



RV Investigator Voyage Plan

VOYAGE #:		IN2023_V05
Version Number:	1.0	
Voyage title:	Untangling the causes of change over 25 years in the southeast marine ecosystem	
Mobilisation:	Hobart, Tasmania, Friday 23 June – Sunday 25 June, 2023	
Pre-medical clearance period:	Hobart, Tasmania, Monday 26 June – Tuesday 27 June, 2023	
Depart:	08:00 @ PW04, Hobart, Tasmania, Wednesday 28 June, 2023	
Return:	08:00 @ PW04, Hobart, Tasmania, Sunday 30 July, 2023	
Demobilisation:	Monday 31 July, 2023	
Voyage Delivery Coordinator:	David Flynn	
Voyage Manager:	David Flynn	
Chief Scientist:	Rich Little	
Affiliation:	CSIRO	

Scientific objectives

This project will repeat the surveys to document changes and establish a new biological and environmental baseline to help answer three broad questions:

1. How and why have fish assemblages and species abundances changed in the southeast ecosystem, and can the causes be mitigated?
2. How does this affect the multiple-use management of the region, particularly conservation and biodiversity management of Australian Marine Parks and the hive of activity from fisheries, oil & gas, and renewable energy sectors?
3. What are the implications for marine spatial planning and adaptive management in the sectors that use the marine ecosystem?

Voyage objectives

Our sampling protocol is driven by the effects that we have hypothesised to explain apparent trends in fish abundance. These impacts include changes that have occurred to the benthic habitat (H1: habitat modification hypothesis), changing food webs (H2: habitat hypothesis); water column (H3: climate hypothesis), and fishery catch. They are not independent of each other and can operate either directly on the species or indirectly through the supporting habitats and associated trophic systems.

We will work 2 shifts of 12-hours (7:00 - 19:00) to collect data on the demersal fish community composition, benthic habitat, water column, and prey fields.

The day shift will be responsible primarily for demersal fish trawl processing. We will also be casting CTDs for estimating the prey fields.

The night shift will conduct habitat analysis using the Deep Towed Camera. It will also sample the water column for small pelagic fish and micro-nekton.

An important part of our sampling will also be directed toward collecting samples for eDNA analysis. This will be done using CTD casts, during the day and night shifts. CTDs will also be used to record plankton samples, and for understanding the ocean dynamics, including climate variables.

The project is also committed to maximising research benefit and impact for Parks Australia in their monitoring needs for the Flinders and Freycinet marine parks in the Southeast marine park network. We are planning to spend 4 days and nights conducting non-extractive sampling in the marine parks. Within the marine parks we will be using the DTC to measure benthic habitat on reefs and sediments. During the day, we will spend collecting extractive trawl samples outside of the Parks.

Voyage Risk Assessment (VRA)

The MNF, in consultation with the science party and other relevant stakeholders, have developed a comprehensive Voyage Specific Risk Assessment (VSRA) to ensure voyage risks are identified and appropriately controlled. This voyage has undergone a comprehensive risk assessment process.

Media Activities

No specific media has been planned for this voyage, however the chief scientist and science party will work closely with the MNF communications adviser to publish relevant articles, as appropriate, throughout the voyage.

Activity plan for first 24-48 hours of voyage

Monday 26 June:

