Jervis Bay Mussel Farming Modification Application (SSI-5657-Mod-1):

Underwater Cultural Heritage Assessment

Report prepared for Department of Primary Industries and Regional Development

February 2025

MTS Heritage Pty Ltd, Suite 1A 167-169 Macquarie Road, Springwood NSW 2777 ABN: 68668095458

Project Name:	Jervis Bay Mussel Farming Modification Application (SSI-5657-Mod-1): Underwater Cultural Heritage Assessment
Document Title:	Jervis Bay Mussel Farming Modification Application (SSI-5657-Mod-1): Underwater Cultural Heritage Assessment
Revision:	Final
Date:	03 February 2025
Client Name:	Department of Primary Industries and Regional Development
Author:	Chris Lewczak and Emily Pickering

MTS (Mountains) Heritage Pty Limited
ABN 68 668 095 458
1/167-197 Macquarie Road
Springwood NSW 2777
T +61 4 1246 8950
www.mtsheritage.com.au

Document history and status

Revision	*Date Issued*	*Description*	*Author*	*Reviewed*	*Date Comments received*
Draft	03 Feb 2025	Draft to Client	C. Lewczak and E. Pickering	F. Leslie	03 Feb 2025
Final	03 Feb 2025	Final to client	C. Lewczak	F. Leslie	

Contents

Tables

Plates

Figures

Executive Summary

NSW Department of Primary Industries and Regional Development (DPIRD) is proposing to relocate two existing mussel aquaculture leases 250m create a new lease within the waters of Jervis Bay. The establishment of these three leases would require the installation of 312 screw anchors into the seabed that would support the droplines where the blue mussels would be grown and harvested. These lease sites would be located within 11 m and 14 m of water and located entirely within NSW State Waters. The location of these three leases would be on flat sandy seabed away from any known seabed landscape features such as rock outcrops and reefs.

As part of the environmental approval process, DPIRD requires an underwater cultural heritage assessment to assess the potential impact the establishment of the new lease areas would have on known and potential Underwater Cultural Heritage (UCH) sites, including shipwrecks, aircraft and submerged or inundated Aboriginal sites or relics. This assessment includes the preparation of a predictive model of known Aboriginal heritage sites with an understanding of the seabed type and formations visible in the geophysical survey data. This report has also included consultation DPIRD has undertaken with relevant Aboriginal communities.

Historical research on the maritime history of the area indicates that the area was not developed until the 1840s. Prior to this, Jervis Bay had been visited by whaling ships, red ceder cutters and surveyors who were tasked with mapping potential locations of village settlements. Maritime infrastructure was concentrated around Currambene Creek. The failure of the growth of the township at present day Huskinson in the late 1850s lead to the creation of a shipbuilding industry at Currambene Creek. From the late 1890s onwards, it became the seaside recreational retreat from Sydney. Up until the 1890s, the preferred way to travel to Jervis Bay was predominately by ship.

Searches of the shipwreck and other underwater cultural heritage databases show that there are no known shipwrecks within the subject site. A review of the multibeam echo-sounding survey and of ROV data under and around the current lease areas shows the seabed is entirely ripple pale sand formations. There are no reef, rock or other seabed features present within the subject site. Review of the same ROV data shows that the installation of the screw anchors do not cause scouring or sediment buildup around their location. The droplines where the mussels are grown and harvested are held up off the seabed by buoys.

This assessment has concluded there is a low potential for shipwrecks, shipwreck material or other underwater cultural heritage articles to be present within the proposed locations of the lease areas within the subject site. No evidence of shipwrecks or other anomalies are present in these areas, with a low potential for undocumented and unknown shipwrecks . There is not expected to be any scouring that would occur after the installation of the screw anchors. The operation of the mussel aquaculture leases are also not expected to have any operational impacts on any known or potential UCH sites or articles within Jervis Bay.

Based on the results of this assessment, it is recommended that:

- No permit is required for this project under the UCH Act 2018, as the activity is not considered to ‘directly or indirectly physically disturb’ protected shipwrecks. A copy of this report will be provided to the DCCEEW maritime archaeologist and Heritage NSW maritime archaeologist for their review and endorsement and additional information included to satisfy their requirements.
- The unexpected finds procedure included as Section 8 of this report should be followed if potential underwater cultural heritage site or articles are unexpectedly identified during the establishment of the mussel farm leases.

1. Introduction

1.1 Project background

MTS Heritage Pty Ltd (Mountains Heritage) has been engaged by Department of Primary Industries and Regional Development (DPIRD) to prepare an Underwater Cultural Heritage (UCH) assessment for a State Significant Infrastructure Modification Application (SSI-5657-Mod-1) for the Jervis Bay Mussel Farms Relocation and Expansion in Jervis Bay on the NSW South Coast. DPIRD are working with the current lease holder, South Coast Mariculture, to partially relocate and expand three existing mussel leases, including:

- two leases in Callala Bay, which would move approx. 250m to the northwest and be expanded by 5ha, to cover a total of 25ha each; and
- one lease in Vincentia, which would move to Callala Bay and be expanded by 10ha to 20ha.

The specific design of the modification includes the installation of up to 312 screw anchors in the seabed to secure lines supported by buoy floats for the mussel farming operation. Existing screw anchors would remain in situ within the seabed. The proposal is entirely located within NSW State Waters, within Jervis Bay Marine Park.

Agency advice received from Department of Planning and Environment (DPE) has requested that a desktop Underwater Cultural Heritage (UCH) assessment be prepared for the modification project. DPE also noted the assessment must include a seabed survey undertaken by a suitably qualified maritime archaeologist in the form of a dive survey or remote sensing. DPE communicated that a Statement of Heritage Impact and a Maritime Archaeological Assessment (MAA) may be required if the UCH Assessment identifies known or potential UCH sites within the project area.

Based on the advice received from DPE, this desktop UCH assessment has been prepared to the standard of a MAA and includes an impact assessment based on the installation of new screw anchors and potential operational impacts to known and potential UCH. This approach aims to minimise any delay in having to prepare a second separate assessment at the conclusion of the UCH assessment, and includes all requirements requested by DPE including statements regarding potential for pollution from the mussel farming operation (biowaste) on known and potential UCH assessments in the area.

Consultation with the Jerrinja Local Aboriginal Land Council (LALC) had previously been undertaken for the original SSI application and approval process, as well as part of the previous Modification to the SSI. This application also included a recent AHIMS database search (August 2023). Mountains Heritage has reviewed the above and has considered nearby recorded terrestrial sites that have been recorded in similar landforms identified on the seabed; and existing Aboriginal community consultation. This information forms the basis of an archaeological predictive model for the potential for tangible Aboriginal cultural heritage to be present in the Project area.

