

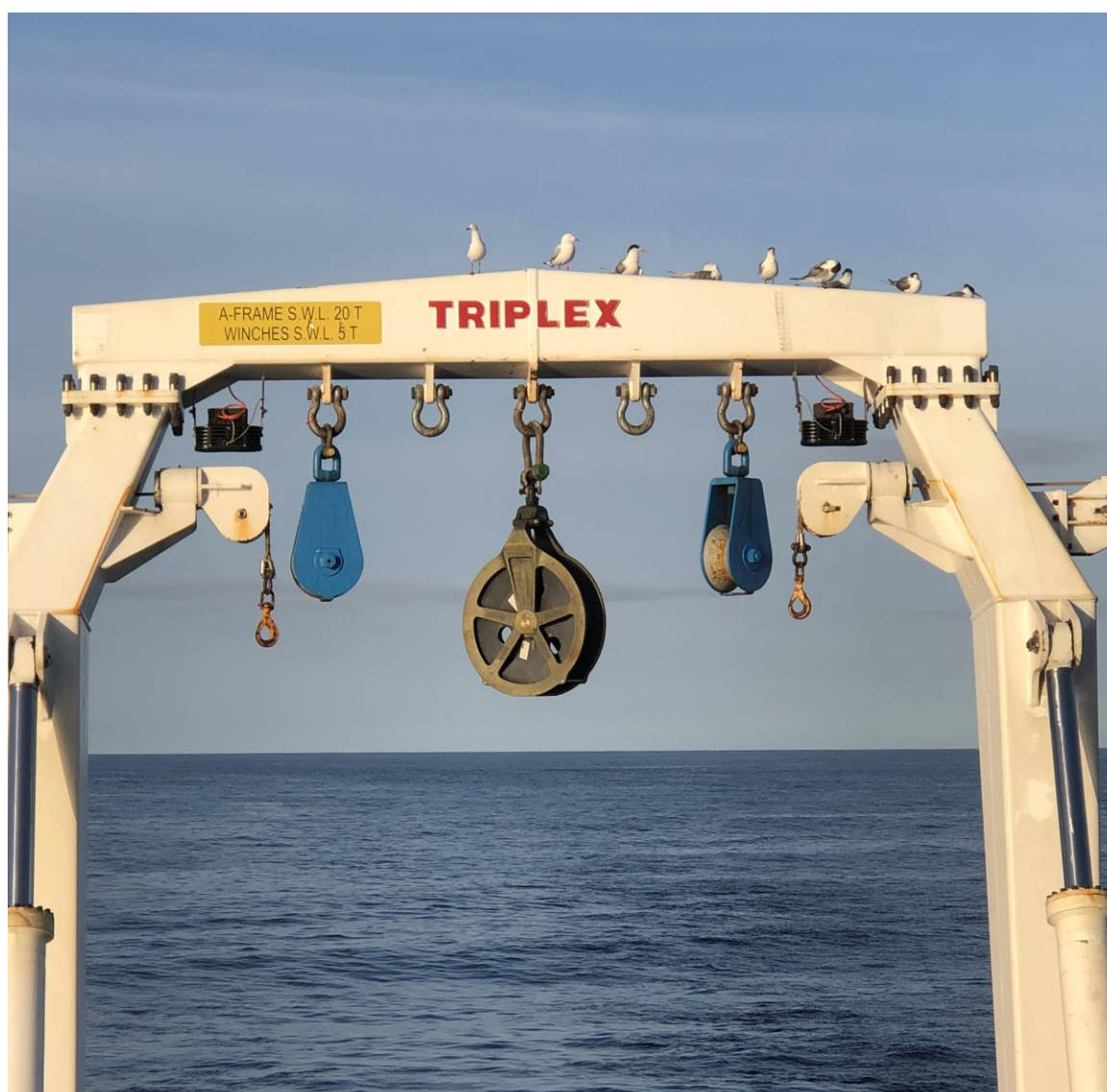


SEA-MES Project — Sampling and data overview

This compilation of factsheets gives an overarching summary of the samples and data collected for the [SEA-MES Project](#) over four Marine National Facility RV *Investigator* voyages (see Table below). Data sets will be published in due course through the CSIRO [Data Trawler](#) and the CSIRO Data Access Portal ([DAP](#)).