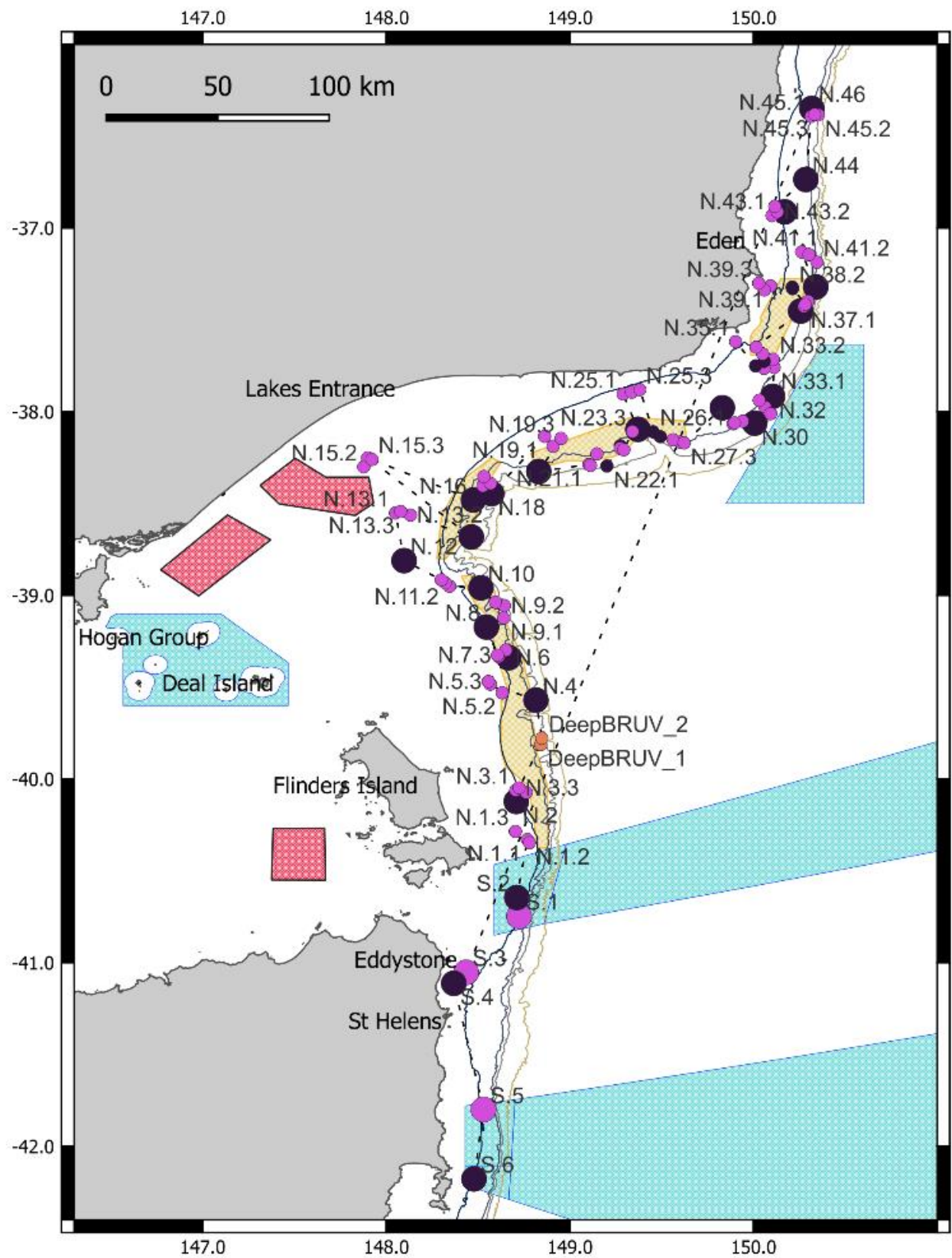
- 1030: ASP Seagoing Induction all participants @ Forward Lounge/Mess
- 1300: Voyage Manager Briefing @ Aft Lounge all participants
- 1400: All muster emergency drill @ 02 Deck, with warm clothing, helmet, boots and lifejacket
- 1500: ABF Clearance all participants
- 1530: Senior Management Team meeting @ Bridge (Master, Senior Crew, Chief Scientist and Voyage Manager)
- 1600: CTD Sampling training & planning discussion @ Hydrochem Lab

Tuesday 27 June:

- ~0930: Depart PW04 for Selfs Point Bunkering Fuel
- 1000: Lab Inductions starting @ Dirty Wet Lab
- 1100: CTD Sampling training & planning discussion @ Hydrochem Lab
- 1300: DAP Intro Session @ Forward Lounge: internet connectivity, data processing, printing etc.
- 1400: Mammoth Net Toolbox Talk @ Rear Deck (Claire Davies, FO, SIT, CIR, CM)
- 1530: Clothilde presenting Science Talk @ Aft Lounge (from ashore), 'Oceanography of our sample area'

Voyage track example

Figure 1. Proposed IN2023_V05 Voyage Track with Commonwealth Marine Park boundaries shown in blue.



Waypoints and stations

The following time estimates are based on a steaming speed of 10 knots.