The assessment follows the *Guidelines for preparation of a Statement of Heritage Impact* published by Department of Planning and Environment (2023), and relevant Commonwealth and professional guidelines prepared for Maritime Archaeological Assessments.

1.2 Site location

Jervis Bay is located approximately 190 km south of Sydney, NSW. The proposed relocation of two existing mussel aquaculture leases and the creation of a third would be located in the waters on the northwestern area of Jervis Bay, approximately 1.2 km southeast of Callala (hereafter referred to as the subject site). The proposed leases would be in a water depth of between 11 m and 14 m (Figure 1.1 and Figure 1.2).

1.3 Heritage status

This UCH assessment concentrates on maritime heritage items (State) that are known, or have the potential to be located, within the subject site. There are no known heritage listed shipwrecks or other UCH articles located with the subject site. There is one shipwreck lost in the greater Jervis Bay area, as well as two aircraft wrecks (see Section 2.3). At the time of preparing this assessment, there were no know shipwrecks located within the subject site (see Section 2.3).

The subject site is located wholly within State waters. Part of Jervis Bay is classified as Commonwealth waters; however, these works do not encroach on that designated area. This assessment has been undertaken following State Heritage legislation and guidelines. The Commonwealth UCH Act 2018 does include the provision of protection to shipwrecks within State waters, however, it does not include the protection of aircraft wrecks unless they are in Commonwealth waters (See Section 2). There are no provisions for the protection of submerged cultural landscapes within the UCH Act 2018 that apply to State waters.

1.4 Aims and scope

The following report aims to assess the heritage impact of the installation of the screw anchors associated with the new and relocated mussel aquaculture lease areas on known and potential heritage items identified within the subject site.

Preparation of the UCH assessment involved the following tasks:

- Review of previously acquired Aboriginal heritage information supplied by DPIRD, ROV survey transect data collected by South Coast Mariculture, and other relevant heritage listings or other management plans prepared for this project.
- Review of the existing geophysical survey information collected for the mussel aquaculture farm SSI Modification project to-date.
- Targeted historical research on the known and potential UCH resources in the subject site, including shipwreck, aircraft, sea dumping and other maritime resources within the subject site.
- Mapping of the location of known and potential sites based on the findings of the above and from historical plans to assess the potential impact of the new mussel farm leases for the Project;
- Preparation of a draft UCH report, including a detailed impact assessment, conclusions, and recommendations to assist the Project to avoid and/or mitigate impacts to known and potential UCH resources at the subject site, including:
  - Statements relating to the potential for impacts to potential tangible Aboriginal Cultural Heritage using the findings from the review of Aboriginal heritage data and consultation; and,
  - Potential for shipwrecks and other possible UCH resources at the subject site.
- Preparation of an unexpected finds procedure for the Project; and,
- Finalisation of the UCH assessment following the receipt of comments from DPI.

1.5 Submerged cultural landscape methodology

The methodology for predicting potential submerged landscapes and the potential for Aboriginal objects in a maritime environment in Australia continues to be developed. In NSW there are no guidelines for undertaking offshore submerged or inundated underwater cultural heritage assessments. There is Commonwealth guidance for the undertaking of offshore developments that can provide an expectation of what an assessment should include. This guidance, coupled with the NSW Aboriginal Cultural Heritage Assessment guidelines have been used to provide a methodology

for assessing submerged cultural landscapes in NSW, and the potential for Aboriginal objects to be present.

Draft Commonwealth '*Technical Guidelines on the Archaeological Assessment of First Nations Underwater Cultural Heritage in Commonwealth Waters'* have been released for public comment prior to their finalisation, which is anticipated in mid-2025 at the earliest. It is not the intention that this assessment to follow these guidelines as the subject site is located in State waters, and consultation with the Local Aboriginal Land Council have been ongoing since the original lodgement of the SSI. It is the intent of this assessment to outline the consultation that has been undertaken for this SSI and the outcomes of the consultation that have already been completed, and prepare a predictive model to further understand any potential for identified submerged landscapes.

The methodology includes an understanding of the seabed topography, including form and features. This understanding is developed from geophysical surveys, consisting of multibeam echo sounder (MBES).

Knowledge of Aboriginal cultural heritage sites in the area surrounding the subject site is also important, as the types of cultural heritage sites, including objects and their locations, are crucial for understanding spatial patterning. This helps inform the archaeological predictive model. The model is used to make statements regarding the Aboriginal archaeological potential in an area, on land or submerged, based on the types and locations of Aboriginal objects and other cultural heritage sites that have previously been recorded in the area surrounding the subject site.

From gaining an understanding of the seabed, including landforms and characteristics, creation of an Aboriginal archaeological predictive model, and from consultation with Aboriginal community groups, statements can be made regarding the archaeological potential for Aboriginal objects within the subject site.

1.6 Report outline

The following report includes:

- legislative background (Section 2)
- an Aboriginal archaeological context (Section 3);
- a summary history of the subject site (Section 4);
- a review of key project studies (Section 5);
- assessment of the significance of heritage items identified at the subject site (Section 6);
- an assessment of the potential impact of proposed works on identified heritage items (Section 7);
- conclusions and recommendations (Section 8); and
- an unexpected finds procedure (Section 9)

1.7 Authorship and acknowledgements

This report has been prepared by Emily Pickering (Graduate Archaeologist, Mountains Heritage) and Chris Lewczak (Principal Maritime Archaeologist, Mountains Heritage). Fiona Leslie (Principal Heritage Consultant, Mountains Heritage) reviewed the draft and final versions of the report.

We would like to acknowledge the assistance kindly provided by Ian Lyall, Program Leader Aquaculture - Fisheries and Aquaculture Management at DPIRD.

MOUNTAINS HERITAGE

Legend

- Proposed relocated and new lease areas
- Current Leases

Figure 1.1: General Location of Jervis Bay

0 2 4 6 8 10 km

Map Source: Google Earth

MOUNTAINS HERITAGE

Figure 1.2: Location of the mussel aquaculture leases within Jervis Bay

Legend

- Proposed relocated and new lease areas
- Current Leases

0 1 2 3 4 km

Map Source: Google Earth

2. Legislative context

The following report section provides a summary of environmental and heritage legislation relevant to the subject site.

