



**POSEIDON Bird and Marine Mammal Aerial Surveys for the
Southwest Celtic Sea**

Natural England

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Survey Report: January – March 2024 (seasonal)

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Revision and Amendment Register

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1. Introduction

Natural England contracted APEM Ltd (APEM) to undertake a second-year programme of four seasonal aerial digital surveys within the South-West Celtic Sea (Figure 1), commencing October 2023. This programme will repeat the four year-one seasonal aerial digital surveys of the same study area completed by APEM from 2022 – 2023. The purpose of the surveys is to provide information on the distribution and abundance of birds and marine megafauna within the Survey Area.

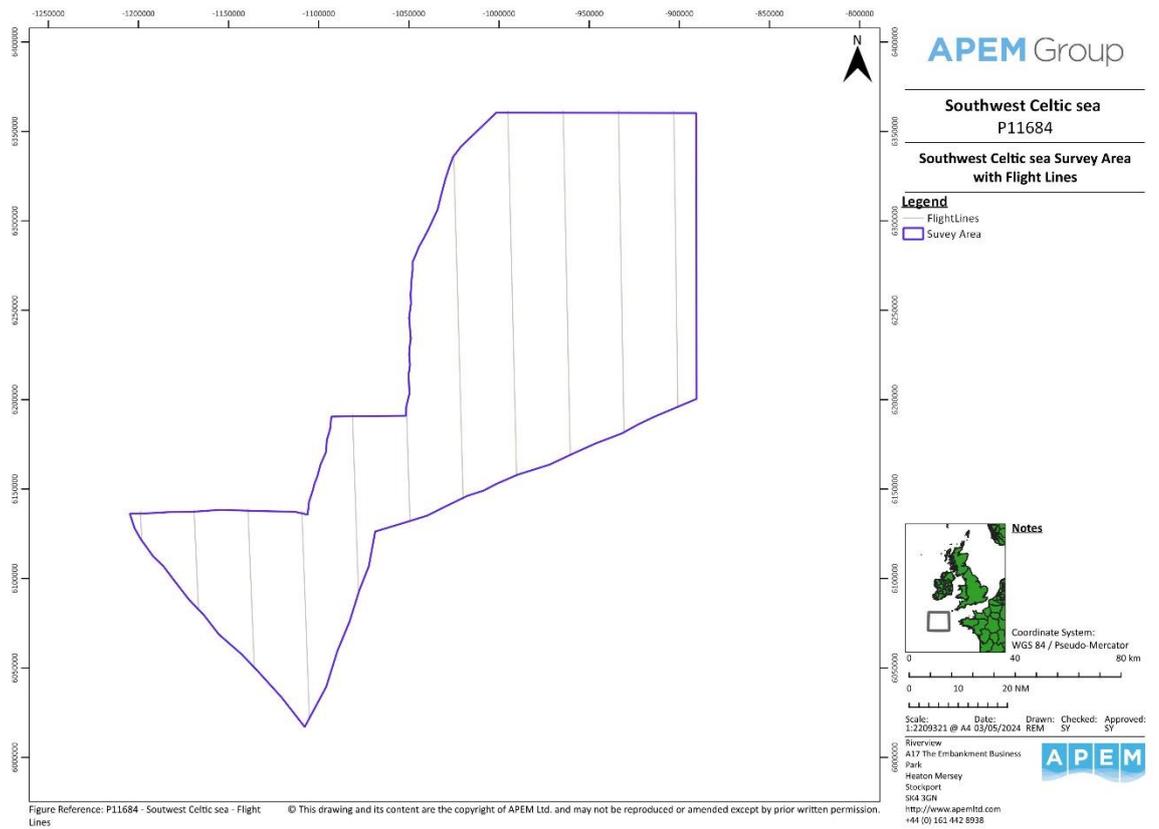


Figure 1 Location of the SW Celtic Sea Survey Area

2. Summary of Survey

The second year two (January to March 2024 seasonal) aerial survey was undertaken across two days. Surveys occurred over two flights on the 21st of March 2024 and a single flight on the 14th of April 2024 using Vulcanair P68 twin-engine survey aircraft. Patches of low cloud obscured several lines on the initial survey day on 21st of March. It was agreed that a partial re-survey of the affected lines would be undertaken at the next available opportunity. Due to an extended period of poor weather, the re-survey was undertaken on the 14th of April (Figure 2). The survey involved high-resolution digital still image collection using a GPS-linked bespoke flight management system to ensure tracks were flown with a high degree of accuracy.