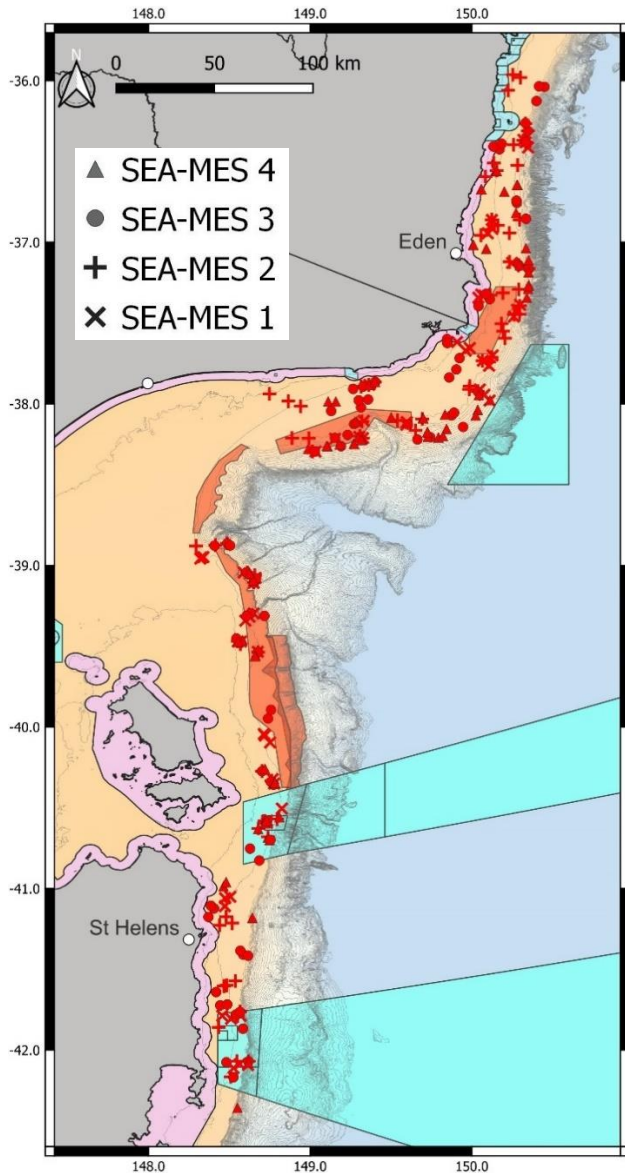
No.	Voyage	Year	start	end
1	IN2023_V05	2023	25-Jun	30-Jul
2	IN2024_V03	2024	1-May	31-May
3	IN2024_V05	2024	13-Nov	12-Dec
4	IN2025_V04	2025	27-May	28-Jun

General descriptions of the gears, including how they are used in the environment and the types of data obtained from sampling with them can be found in Untiedt et al. (2022): [Gears and methods used for scientific sampling in Australian Marine Parks: Values, benefits and impacts](#) | Australian Marine Parks | Parks Australia.



Trawl sampling

The SEA-MES program conducted a total of 284 demersal fish trawl operations over a total of 766 km, using the McKenna Market trawl at depths ranging from 45 m to 571 m. The map below shows the distribution of the trawl samples over the across the south-eastern continental shelf and upper slope of Australia, by voyage.