2.1 Commonwealth legislation

Underwater Cultural Heritage Act 2018

The *Underwater Cultural Heritage Act 2018 (UCH (Cwlth) Act)* provides for the protection of Australia's underwater cultural heritage. The UCH Act is administered by the Department of Climate Change, Energy, the Environment and Water (DCCEEW). The UCH Act applies to both Australian waters and Commonwealth waters. Generally, Australian waters extend from the Territorial sea baseline, defined by the lowest astronomical tide line (LAT), out to the continental shelf (or specifically defined by treaties with other countries). Commonwealth waters extend seaward from State or Northern Territory coastal waters (3nm from the territorial sea baseline) out to the continental shelf (or specifically defined location).

For the purposes of this assessment, the subject site is located in Australian waters only.

The objectives of this Act are:

> *(a) to provide for the identification, protection, and conservation of Australia's underwater cultural heritage.*
>
> *(b) to enable the cooperative implementation of national and international maritime heritage responsibilities.*
>
> *(c) to promote public awareness, understanding, appreciation and appropriate use of Australia's underwater cultural heritage.*

The UCH Act provides automatic protection for certain articles of underwater cultural heritage that have been in Australian or Commonwealth waters for at least 75 years, including vessels and articles associated with the vessel. The Act also extends automatic protection to the remains of aircraft and associated articles that have been in Commonwealth waters for at least 75 years. For a vessel (in Australian waters) or aircraft (in Commonwealth waters) to be automatically protected, they must have entered the relevant waters at least 75 years ago or earlier. That is, the vessel or aircraft have had to enter the water in, or prior to, 1949 to be granted automatic protections under this Act. Vessels and aircraft wrecked in or after 1950, however, are not granted automatic protection.

Other articles of underwater cultural heritage, including submerged terrestrial Aboriginal sites, as well as vessels and aircraft sunk within the last 75 years, can be protected if the Minister is satisfied that the articles are significant. The criteria to be used to determine whether articles reach the threshold for protection have been published as part of a set of rules that accompany the Act.

Under Part 3, Division 2 of the UCH Act, a person must not undertake actions that have an *adverse impact* on protected underwater cultural heritage unless a permit has been granted. Under the act, *adverse impact* on protected underwater cultural heritage is if the conduct:

> (a) *directly or indirectly physically disturbs or otherwise damages the protected underwater cultural heritage; or*
>
> *(b) causes the removal of the protected underwater cultural heritage from waters or from its archaeological context.*

If an action is likely to have an adverse impact on an underwater cultural heritage site protected by the Act, a permit must be applied to the Minister of DCCEEW.

Under the UCH Act, the Minister is required to maintain a register of all articles that are protected under the Act. The Australasian Underwater Cultural Heritage Database (AUCHD) lists information relating to shipwrecks, submerged aircraft and other underwater cultural heritage automatically protected or declared by the Minister to be protected. As shipwrecks that have been in the Australian water from greater than 75 years are listed on the AUCHD, this would include shipwrecks that are listed in State waters and listed on relevant State shipwreck databases. The results of a search of this database are listed in Section 2.3.

Environment Protection and Biodiversity Conservation Act 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), proposed 'actions' that have the potential to significantly impact on matters of national environmental significance (MNES) or the environment of Commonwealth land, or 'actions' that are being carried out by a Commonwealth agency, require the approval of the Commonwealth Minister for the Environment and Water. Any approval that may be required under the EPBC Act is separate and in addition to State approval(s).

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) includes 'national heritage' as a matter of National Environmental Significance and protects listed places to the fullest extent under the Constitution. It also establishes the National Heritage List (NHL) and the Commonwealth Heritage List (CHL).

The following is a description of each of the heritage lists and the protection afforded to places listed on them.

Commonwealth Heritage List

The Commonwealth Heritage List (CHL) is established under the EPBC Act. The CHL is a list of properties owned by the Commonwealth that have been assessed as having significant heritage value. Any proposed actions on CHL places must be assessed for their impact on the heritage values of the place in accordance with *Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies (Significant Impact Guidelines 1.2)*. The guidelines require the proponent to carry out a self-assessment process to decide whether or not the action is likely to have a significant impact on the environment, including the heritage value of places. If an action is likely to have a significant impact an EPBC Act referral must be prepared and submitted to the Minister for approval.

National Heritage List

The National Heritage List (NHL) is a list of places with outstanding heritage value to Australia, including places overseas. Any proposed actions on NHL places must be assessed for their impact on the heritage values of the place in accordance with Management of National Environmental Significance (Significant Impact Guidelines 1.1). The guidelines require the proponent to carry out a self-assessment process to decide whether or not the action is likely to have a significant impact on a matter of National Environmental Significance, including the national heritage value of places. If an action is likely to have a significant impact an EPBC Act referral must be prepared and submitted to the Minister for approval.

Register of the National Estate

The Register of the National Estate (RNE) was formerly compiled as a record of Australia's cultural and Aboriginal heritage places worth keeping for the future. The RNE was frozen on 19 February 2007, which means that no new places have been added or removed since that time. From February 2012 all references to the RNE were removed from the EPBC Act. The RNE is maintained on a non-statutory basis as a publicly available archive.

The results of a search of the Australian Heritage Database are listed in Section 2.3 below.

2.2 New South Wales legislation

Environmental Planning & Assessment Act 1979 (EP&A Act)

The *Environmental Planning and Assessment Act 1979* (EP&A Act) provides the framework for environmental planning and assessment in NSW. It includes a requirement for impacts, or likely impacts, on historical heritage to be assessed as part of a project's environmental approval, and for Local Government Areas (LGAs) to prepare Local Environment Plans (LEPs) and Development Control Plans (DCPs) to provide guidance on the level of environmental assessment required.

Division 5.1 of the EP& A Act outlines the provisions for approval of activities and specifies the requirement for consideration of environmental impacts. Under Clause 5.5:

> *'(1) For the purpose of attaining the objects of this Act relating to the protection and enhancement of the environment, a determining authority in its consideration of an activity shall, notwithstanding any other provisions of this Act or the provisions of any other Act or of any instrument made under this or any other Act, examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity.'*

Preparation of this UCH assessment will inform an REF for the Project. It will determine the potential impact of the proposed mussel farm leases on heritage items identified within the subject site in accordance with the provisions of the EP& A Act.

Heritage Act of New South Wales (NSW) 1977

The *Heritage Act 1977* (Heritage Act) is a statutory tool designed to conserve environmental heritage in NSW. It is used to regulate development impacts on the State's historical heritage assets. The Act defines a heritage item as '*a place, building, work, relic, moveable object or precinct'*.