SITE	DEGREES DECIMAL MINUTES LATITUDE	DEGREES DECIMAL MINUTES LONGITUDE	DISTANCE (NM)	TOTAL DISTANCE (NM)	STEAMING TIME (HRS)	TOTAL STEAM (HRS)
ETD Princes Wharf 04 Hobart 0800hrs	42° 53.186'S	147° 20.323'E	0.0	0	0	0
Tranmere	42° 54.311'S	147° 22.727'E	2	2	0.4	0.4
Blackmans Bay	43° 00.665'S	147° 21.605'E	6	9	1.3	1.7
Storm Bay	43° 12.711'S	147° 30.781'E	14	22	1.4	3.1
GSM Backscatter Cal. #4 Start	43° 16.542'S	147° 50.100'E	15	37	1.5	4.5
GSM Backscatter Cal. #4 End	43° 16.620'S	147° 56.082'E	4	41	0.4	5.0
S.1	40° 44.790'S	148° 43.380'E	156	197	15.6	20.6
S.2	40° 38.664'S	148° 42.636'E	6	203	0.6	21.2
N.1.1	40° 19.727'S	148° 46.131'E	19	222	1.9	23.1
N.1.2	40° 20.765'S	148° 46.777'E	1	224	0.1	23.2
N.1.3	40° 17.091'S	148° 42.198'E	5	229	0.5	23.7
N.2	40° 07.304'S	148° 42.487'E	10	239	1.0	24.7
N.3.1	40° 03.614'S	148° 42.323'E	4	242	0.4	25.1
N.3.2	40° 04.312'S	148° 45.731'E	3	245	0.3	25.3
N.3.3	40° 02.850'S	148° 43.383'E	2	247	0.2	25.6
DeepBRUV_1	39° 48.714'S	148° 50.454'E	15	262	1.5	27.1
DeepBRUV_2	39° 46.632'S	148° 50.832'E	2	264	0.2	27.3
N.4	39° 34.176'S	148° 48.900'E	13	277	1.3	28.6
N.5.1	39° 28.992'S	148° 33.986'E	13	290	1.3	29.8
N.5.2	39° 31.784'S	148° 37.871'E	4	294	0.4	30.2
N.5.3	39° 28.102'S	148° 33.355'E	5	299	0.5	30.7
N.6	39° 20.322'S	148° 40.053'E	9	308	0.9	31.7
N.7.1	39° 19.971'S	148° 36.681'E	3	311	0.3	31.9
N.7.2	39° 17.841'S	148° 39.070'E	3	314	0.3	32.2
N.7.3	39° 19.526'S	148° 36.366'E	3	316	0.3	32.5
N.8	39° 10.330'S	148° 32.709'E	10	326	1.0	33.4
N.9.1	39° 07.368'S	148° 38.369'E	5	331	0.5	34.0

SITE	DEGREES DECIMAL MINUTES LATITUDE	DEGREES DECIMAL MINUTES LONGITUDE	DISTANCE (NM)	TOTAL DISTANCE (NM)	STEAMING TIME (HRS)	TOTAL STEAM (HRS)
N.9.2	39° 03.322'S	148° 38.579'E	4	335	0.4	34.4
N.9.3	39° 02.164'S	148° 35.668'E	3	338	0.3	34.6
N.10	38° 57.515'S	148° 30.924'E	6	344	0.6	35.2
N.11.1	38° 57.000'S	148° 20.700'E	8	352	0.8	36.0
N.11.2	38° 55.900'S	148° 19.300'E	2	353	0.2	36.2
N.11.3	38° 54.900'S	148° 18.000'E	1	355	0.1	36.3
N.12	38° 48.620'S	148° 05.805'E	11	366	1.1	37.5
N.13.1	38° 33.030'S	148° 03.054'E	16	382	1.6	39.0
N.13.2	38° 33.732'S	148° 07.890'E	4	386	0.4	39.4
N.13.3	38° 32.565'S	148° 04.706'E	3	388	0.3	39.7
N.14	38° 40.881'S	148° 27.792'E	20	408	2.0	41.7
N.15.1	38° 16.650'S	147° 50.946'E	38	446	3.8	45.5
N.15.2	38° 17.988'S	147° 52.618'E	2	448	0.2	45.6
N.15.3	38° 15.571'S	147° 55.292'E	3	451	0.3	46.0
N.16	38° 28.811'S	148° 28.471'E	29	480	2.9	48.9
N.17.1	38° 21.798'S	148° 30.108'E	7	487	0.7	49.6
N.17.2	38° 19.500'S	148° 34.272'E	4	491	0.4	50.0
N.17.3	38° 21.179'S	148° 31.905'E	3	494	0.3	50.2
N.18	38° 26.726'S	148° 34.461'E	6	500	0.6	50.8
N.19.1	38° 08.012'S	148° 51.718'E	23	523	2.3	53.1
N.19.2	38° 11.262'S	148° 54.502'E	4	527	0.4	53.5
N.19.3	38° 08.673'S	148° 57.133'E	3	530	0.3	53.9
N.20	38° 19.504'S	148° 49.807'E	12	542	1.2	55.1
N.21.1	38° 17.202'S	149° 06.225'E	13	556	1.3	56.4
N.21.2	38° 17.494'S	149° 06.684'E	0	556	0.0	56.5
N.21.3	38° 13.711'S	149° 08.826'E	4	560	0.4	56.9
N.22.1	38° 17.694'S	149° 12.098'E	5	565	0.5	57.3
N.22.2	38° 11.110'S	149° 16.456'E	7	572	0.7	58.1
N.23.1	38° 11.900'S	149° 16.500'E	1	573	0.1	58.2
N.23.2	38° 12.400'S	149° 17.600'E	1	574	0.1	58.3
N.23.3	38° 06.450'S	149° 20.450'E	6	581	0.6	58.9
N.24	38° 05.745'S	149° 22.207'E	2	582	0.2	59.1