Specimen collection and sample processing

- Trawl operations were generally conducted during day-light hours, targeting unstructured seafloor.
- During the final voyage 13 day-night comparison trawls were conducted.
- For 126 of the 284 trawl operations, seafloor imagery was collected using a Headline Camera (HLC); images were taken at 5-second intervals.
- Catch sorting protocols included:

- Fish were euthanised in AQUI-S solution; most Chondrichthyans and Syngnathids were picked out and put in sea water recovery tanks for release.
- Chondrichthyan individuals were identified, sexed, measured, weighed and released. Representatives of species were photographed during measurement; a small number were retained for dissection.
- Bony fishes were sorted by species, identified, bulk-weighed and moved to the lab for biological processing: length/weight measurements, 50 fish per species (100 for selected species); dissection for tissue collection of target species.
- Invertebrates were sorted into broad classes and operational taxonomic units (OTUs), bulk-weighed and recorded; subsamples were retained for identification and future work.
- Selected fish and invertebrate specimens were retained for the Australian Fish Collection (ANFC) and the Australian Museum (AM).
- Photographs were taken of the sorted catches for future reference.



Catch data overview

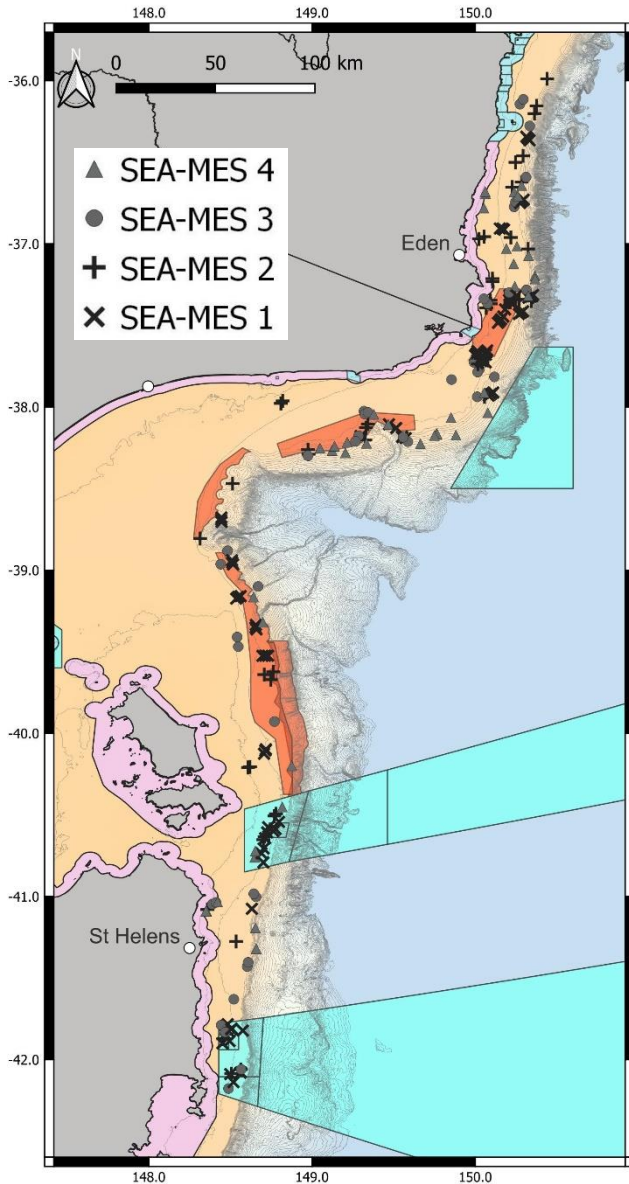
- Fishes:
 - 108,552 kg, 1,139,960 individuals.
 - 243 species, representing 174 genera and 115 families.
 - 54 Chondrichthyes, 188 Osteichthyes, 1 Agnatha
- Invertebrates:
 - 3,688 kg, ca. 32,807 individuals/ part colonies
 - 15 phyla, representing 46 broad groups and 274 OTUs.
 - Most abundant Phyla by weight and numbers: Arthropoda, Mollusca, Cnidaria, Porifera, Tunicata, Echinodermata.
- Fish biological processing:
 - 124,297 length and 127,017 weight measurements of 297 fish species were taken
 - Dissection of 42 fish species for collection of muscle tissue (8,991), otoliths (5,097), stomachs (14,687), gonads (4,739)

Gear description

- [Untiedt et al. \(2022\). Part III – 3. Trawls & Nets - Demersal Fish Trawl](#)

Deep Towed Camera sampling

The SEA-MES program conducted a total of 216 Deep Towed Camera (DTC) operations over 430 km tow distance and with a total sampling duration of 159 hours, using the MNF DTC platform. The map below shows the distribution of the DTC location over the across the south-eastern continental shelf and upper slope of Australia, by voyage.