To assist management of the State's heritage assets, the Act distinguishes between items of Local and State heritage significance.

'*Local heritage significance', in relation to a place, building, work, relic, moveable object or precinct means significance to an area in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item'*

'State heritage significance', in relation to a place, building, work, relic, moveable object or precinct means significance to the State in relation to the historical scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item'.

As outlined in the following subsections, different parts of the Heritage Act are designed to protect and conserve heritage items.

State Heritage Register

Under Part 3A of the Heritage Act, the NSW Heritage Council is required to maintain a State Heritage Register (SHR). This register lists items of State heritage significance, as determined by the Heritage Council and/or the Minister. To list an item on the SHR, the Heritage Council must consider that the item satisfies more than one of the heritage assessment criteria in Section 4A of the Act.

Listing on the SHR controls activities such as alteration, damage, demolition and development. When a place is listed on the SHR, the approval of the Heritage Council of NSW is required for any major work.

Archaeological relics

Archaeological 'relics' are defined by the Heritage Act as:

'any deposit, artefact, object or material evidence that: (a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and (b) is of State or local heritage significance'

Part 6 Division 9 of the Heritage Act protects archaeological relics from being 'exposed, moved, damaged or destroyed' by the disturbance or excavation of land. This protection extends to the situation where a person has 'reasonable cause to suspect' that archaeological remains may be affected by the disturbance or excavation of the land. It applies to all land in NSW that is not included in the SHR.

Section 139 of the Act requires any person who knows, or has reasonable cause to suspect, that their proposed works will expose or disturb a 'relic' to first obtain an Excavation Permit from the Heritage Council of NSW (pursuant to section 140), unless there is an applicable exception (pursuant to Section 139(4)). If there is an exception, an Excavation Permit Exception Notification Form must be submitted and endorsed by Heritage NSW for places not listed on the SHR.

Section 146 of the Act requires any person who is aware or believes that they have discovered or located a relic must notify the Heritage Council of NSW providing details of the location and other information required.

It is one of the objectives of this report to determine if the new mussel farm leases could affect any potential archaeological relics within the subject site.

Protection of historic shipwrecks

Part 3C of the Heritage Act relates to the protection of shipwrecks within State waters. In NSW, a historic shipwreck means the remains of any ship that have been situated in State waters for 75 years or more, or that are the subject of a historic shipwrecks' protection order. Historic shipwrecks are protected under the Heritage Act and a Register of Shipwrecks is kept by the Heritage Council. It is noted that items not listed on the Register may still protected under the relics provisions of the Heritage Act (see 'Relics').

The protection afforded under the Heritage Act also extends to articles associated with a shipwreck including articles that formed part of, or had been installed on, or carried in, the ship, or constructed or used by a person associated with the ship.

Part 3C of the Act applies to shipwrecks and associated articles within State waters that are not the subject of an IHO or included, or within an area included, on the SHR. Under the Act, it is an offence to "move, damage or destroy" a shipwreck in NSW unless in accordance with a permit.

The Heritage Council of NSW is required to maintain a Register of Shipwrecks. This register contains particulars of each historic shipwreck protected, or afforded protection by the Minister. A search of this database was conducted for this project, and the results are detailed in Section 2.3.

Section 170 Heritage and Conservation Registers

Government agencies have responsibilities to manage their heritage assets under Section 170 of the Heritage Act. Section 170 requires agencies to identify, conserve and manage heritage assets owned, occupied or managed by that agency. Section 170 requires government agencies to keep a register of heritage items, which is called a Heritage and Conservation Register or more commonly, a s170 Register.

The Heritage Act obliges government agencies to maintain their assets with due diligence in accordance with State-Owned Heritage Management Principles approved by the Minister on the advice of the Heritage Council and notified by the Minister to government instrumentalities from time to time. Broad principles and guidelines for the management of State-owned heritage assets have been published by the NSW Heritage Office under s170 of the Act (NSW Heritage Office, 2004).

A search of the NSW Heritage databases, including the Register of Shipwrecks maintained by the Heritage Council, was conducted for this project, and the results are detailed in Section 2.3.

National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act), administered by the Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW), is the primary legislation for the protection of Aboriginal cultural heritage in NSW. The NPW Act gives the Director General responsibility for the proper care, preservation and protection of 'Aboriginal objects' and 'Aboriginal places', defined under the Act as follows:

- an *Aboriginal object* is any deposit, object or material evidence (that is not a handicraft made for sale) relating to Aboriginal habitation of NSW, before or during the occupation of that area by persons of non-Aboriginal extraction (and includes Aboriginal remains); and
- an *Aboriginal place* is a place declared so by the Minister administering the NPW Act because the place is or was of special significance to Aboriginal culture. It may or may not contain Aboriginal objects.

Part 6 of the NPW Act provides specific protection for Aboriginal objects and places by making it an offence to harm them and includes a 'strict liability offence' for such harm. A 'strict liability offence' does not require someone to know that it is an Aboriginal object or place they are causing harm to in order to be prosecuted. Defences against the 'strict liability offence' in the NPW Act include the carrying out of certain 'Low Impact Activities', prescribed in Clause 80B of the *National Parks and Wildlife Amendment Regulation 2010* (NPW Regulation), and the demonstration of due diligence.

An Aboriginal Heritage Impact Permit (AHIP) issued under Section 90 of the NPW Act is required if impacts to Aboriginal objects and/or places cannot be avoided. An AHIP is a defence to a prosecution for harming Aboriginal objects and places if the harm was authorised by the AHIP and the conditions of that AHIP were not contravened. Applications for an AHIP must be accompanied by assessment reports compiled in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011) and the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b). Applications must also provide evidence of consultation with the Aboriginal communities. Consultation is required under Part 8A of the NPW Regulation and is to be conducted in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a). AHIPs may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or person or specified types or classes of Aboriginal objects. Section 89A of the NPW Act requires notification of the location of Aboriginal sites within a reasonable time, with penalties for non-notification. Section 89A is binding in all instances.

2.3 Heritage database searches

Heritage items and places are recorded on statutory and non-statutory registers held at the Commonwealth, State and local level, depending on their level of significance. Commonwealth managed heritage includes the AUCHD administered under the UCH Act 2018, and the National Heritage List (NL) and the Commonwealth Heritage List (CHL), both administered by the EPBC Act. Items on the ACHD, NHL and CHL, as well as World Heritage items in Australia, are recorded on the Australian Heritage Database, currently administered by the DCCEEW.