The survey comprised 11 transects orientated in an east-west direction and the aircraft capturing imagery at approximately 1.5 cm Ground Sampling Distance (GSD) with a survey altitude of 1,300 ft. Lines 5, 6, 7 and 8 were flown at altitudes down to 1,200 ft to avoid clouds. This altitude is within specified tolerance limits. All survey lines were completed.

On the 21st of March, two planes were used to survey lines 1 to 5 (take off at 10:03, landing at 17:01), and 6 to 11 (take off at 09:56, landing at 16:08), respectively. The initial attempt to survey line 1 was unsuccessful due to the flight system crashing and issues with the GPS. These issues were fixed and the line re-flown. However, some nodes across lines 1, 3, 4, 5, 7, 8 and 9 were obscured by cloud, preventing capture of suitable imagery. To capture the remaining nodes, one plane undertook a re-fly on the 14th of April, of survey lines 1, 3, 4, 5, 6, 7, 8 and 9 (take off at 11:25, landing at 17:05). A total 6,388 image nodes were captured, and the approximate coverage was calculated to be 3.26% captured.

On the 21st of March, clouds were few to overcast (10-100% cloud cover). Visibility was between 1 km and greater than 10 km throughout the survey. Winds of 5-13 knots (Beaufort Scale 2 to 5) blew from a southerly to west south-westerly direction and sea state was recorded as 1 (calm[rippled], wave height 0-0.1 m). Outside air temperature was 8-10°C. Turbidity was 0-1 (clear to slightly turbid).

On the 14th of April, clouds were few to broken (10-90% cloud cover). Visibility remained between 9 km and greater than 10 km throughout the survey. Winds of 4-8 knots (Beaufort Scale 2) blew from a west south-westerly to north-westerly direction and sea state was recorded as 1 to 2 (Calm [Rippled] to smooth, wave height 0-0.5m). Outside temperature was 7-8°C. Turbidity was 1 (slightly turbid).

A summary of weather descriptions is given in Table 3. Weather details are recorded by air crew during surveys. Sea state and turbidity were visually estimated. Temperature and wind speed were recorded using the aircraft instruments.

No health and safety issues were reported during the survey.