SITE	DEGREES DECIMAL MINUTES LATITUDE	DEGREES DECIMAL MINUTES LONGITUDE	DISTANCE (NM)	TOTAL DISTANCE (NM)	STEAMING TIME (HRS)	TOTAL STEAM (HRS)
N.25.1	37° 54.229'S	149° 17.373'E	12	594	1.2	60.3
N.25.2	37° 53.575'S	149° 20.192'E	2	597	0.2	60.5
N.25.3	37° 52.773'S	149° 22.855'E	2	599	0.2	60.7
N.26.1	38° 06.507'S	149° 27.199'E	14	613	1.4	62.1
N.26.2	38° 08.132'S	149° 29.571'E	2	615	0.2	62.4
N.27.1	38° 09.900'S	149° 36.010'E	5	621	0.5	62.9
N.27.2	38° 09.167'S	149° 33.733'E	2	623	0.2	63.1
N.27.3	38° 10.150'S	149° 37.330'E	3	626	0.3	63.4
N.28	37° 58.695'S	149° 49.812'E	15	641	1.5	64.9
N.29.1	38° 03.921'S	149° 53.317'E	6	647	0.6	65.5
N.29.2	38° 03.095'S	149° 56.429'E	3	649	0.3	65.8
N.29.3	38° 03.610'S	149° 53.754'E	2	651	0.2	66.0
N.30	38° 03.714'S	150° 00.367'E	5	657	0.5	66.5
N.31.1	37° 58.416'S	150° 03.720'E	6	663	0.6	67.1
N.31.2	38° 00.613'S	150° 05.607'E	3	665	0.3	67.4
N.31.3	37° 56.250'S	150° 01.850'E	5	671	0.5	67.9
N.32	37° 54.956'S	150° 06.236'E	4	674	0.4	68.3
N.33.1	37° 45.500'S	150° 06.700'E	9	684	0.9	69.2
N.33.2	37° 42.900'S	150° 06.400'E	3	686	0.3	69.5
N.33.3	37° 45.800'S	150° 03.400'E	4	690	0.4	69.9
N.34.1	37° 43.561'S	150° 03.477'E	2	692	0.2	70.1
N.34.2	37° 45.000'S	150° 00.650'E	3	695	0.3	70.3
N.35.1	37° 37.100'S	149° 54.150'E	9	704	0.9	71.3
N.35.2	37° 41.064'S	150° 03.004'E	8	712	0.8	72.1
N.35.3	37° 38.874'S	150° 00.829'E	3	715	0.3	72.4
N.36	37° 27.096'S	150° 15.384'E	16	732	1.6	74.0
N.37.1	37° 25.550'S	150° 16.500'E	2	734	0.2	74.2
N.37.2	37° 23.900'S	150° 17.750'E	2	735	0.2	74.4
N.37.3	37° 24.950'S	150° 16.900'E	1	737	0.1	74.5
N.38.1	37° 19.300'S	150° 12.651'E	7	743	0.7	75.2
N.38.2	37° 19.750'S	150° 12.750'E	0	744	0.0	75.2
N.39.1	37° 18.900'S	150° 05.500'E	6	750	0.6	75.8