State heritage places and items are registered on the SHR. The SHR is a searchable online database that records all State heritage items and places and their curtilages. Associated with the SHR is the State Heritage Inventory (SHI), an online database that records some local heritage items and items owned by State statutory authorities. Section 170 of the *Heritage Act 1977* requires all statutory authorities to advise NSW DCCEEW of their heritage assets for recording on the SHI.

The Maritime Heritage Database is also administered under the *Heritage Act 1977* and contains the information about shipwrecks, submerged aircraft, other maritime underwater cultural heritage sites and relics protected in NSW waters.

The following table summarises the results of heritage register searches conducted on 30 October 2024.

Australasian Underwater Cultural Heritage Database

A total of 29 vessels are listed on the AUCHD as being lost in Jervis Bay (Table 2-1). Further investigation into these listings identified two (2) plane wrecks on the database that has a low potential to be **near** the subject site (bolded in the table). This is based on the limited information that is available relating to the vessels wrecking event.

Table 2-1: Summary of underwater cultural heritage listed as lost off or in Jervis Bay

AUCHD	Name	Vessel type	Year lost	Where lost
34	Aeolus		1867	Jervis Bay, Hole in the Wall
42	Agnes		1883	Jervis Bay, off
137	Atacama		1898	Jervis Bay, 50-70mls east of
246	Botany	Dredge	1936	Jervis Bay, off
256	Brisbane		1832	Jervis Bay
312	Caroline		1859	Jervis Bay, Point Perpendicular, ashore
360	Chimborazo	Screw steamer	1878	Jervis Bay, Point Perpendicular
390	Coast Farmer	Screw steamer	1942	Jervis Bay, off
392	Colac HMAS	Screw steamer	1987	Jervis Bay, off
435	Coraline	Launch	1940	Jervis Bay, Point Kialla
453	Cumberland		1797	Jervis Bay, south
469	Dandenong	Screw steamer	1876	Jervis Bay, off

AUCHD	Name	Vessel type	Year lost	Where lost
595	Emma		1864	Shoalhaven, 15mls sth (nth of Jervis Bay)
755	George S. Livanos	Screw steamer	1942	Jervis Bay, 15 mls off
960	John Dory		1941	Jervis Bay, 3 mls north Point Perpendicular
976	Julie Heyn		1865	Jervis Bay, Cape St George
1147	Maid of Riverton		1870	Jervis Bay, reef, entrance to Curranbene Creek
1190	Martha and Elizabeth		1855	Jervis Bay, Point Perpendicular
1240	Merimbula	Screw steamer	1928	Jervis Bay, Beecroft Head
1311	Nancy		1805	Jervis Bay, to south of, (Cape Perpendicular?)
1404	Palmerston	Screw steamer	1929	Jervis Bay, 18 mls south
1442	Phoebe		1876	Jervis Bay, north of?
1461	Plutus	Screw steamer	1882	Jervis Bay, north of, on sand near Plutus Reef
1489	Prince Patrick		1867	Jervis Bay, Montague Bay, beached
2028	Wandra	Screw steamer	1915	Jervis Bay, Drum & Drumsticks
2063	William Combe	Screw steamer	1931	Jervis Bay, Drum & Drumsticks Islet
10690	**FAIREY FIREFLY (VX381) Aircraft**			**Jervis Bay**
10691	**Fairy Firefly**			**Hare Bay, Jervis Bay**
10803	Unidentified Currumbene Creek Jervis Bay Boat Wreck	Fishing vessel		Currumbene Creek, Jervis Bay near Myola

Australian Heritage Database Search

A search of the Australian Heritage Database, that lists all heritage places listed on the NL, CHL and the Register of National Estates (now archived). There are two heritage places (either listed or nominated) containing the subject site.

Table 2-2: Australian Heritage Database results for Jervis Bay

Place ID	Status	Class	Name	Details
1587	Registered 22/06/1993	Natural	Jervis Bay and Surrounds, Jervis Bay, NSW, Australia	Jervis Bay and surrounding area extends from Sussex Inlet in the south to Culburra in the north, extending westward to include Currambene State Forest. The waters of Jervis Bay are also included.
106073	Nominated	Natural	Jervis Bay and Surrounding Area, Jervis Bay Rd, Jervis Bay, NSW, Australia	Approximately 30,000ha, surrounding and including Jervis Bay, 13km south-east of Nowra

NSW State Heritage Register

A search of the NSW Heritage inventory, which includes items listed on the SHR and SHI, lists no heritage items within the subject site.

NSW Maritime Heritage Database

A search of the Maritime Heritage Database was undertaken using keywords to search for shipwrecks in the subject site. These search terms included “Jervis”, “Jervis Bay”, “Jervis”, “Javis Bay”, “Huskisson”, “Callala” and “Currambene”. The search results returned a total of 42 sites contained in the database (se appendix A). Further investigation into these listings identified one (1) shipwreck that have a low potential to be in the subject site. This is based on the limited information that is available relating to the wrecking event. The shipwreck, *Missie,* was tacking within Jervis Bay on approach to Currambene Creek when the ketch was overturned in a squall and sank. The crew was saved, wit the ketch reportedly lost in “50 Fathoms” of water. It is possible that, as the vessel was on approach to the creek, the wreck was lost in “5” Fathoms’ of water (9 m) as opposed to 50 fathoms (91 m). The entrance to the creek is located well to the west of the Project are, however, as it is likely to have been lost while tacking on approach to the creek entrance, and lost is squall, there is low possibility the vessel overturned and drifted before sinking.

Notable shipwrecks that have been located within Jervis Bay include the wreck of the *Reliance (1943)* and *(unidentified Callala Beach) – Lady Hampden (1941)*. Both of these wrecks are located greater than 1km from the investigation subject site. Shipwrecks, including the potential for unknown and undocumented wreck, are discussed in this report as part of understanding the potential for UCH in the area.

The remainder of the ship and aircraft wrecks listed on the database are listed as “lost north/south of Jervis Bay” or ‘X miles north/south’ of Jervis Bay, meaning they were lost outside the mouth of the bay and are not likely to be located within Jervis Bay or the Project area. Only those wrecks believed to be located close to the subject site are presented in Table 2-3 below. A full list of the search results are presented in Appendix A.