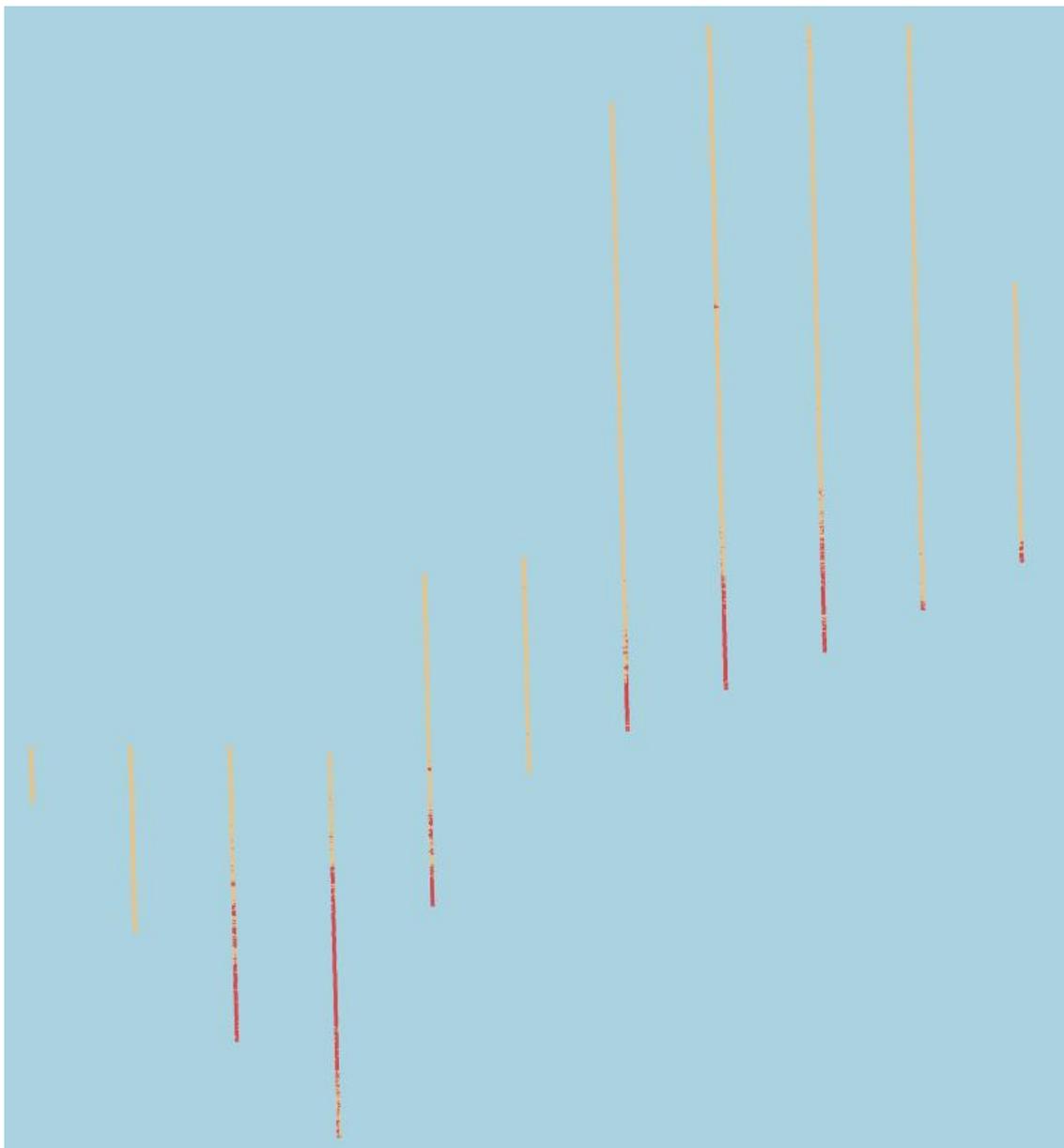


Figure 2 Nodes captured during the initial survey on 21/03/2024 (orange), and those missed due to low cloud, which were subsequently captured on 14/04/2024 (red).

Table 1 Summary of image capture and other observations during survey flight 1 (21/03/2024) and survey flight 2 (14/04/2024)

Survey line	Survey flight*	N cameras capturing images	N image nodes	Camera issues**	Shipping observations	Anecdotal observations	Health and Safety issues
1	1	3	708	Cloud on the line. Flight system crashed and issues with the GPS. The affected half of the line was re-flown.	-	-	-
	2		41	-	-	-	
	Total		749	-	-	-	
2	1	3	829	-	-	-	-
	2		N/A	-	-	-	
	Total		829	-	-	-	
3	1	3	701	Cloud on the line	-	-	-
	2		187	-	-	-	
	Total		888	-	-	-	
4	1	3	781	Cloud on the line	-	-	-
	2		160	-	-	-	
	Total		941	-	-	-	
5	1	3	771	Cloud on the line. Flown at 1,225 ft.	-	-	-
	2		120	-	-	-	
	Total		891	-	-	-	
6	1	3	308	Cloud on the line. Flown at altitudes from 1,200 ft to 1,300 ft	-	-	-
	2		N/A	-	-	-	
	Total		308	-	-	-	
7	1	3	270	Cloud on the line. Flown at 1,200 ft.	-	-	-
	2		201	-	-	-	
	Total		471	-	-	-	

8	1	3	155	Cloud on the line. Flown at 1,200 ft.	-	-	-
	2		392	-	-	-	-
	Total		547	-	-	-	-
9	1	3	136	Cloud on the line	-	-	-
	2		284	-	-	-	-
	Total		420	-	-	-	-
10	1	3	265	-	-	-	-
	2		N/A	-	-	-	-
	Total		265	-	-	-	-
11	1	3	79	-	-	-	-
	2		N/A	-	-	-	-
	Total		79	-	-	-	-

*Low cloud cover on the 21st of March obscured part of lines 1, 3, 4, 5, 7, 8 and 9. A successful re-survey of the affected nodes was undertaken on the 14th of April. Nodes captured and other observations on each line on the initial survey flight on the 21st of March are indicated as Survey flight 1. Those captured on the follow-up flight on the 14th of April are indicated as Survey flight 2.