Data collection and sample processing

- DTC operations were generally conducted at night time, targeting structured habitats.
- Imagery data collected by the MNF DTC consists of high-definition video and stereo still images (at 2-second intervals) of the seafloor, and a navigation data file with x,y,z coordinates and sensor readings at 1-second intervals.

- A novel [Open–Close Device to sample eDNA](#) was deployed attached to the DTC on 52 deployments.
- During the first three voyages videos were annotated for broad-scale physical and biotic habitat, in near-real time, and a report describing the habitats was generated shortly after each of these voyages (Untiedt et al. 2023, 2024a & b).
- During the first voyage, fishes were identified and counted in DTC still imagery at sea (see Untiedt et al. 2023)
- Seafloor still images were collected at 5-second intervals using a headline camera (HLC) mounted on the fish trawl (see previous page). These data are being annotated for broad-scale physical and biotic habitat to ensure visual coverage on trawl grounds.



DTC_DSP_IN2024_V05_186_20241203T095155Z_00007

Seafloor imagery overview

- The total imagery collection from SEA-MES voyages contains
 - 216 video files (mp4), one per DTC operations
 - ~216,000 still image pairs from 216 DTC operations
 - ~66,000 still images from 126 HLC (Trawl) operations
- Image annotations summary:
 - Broad-scale habitat from 135 DTC videos (surveys 1 to 3)
 - Broad-scale habitat from 31 HLC (Trawl) operations (annotation effort is continuing)
 - Fishes in still image from 60 DTC operations on survey 1
- The imagery will be published through the CSIRO Data Access Portal ([DAP](#)) under each Survey code; it will be made accessible through [Seamap Australia](#).

Gear description

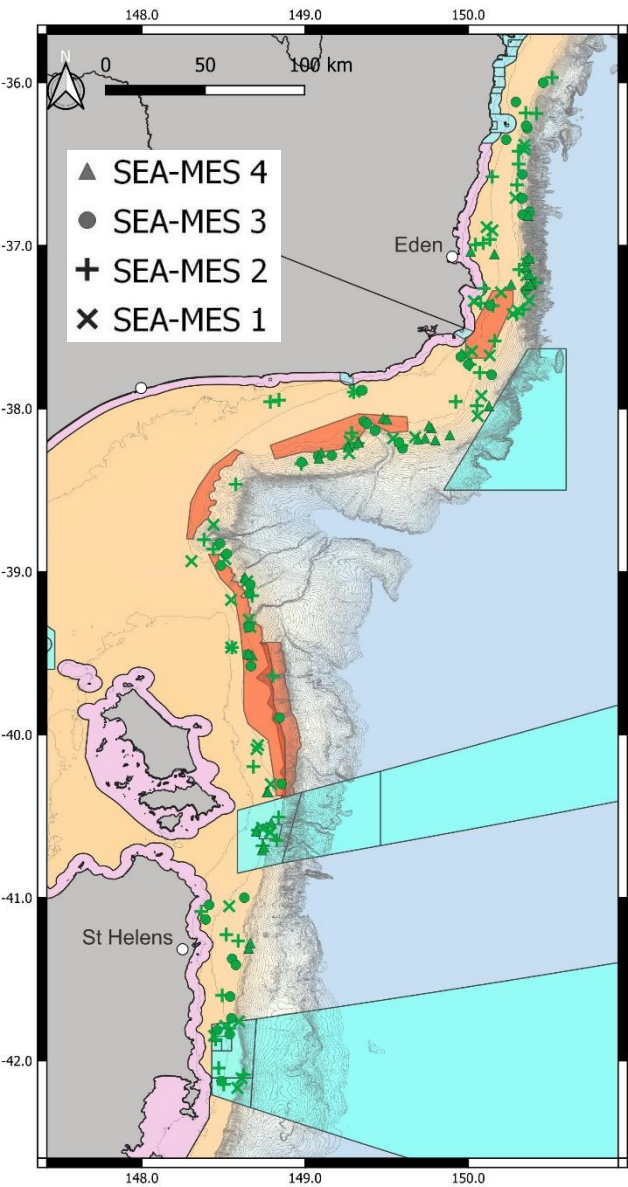
- [Untiedt et al. \(2022\). Part III – 10. Underwater imaging Platforms – Towed Camera](#)