The two aircraft wrecks, the Fairey Firefly (VX 381) and the Fairey Firefly (WD 887) collided with each other on November 27, 1956. The aircraft collided over Jervis Bay, with the Fairey Firefly VX 381 crashing into the water near Hare Bay, and the VX 381 being lost somewhere unknown within Jervis Bay.

Table 2-3: Maritime heritage sites listed on the NSW Maritime Heritage Database believed lost at "Jervis Bay". Potential shipwrecks lost within proximity of the subject site are presented in bold.

Site title	Date lost	Type	Region	Where Lost
Beaufort Bomber (A9 - 27) Jervis Bay	1943/4/14	Bomber	Illawarra	Jervis Bay
Fairey Firefly (WD 887) Jervis Bay	1956/11/27	Anti-submarine	Illawarra	Jervis Bay
Missie	1869/09/	Ketch	Illawarra	Jervis Bay, Currambene Creek

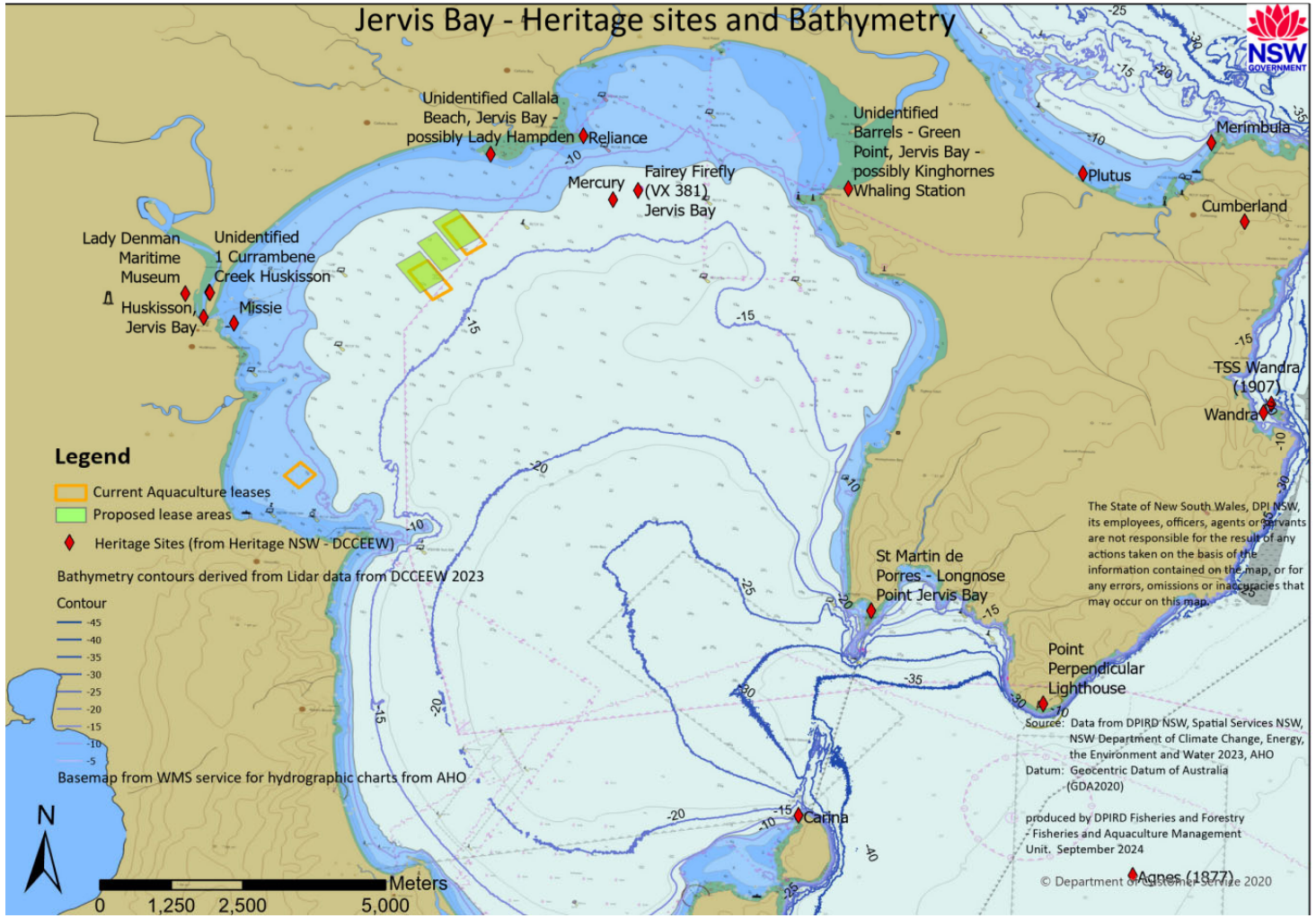


Figure 2.1: Maritime Heritage Database search results in Jervis Bay. Four unlocated shipwrecks are listed in Jervis Bay (red). Proposed relocated and new mussel aquaculture leases shown in green (Source: DPI via Maritime Heritage Database).

3. Aboriginal Archaeological Context

3.1 Aboriginal history of Jervis Bay

Jervis Bay is traditional Aboriginal land. Ancestors of the Jerrinja, Wodi Wodi and Wandandian people of the Dharawal and Dhurga language groups have held a deep-rooted connection to country for many thousands of years (Booderee National Park 2024). The division between groups was not the clear and neat line which fitted the European way of thinking (Evans, 2004: 6). Regardless, hundreds of Indigenous sites around Jervis Bay, especially on the Bherwerre Peninsula, testify to over three millennia of occupation (Sullivan, 1977). These sites include shell middens, rock shelters, burial sites, ceremonial grounds, stone-flaking sites and axe-sharpening grooves (DCCEEW, 2022).

The distribution and variety of sites emphasises the importance of the eastern end of Wreck Bay. The high density of midden sites here mirrors the preferred fishing zones of the present community. Ceremonial *bunan* grounds are also located in this section of Wreck Bay, and most axe grinding groove sites are in the catchments of Mary and Summercloud Bays (DCCEEW, 2022). The oldest archaeological evidence of Aboriginal occupation in the region includes a site at Burrill Lake, about 30 kilometres south of Jervis Bay, dating to more than 20,000 years ago (DCCEEW, 2022). At Currarong, on the base of the Beecroft Peninsula, a rock overhang formed part of a series of complex, inter-related camps where seafood was prepared and consumed. Bones from seals, penguins and mutton-birds suggest the local people sustainably managed the ocean's bounty (Hoskins, 2013: 2).