**Due to the vast number of capture points collected during a survey it is not uncommon for camera systems to sometimes miss capture points. Typically, the number of missed capture points is low and random across the site. APEM collected additional data to ensure the required coverage was captured. Additionally, APEM's onboard camera technician monitored data as it was being captured. Surveys are aborted or lines re-surveyed if camera issues impact data collection.

Table 2 Summary of survey conditions during the initial survey flight (21/03/2024) denoted as Survey line x, and the follow-up flight (14/04/2024) denoted as Survey line x (2)

Survey line*	Date	Time on line (start / end)	Ground Speed (knts)	Cloud cover (%)	Visibility (km)	Outside temperature (°C)	Wind speed (knts)	Wind direction	Sea state (Douglas)	Turbidity
1	21/03/2024	14:59 / 15:55**	113	50	8	8	6	240°	1	0
1 (2)	14/04/2024	15:32 / 15:34	125	50	>10	7	8	270°	1	1
2	21/03/2024	14:09 / 14:51	115	60	8	8	6	240°	1	0
3	21/03/2024	13:33 / 14:02	114	90	2 to 8	8	5	180°	1	0
3 (2)	14/04/2024	15:10 / 15:17	120	30	>10	7	8	270°	1	1
4	21/03/2024	12:45 / 13:22	115	80	8	10	10	170°	1	0
4 (2)	14/04/2024	14:55 / 15:01	123	10	>10	8	7	250°	1	1
5	21/03/2024	12:02 / 12:38	120	90	1	8	10	170°	1	0
5 (2)	14/04/2024	14:43 / 14:47	121	20	>10	8	8	270°	1	1
6	21/03/2024	14:23 / 14:35	128	100	>10	8	13	270°	1	0-1
7	21/03/2024	13:55 / 14:13	119	20	>10	8	13	270°	1	0-1
7 (2)	14/04/2024	14:21 / 14:28	122	20	>10	8	5	300°	1	1
8	21/03/2024	13:20 / 13:40	123	100	>10	8	6	180	1	0-1
8 (2)	14/04/2024	13:55 / 14:10	120	10	9	8	4	300°	2	1
9	21/03/2024	12:52 / 13:08	121	10	>10	8	13	270°	1	0-1
9 (2)	14/04/2024	13:35 / 13:44	120	90	9	8	5	320°	2	1
10	21/03/2024	12:34 / 12:44	124	15	>10	8	12	250°	1	0-1
11	21/03/2024	12:17 / 12:20	120	10	>10	8	12	250°	1	0-1

*Lines resurveyed on the 14th of April are indicated with (2) after the line number.

**The initial survey of line 1 on the 23rd of March did not capture all nodes due to a flight system crash and GPS issues, and part of the line was immediately re-flown. The time on line is therefore longer than usual.

3. Shipping Observations

No vessels were observed from the aircraft.

4. Anecdotal Observations

No anecdotal observations were made.

5. Appendices

Table 3 Explanation of weather conditions

Wind (Beaufort Scale)			Douglas Sea State			Cloud cover (%)		Turbidity	
Scale	Description	Mean wind speed (knots)	Scale	Description	Wave height	% Cover	Description	Scale	Description
0	Calm	0	0	Calm (glass)	No wave	0	Clear	0	Clear
1	Light air	2	1	Calm (rippled)	0 – 0.10 m	1-10	Few	1	Slightly Turbid
2	Light breeze	5	2	Smooth	0.10 – 0.50 m	11-50	Scattered	2	Moderately Turbid
3	Gentle breeze	9	3	Slightly Moderate	0.50 – 1.25 m	51-95	Broken	3	Highly Turbid
4	Moderate breeze	13	<i>Surveys not typically flown at sea states > 3.</i>			96-100	Overcast		
5	Fresh breeze	19	4	Moderate	1.25 – 2.50 m				
6	Strong breeze	24							
7	Near gale	30							
8	Gale	37							