References

- Untiedt C. et al. (2023). [IN2023_V05](#)
- Untiedt C. et al. (2024a). [IN2024_V03](#)
- Untiedt C. et al. (2024b). [IN2024_V05](#) (in prep)

Multi-Net sampling

The SEA-MES program conducted a total of 173 pelagic Multi-net operations with a total sampling duration of 116 hours, using a Hydrobios Mammoth multi-net. The map below shows the distribution of the multi-net samples over the across the south-eastern continental shelf and upper slope of Australia, by voyage.



Specimen collection and sample processing

- Multi-net sampling is deployed obliquely through the water column and has a multi-net opening/ closing cod-end system to take up to nine depth stratified samples.
- Samples were taken in the daytime and at night to capture information about diel vertical migration (DVM).
- The standard sampling regime used a 500 µm mesh net on the initial descent from the surface to 10 m off the

bottom, an integrated sample. On the ascent 100 µm mesh nets were used at defined depth strata to sample the water column. Each depth strata was towed for 3 – 5 minutes.

- On voyages 2, 3 and 4, 500 µm mesh nets were used for all nets on approximately every third operation. This was to sample larger zooplankton such as euphausiids and fish larvae. However, much of the biodiversity is lost through the coarser mesh.
- For the 100 µm (MultiN-100):
 - 143 operations were completed.
 - 560 depth stratified samples were collected.
 - The samples were split at sea, half was dried at 60°C for a biomass estimate, half was preserved in 10% formalin for community composition analysis.
 - The integrated sample was examined at sea and selected specimens were preserved for isotope analysis. The sample was not retained.
- For the 500 µm (MultiN-500):
 - 30 operations were completed on voyages 2 to 4.
 - 140 depth stratified samples were collected.
 - The sample was split, half was preserved in ethanol, half in 10% formalin.
 - The integrated sample was examined at sea and selected specimens were preserved for isotope analysis. The sample was not retained.

Catch data overview

- Biomass (mgm⁻³) is highly variable within each voyage, being greater in the northern regions and declines notably with depth.

	IN2023_V05	IN2024_V03	IN2024_V05	IN2025_V04
<25 m	19 ± 17	26 ± 8	35 ± 17	13 ± 8
25-50 m	15 ± 11	21 ± 9	31 ± 17	9 ± 2
50-100 m	10 ± 9	11 ± 5	14 ± 9	6 ± 2
100-150 m	7 ± 6	4 ± 1	6 ± 3	5 ± 2
> 150 m	4 ± 3	4 ± 3	5 ± 2	5 ± 2