The main sources of bush foods were yams, berries and native animals such as kangaroos, possums and echidnas (WBACC, 2020). Seafood has always been plentiful in the local diet - oysters, abalone, pipis and mussels were easily found at low tide. Fish were hunted with grass tree spears, and net-fishing still plays a major role in the lives of the Wreck Bay community. The main fish caught are whiting, bream, salmon and tailor (DCCEW, 2022).

The ongoing indigenous stewardship of Jervis Bay is recognised in the *Aboriginal Land Grant (Jervis Bay Territory) Act 1986* (later the *Aboriginal Land and Waters Act*), the 1995 conferring of Booderee National Park title on the Wreck Bay Aboriginal Community Council, 1997 Wreck Bay land claim, and undetermined South Coast People Native Title claim (NC2017/003) (Director of National Parks, 2015: 5-14).

3.2 Environmental context

The Australian coastline has shifted and moved over the last 22,000 years, with the current shoreline and sea level stabilising between 6,000 to 8,000 years before present (BP) (Sloss et al 2007). At the height of the Last Glacial Maxima (LGM) approximately 22,000 BP, the sea level was approximately 130 m below the modern mean sea-level. As a result, the Australian coastline extended between 15 and 25 km past the current coastline. It is estimated that two million square kilometres of land, nearly a third of the Australia landmass, may have been exposed during this period (Bailey et al 2017). During this time the former exposed landmass became inundated, with the coastline stabilising to where it is today.

The subject site would have been an exposed landscape and likely to have been utilised by Aboriginal people. Jervis Bay would have been an inland area that later transitioned to a coastal region prior to inundation and is likely to have contained favourable habitats for Aboriginal people for the exploitation of marine resources at a time when the area was close to the coastline, and inland species when it was at a distance from the coastline (Benjamin et al 2020).

The subject site would have been subjected to the inundation process, including becoming a foreshore, that through inundation evolved into a beach, intertidal and later nearshore area. These coastal processes would have included the wave and current action that would have caused both erosional and depositional activity. The level of impact the inundation would have had is dependent on several factors, primarily how long the newly inundated sites were located within the beach and nearshore environment. Consequently, Aboriginal objects or sites present within or in proximity to the subject site are likely to have been buried or damaged by natural coastal depositional and erosional processes. Recent archaeological discoveries would, however, suggest that offshore underwater Aboriginal archaeological sites may endure, if not disturbed by such factors for long periods of time (Benjamin et al 2020).

3.3 Seabed topography

A Multibeam Echo Sounding survey undertaken by Astute Surveying (2024) shows the water depth of the subject site to be between 11.8 m to 14.75 m. A north-south transect through the subject site displays a gradual steady sandy seabed slope of approximately 1:530 (H:V). An east-west transect across the subject site shows a water depth of 13.2 m to 14.8 m, with a shallow seabed slope of 1:693 (H:V).

South Coast Mariculture have undertaken three years of a benthic monitoring program of their mussel farm leases as part of their farming approval process (SSI-5657). The surveys were completed in 2019, 2020 and 2023, and are used to compare the changes to the seabed over time, particularly since the establishment of the extant mussel farm leases.

These visual inspections viewed the condition of the seabed with the use of a ROV with a Heavy Lift kit modification and 4 LED lights. Each transect lasted 2- 3 mins, travelling ~1m above the seabed in a straight line (South Coast Marine September 2024: 4).

The recorded seabed within the mussel farm lease areas consists of ripple pale sand with drift algae and little shell debris (South Coast Marine September 2024: 5-14) (Plate 3.1, Plate 3.2 and Plate 3.3). A comparison between the results of the three monitoring years found that:

> *…based on water quality, broad seabed characteristics, sedimentary characteristics (particularly %TOC), and fishes, provided evidence that the present stocking of blue mussels at the Callala North Lease site is having no detectable effect on the marine environment in this area of Jervis Bay. Therefore, no triggers were identified as part of these monitoring efforts. (*South Coast Marine September 2024: 15).

The imagery taken from the ROV video transects show the lease areas consisting of ripple pale sandy seabed. There are patches of algae grown between the ripples, and other areas where there is little to no seabed vegetation present (Plate 3.1, Plate 3.2 and Plate 3.3)

Plate 3.1: Image of the seabed taken from the lease area showing the general seabed topography (Source: South Coast Marine September 2024: 8).

Plate 3.2: Image of the seabed taken from the lease area showing the rippled plate sand areas and some medium areas between drift algae (Source: South Coast Marine September 2024: 13)

Plate 3.3: Image from the ROV transect of the lease area showing the rippled pale sand areas, some medium areas between drift algae (Source South Coast Marine September 2024: 14)

The visible seabed formation in the MBES data shows almost the entirety of the seabed within the subject site consists of ripple pale sand topography slopping from the northwest down towards the southeast (Plate 3.4).

Plate 3.4: Extract of the MBES results of the subject site showing the long sand ripple place seabed topography (Source: Astute Surveying 2024).

3.4 Archaeological context

DPIRD conducted a search of the Aboriginal Heritage Information Management System (AHIMS) on the 23 August 2023 to understand the wider context of Aboriginal sites present in the Jervis Bay area. Understanding the type and location of previously recorded Aboriginal sites provides a basis for the formation of an archaeological predictive model that can be applied to the Aquaculture leases subject site.

Within the wider context of the Project, there are a total of 51 registered Aboriginal sites that have been recorded in the surrounding region (Figure 3.1). Figure 3.1 does not show the location of all of the registered sites. Some of the location information was not provided with the search results, and the location of the known burial site has deliberately not been shown.

From the AHIMS data, the most commonly recorded site type is artefact sites, either registered as isolated finds or open camp sites (i.e. multiple artefacts in a given area) (n=16) and/or associated with midden sites (n=17) or wide Potential Archaeological Deposit sites (n=3). The remainder of the sites that have been registered include individual Potential Archaeological Deposits Sites (n=2), Shell/Midden sites (n=8) and three modified tree sites (n=3). Of the remaining site types recorded, there were two sites that contained multiple site types, including a recording including “Artefact, PAD, Non-Human Bone and Organic Material”, and a separate ‘Artefact Shell Non-Human Bone and Organic Material’ site.

The majority of sites in the search area are located in proximity to the coastline, or in association with other likely resource areas including Currambene Creek. In this area, the distribution of archaeological sites appears to correspond more directly to the most intensively assessed/investigated areas, rather than being a true reflection of site distribution across the whole area.

