g	sb	n	1
EL1165A	K.J. Gardner/ StenaForth	2022-07-3	1 v	T. Best	18:06	18:16	s	46	59.95	n	46	52.68	W	1000.0	47	0.14	n	46	51.50	w	1000.0	2.3	SW	4	8	0	g	sb	n	1
EL1165A	K.J. Gardner/ StenaForth	2022-07-3	l v	L. Miles	18:16	18:45	8	47	0.14	n	46	51.50	W	1000.0	47	0.39	n	46	50.67	w	1000.0	2.2	sw	4	8	0	g	sb	n	1
EL1165A	K.J. Gardner/ StenaForth	2022-07-3	1 v	L. Miles	18:45	19:50	f	47	0.39	n	46	50.67	w	1000.0	47	0.49	n	46	52.07	w	1000.0	1.0	SW	4	8	0	g	sb	n	1
EL1165A		2022-07-3	1 v	T. Best	19:50	20:20	f	47	0.49	n	46	52.07	W	1000.0	47	0.33	n	46	50.68	w	1000.0	2.0	w	4	8	0	g	sb	n	ı
EL1165A		2022-07-3		L. Miles	20:20	21:30	f	47	0.33	n	46	50.68	W	1000.0	47	0.06	n	46	51.81	w	1000.0	2.2	SW	4	8	0	Р	sb	n	Lost sight of Stena due to fog
EL1165A		2022-07-3	1 v	T. Best	21:30	22:30	f	47	0.06	n	46	51.81	w	1000.0	47	0.01	n	46	52.16	w	1000.0	2.0	sw	4	8	0	р	n	1	l .
EL1165A		2022-07-3	1 v	T. Best	22:30	23:00	f	47	0.01	n	46	52.16	w	1000.0	47	0.02	n	46	51.91	w	1000.0	1.9	sw	5	8	0	р	n	1	l .
EL1165A	K.J. Gardner/ StenaForth	2022-07-3		Daniel Windeler	11:21	14:30	n	47	0.16	n	46	50.77	w	1000.0	47	0.19	n	46	51.38	w	1000.0	1.5	w	3	8	0				l
EL1165A		2022-07-3		Devin Saunders	14:30	16:30	n	47	0.19	n	46	51.38	w	1000.0	46	59.92	n	46	52.58	w	1000.0	1.7	w	3	8	0			n	.
EL1165A		2022-07-3		D. Saunders	16:30	16:51	s	46	59.92	n	46	52.58	w	1000.0	47	0.13	n	46	51.53	w	1000.0	2.2	SW	3	8	0		\perp	n	.
EL1165A		2022-07-3	1 p	D. Saunders	16:51	18:06	n	47	0.13	n	46	51.53	W	1000.0	47	0.17	n	46	52.84	w	1000.0	2.3	SW	3	S	0			n	Visual detection in safety zone
EL1165A		2022-07-3	1 p	D. Saunders	18:06	18:14	s	47	0.17	n	46	52.84	w	1000.0	47	0.05	n	46	52.04	w	1000.0	1.8	SW	3	8	0			n	1
EL1165A		2022-07-3	1 p	D. Saunders	18:14	18:16	n	47	0.05	n	46	52.04	w	1000.0	47	0.10	n	46	51.76	w	1000.0	2.1	sw	3	8	0		\perp	n	Visual detection in safety zone
EL1165A		2022-07-3		D. Saunders	18:16	18:45	S	47	0.10	n	46	51.76	w	1000.0	47	0.39	n	46	50.67	w	1000.0	2.2	sw	3	8	0		\perp	n	L
EL1165A		2022-07-3	1 p	D. Saunders	18:45	2:30	f	47	0.39	n	46	50.67	w	1000.0	47	0.14	n	46	51.38	w	1000.0	1.5	SW	3	8	0		\perp	n	1
EL1165A		2022-08-0	1 p	D. Windeler	2:30	2:41	f	47	0.14	n	46	51.38	w	1000.0	47	0.35	n	46	50.92	w	1000.0	2.0	sw	3	8	0			n	L
EL1165A	K.J. Gardner/ StenaForth	2022-08-01	1 p	D. Windeler	2:41	2:41	n	47	0.35	n	46	50.92	w	1000.0	47	0.35	n	46	50.92	w	1000.0	2.0	sw	3	s	0			n	



APPENDIX C: DETECTIONS



Ship/ platform name	Sighting number	Acoustic detection number		start of encounter	encounter	animals	were the animals first detected	Observer's/ operator's name	Position - degrees latitude	minutes	north/	degrees	Position - F minutes e longitude v	ast/	Water depth (metres)	Species or species group	Description		Range of animal (metres)	number	of adults (visual	Number of juveniles (visual sightings only)	of calves	Photograp h taken	Behaviour (visual sightings only)	of travel (relative	of travel (compass points)	source activity when animals first	activity when animals last detected	animals entered the mitigation/ exclusion tone (if	animals left the mitigation/ exclusion zone (if relevant)	distance of	approach (UTC)	observed of distance of during of soft start of (if (relevant)	distance d	bserved wa istance uring oft start f elevant)	p d a s	of lo power- pr down (if and/ or re shut- do	
K.J. Gardner/ StenaForth	1 1		2022-07-31	16.51	17:54	٧	٧	Teresa Best	47	0.12	n	46	51.52	w	1000.0	N. Bottlenose Whale	brownish colouring, bulbous melon, beaks, sickle shaped dorsal, small blow	110	100	2	2			n	curious, came in alongside ship then travelled towards guns on the Stena Forth. Blows seen surfacing, dove and resurfaced at 1720 UTC	t	sw	s	n	16.51	17:54	300	16:54		300	300	s	63	
K.J. Gardner/ StenaForth	2		2022-07-31	18:14	18:16	v		Teresa Best	46	59.95	э	46	52.68	w	1000.0	Short Beaked Common Dolphin	tall dorsal, yellow from eye to flank, thick tall stock	150	1250	7	7			у	in transit through mitigation zone porpoising fast	0	ne	9	n	18:14	18:15	250	18:15		250		9	2	
K.J. Gardner/ StenaForth	3		2022-07-31	20.20	20:20	v		Lara Miles	47	0.33	п	46	50.68	w	1000.0	N. Bottlenose Whale	brown, sickle dorsal, bulbous forehead		100	2	2			n	swimming at surface	s	9	1	f			1400					n		
K.J. Gardner/ StenaForth		500	2022-07-31	22:32		4	9	Devin Saunders	46	59.96	n	46	52.53	w	1000.0	Unidentified Delphinid	Throughout the time of detection sponadic upsweep, downtweep, s- shaped and sinusoidal whistles were detected aurally and on the specingram. Most of the whistles were ranged etween 8-16 kitz lasting 0.5		600	1				у		٧	var		f			800	22:39				n		