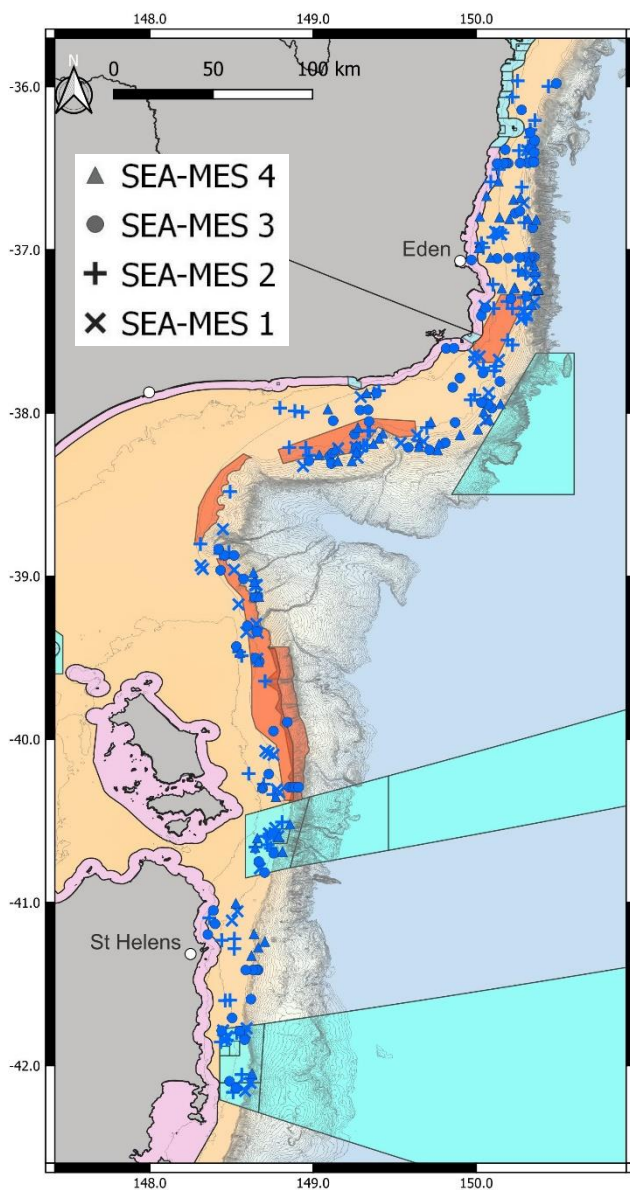
- Zooplankton composition
 - Analysis to date (158 samples) has identified 58,246 individuals from 105 genera and 70 different families, including 60 genera and 32 families of copepod.

Gear description

- [Untiedt et al. \(2022\). Part III – 3. Trawls & Nets – Plankton Nets](#)

CTD sampling

The SEA-MES program conducted a total of 296 Conductivity-Temperature-Depth (CTD) deployments, collecting hydrology measurements. During the morning CTD water samples were collected for pigments and flow cytometry (picoplankton) at the surface and deep chlorophyll maximum (DCM) and Particulate Organic Carbon (POC) samples at the surface or the DCM depending on the voyage. On voyages 3 & 4 phytoplankton samples were also collected at the surface and DCM. The map below shows the distribution of the CTD deployments across the south-eastern continental shelf and upper slope of Australia, by voyage.



Sample description & Summary

- Two or three CTD casts were performed in a 24 hour period and paired to trawl sites.

CTD sampling generated the following sample types:

- Hydrology data records
- eDNA samples (voyage 1 & 2 only) – Deagle et al. 2025.
- Nutrients etc.
- Pigments HPLC.
- Picoplankton flowcytometry surface & DCM.
- POC.
- Phytoplankton (Voyages 3 & 4 only).
- Surface and DCM pigments, flow cytometry and POC:
 - IN2023_V05 23 stations.
 - IN2024_V03 29 stations.
 - IN2024_V05 27 stations.
 - IN2025_V04 29 stations.

Gear description

- [Untiedt et al. \(2022\). Part III – 12. Other Sensors & Profilers](#)



References

- Data by Survey available from CSIRO Data Trawler: [Data Trawler](#).
- Deagle B. et al. 2025. <https://doi.org/10.25919/ngqx-3557>.

Acknowledgements and Permits

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Research was conducted under the CSIRO Wildlife, Livestock and Laboratory Animal Animal Ethics Committee (CWLLA AEC) permit **2022-28**

Fishing and research activities in:

- National Marine Parks were conducted under permits **PA2022-00143-1** & **AU-COM2023-582**
- Commonwealth waters were conducted under AFMA scientific Permits **1005699**, **1005949**, **1005950** & **1006269**
- State Waters of Victoria were conducted under permit number **10010701** & **RP1510**.
- State Waters of New South Wales were conducted under Fisheries - s37 Research Permit **FP23/7**
- State Waters of Tasmania were conducted under Scientific Research Permit **23026**

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