SITE	DEGREES DECIMAL MINUTES LATITUDE	DEGREES DECIMAL MINUTES LONGITUDE	DISTANCE (NM)	TOTAL DISTANCE (NM)	STEAMING TIME (HRS)	TOTAL STEAM (HRS)
N.39.2	37° 20.200'S	150° 03.500'E	2	752	0.2	76.0
N.39.3	37° 18.000'S	150° 01.700'E	3	754	0.3	76.3
N.40	37° 19.211'S	150° 20.340'E	15	769	1.5	77.8
N.41.1	37° 07.780'S	150° 15.706'E	12	781	1.2	79.0
N.41.2	37° 11.150'S	150° 20.700'E	5	786	0.5	79.5
N.41.3	37° 08.612'S	150° 18.108'E	3	790	0.3	79.8
N.42	36° 54.692'S	150° 10.163'E	15	805	1.5	81.3
N.43.1	36° 55.909'S	150° 06.054'E	4	808	0.4	81.7
N.43.2	36° 54.666'S	150° 07.773'E	2	810	0.2	81.9
N.43.3	36° 52.890'S	150° 06.964'E	2	812	0.2	82.1
N.44	36° 44.120'S	150° 17.102'E	12	824	1.2	83.3
N.45.1	36° 23.516'S	150° 18.818'E	21	845	2.1	85.3
N.45.2	36° 23.002'S	150° 21.139'E	2	847	0.2	85.5
N.45.3	36° 22.885'S	150° 19.962'E	1	848	0.1	85.6
N.46	36° 20.904'S	150° 19.039'E	2	850	0.2	85.8
Flinders MBES	40° 34.932'S	148° 43.409'E	265	1115	26.5	112.3
S.3	41° 03.126'S	148° 26.088'E	31	1146	3.1	115.4
S.4	41° 06.702'S	148° 22.044'E	5	1151	0.5	115.9
S.5	41° 47.934'S	148° 31.770'E	42	1193	4.2	120.1
S.6	42° 10.602'S	148° 28.662'E	23	1215	2.3	122.4
GSM Backscatter Cal. #4 End	43° 16.620'S	147° 56.082'E	70	1286	6.4	128.8
GSM Backscatter Cal. #4 Start	43° 16.542'S	147° 50.100'E	4	1290	0.4	129.1
Storm Bay	43° 12.711'S	147° 30.781'E	15	1305	1.1	130.3
Blackmans Bay	43° 00.665'S	147° 21.605'E	14	1318	1.0	131.2
Tranmere	42° 54.311'S	147° 22.727'E	6	1325	0.4	131.7
Hobart (CSIRO, TAS, AU) 0800hrs	42° 53.186'S	147° 20.323'E	2	1327	0.1	131.8

CTD Configuration

	PLEASE SELECT:
Fundamentals:	
Which CTD rosette to be used for this voyage (24 or 36 Niskin bottles):	36
Likely total number of casts:	75
Likely maximum depth of deepest cast:	500m
Standard CTD Configuration - Instrumentation (maximum 6 auxiliary channels plus 2 x DO) 6000 m 1 x SBE9+ (CTD) 2 x SBE3P Temperature Sensors 2 x SBE4C Conductivity Sensors 2 x SBE5T pumps 2 x SBE43 Dissolved Oxygen Sensors	Yes
1 x Tritech PA200/500 Altimeter	Yes
1 x Biospherical QCP2300HP PAR Sensor	Yes
1 x Wetlabs C-Star 25cm Transmissometer	Yes
1 x Wetlabs ECO FLCDRTD Fluorometer – CDOM (370/460nm)	Yes
1 x Wetlabs ECO FLBBRTD Fluorometer – Chlorophyll-a & BackScatter (2 x Channels - 470/695nm)	Yes
Alternative Instruments (Instruments highlighted in grey can be substituted from standard configuration):	
Seapoint Turbidity Meter – Nephelometer	No
Chelsea Aquatracka III (430/685nm) Fluorometer – Chlorophyll-a	No
Seabird SUNA – Ultraviolet Nitrate Analyzer (Serial Connection - 2000 m)	Yes
Standard LADCP Configuration – Instrumentation: 6000 m 1 x Teledyne 300 kHz LADCP (Slave - Up) 1 x Teledyne 150 kHz LADCP (Master - Down) 1 x 48V Deep Sea Battery	Yes
Alternative LADCP Configuration - Instrumentation: 6000 m 1 x Teledyne 300 kHz LADCP (Slave - Up) 1 x Teledyne 300 kHz LADCP (Master - Down) 1 x 48V Deep SeaBattery	No
Hydrochemistry Analyses:	
Salinity	Yes
Dissolved Oxygen	Yes
Nutrients: Nitrate	Yes
Nutrients: Phosphate	Yes

	PLEASE SELECT:
Nutrients: Silicate	Yes
Nutrients: Nitrite	Yes
Nutrients: Ammonia	Yes

Please note any special requests – such as special sampling that is intended to be performed by the science party (e.g. sampling for dissolved gases, radioisotopes, etc.); or any user-supplied instrumentation to be fitted to the CTD frame; etc.

Permits

- NOPSEMA – Confirmed not applicable.
- Marine Parks – PA2022-00143 Science Team Permit.
- Marine Parks – PA2020-00041-1 MNF South-East Network blanket permit, underway systems
- Animal Ethics – Approved AEC Application Number #2022-28
- AFMA – Approved #1005699
- Part 8a (Dept. Env.) for EPBC – Approved AU-COM2023-582

Signature

Your name	Rich Little
Title	Chief Scientist
Signature	
Date:	18 August 2023