The coastal hydrodynamic processes the inundated area has been exposed to would have an effect on the preservation and visibility of any surviving archaeological sites that may be present in the subject site. Organic material is less likely to have survived on the seabed, as this environment is not conducive to the preservation of such matter. This would include coastal practices such as fishing, canoes/watercraft or other coastal or estuarine activities. The archaeological material that has been recorded in the surrounding area is predominately based on artefacts and midden site, material that is not likely to have deteriorated over time. It is these types of cultural heritage sites that are likely to have survived in the submerged environment, if they survive at all.

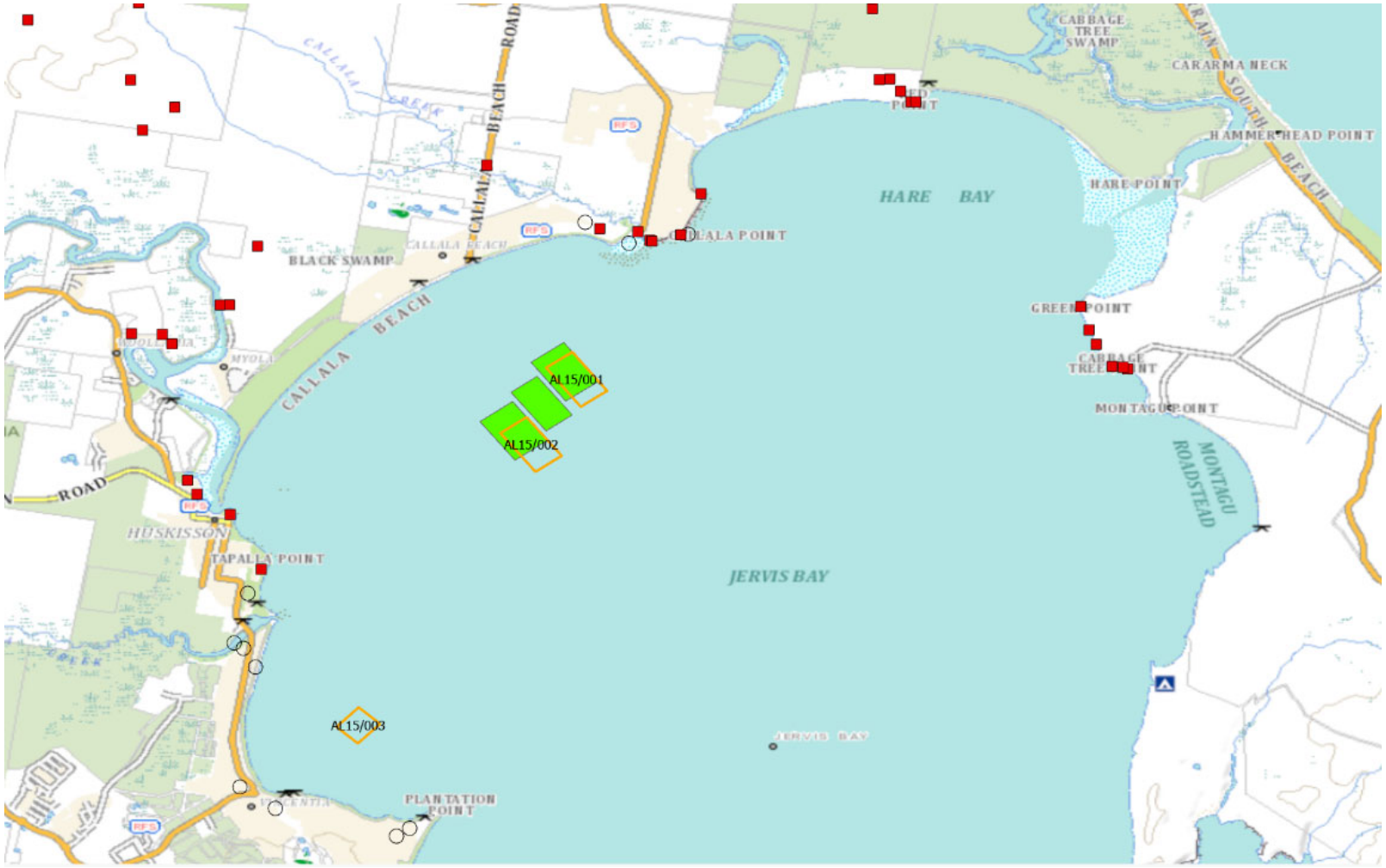


Figure 3.1: Location of the results of the AHIMS search near the proposed modification leases conducted by DPI. Red squares illustrate 2023 AHIMS data, circles with black outline are previous data from 2012. (Source: DPI via AHIMS, 23 Aug 2023).

4. Site History

A maritime focussed history of Jervis Bay and the surrounding area is presented below to provide context for the Underwater Cultural Heritage Assessment.

4.1 Early European maritime investigations

What would eventually become known as Jervis Bay was sighted as early as 25th April 1770, by Captain Cook who wrote:

> *"…About 2 leagues to the northward of Cape George the shore seemed to form a bay which promised shelter from the N.E. winds, but as the wind was not with us it was not in my power to look into it without beating up… the north point of this bay, on account of its figure I named Long Nose* [Point Perpendicular]*. Its latitude 35* 6'."* (Jervis, 1936: 118 citing Cook).

The importance of Jervis Bay as a harbour from north east winds was therefore established from the very earliest days of European incursion. Lieutenant Richard Bowen was the first to enter the bay in August 1791, commanding convict transport ship and former whaling vessel the *Atlantic* on her voyage to Port Jackson (Davis, 2020: 106). He named the bay in honour of Sir John Jervis, then rear-admiral of the Royal Navy (Jervis, 1936: 119). Bowen found good anchoring ground, reporting that the harbour was about a mile and a quarter wide at the entrance and about five miles in width further in. Governor Phillip was made aware of the bay, referring to it as "…a good harbour on the coast." (Jervis, 1936: 119). Captain Matthew Weatherhead, commanding fellow third fleet vessel the *Matilda,* visited Jervis Bay in November 1791, anchored at Long Beach, and remarked: "There is exceedingly good anchorage here." (Jervis, 1936: 119). On a copy of Weatherhead's 1791 nautical chart (see Figure 4.1), hydrographer to the Admiralty Alexander Dalrymple wrote a note: "In the *Matilda* many natives were seen and canoes on the beach; the natives were armed with spears but they [the *Matilda*] could have no communication with them." (Jervis, 1936: 119 citing Ida Lee). Dalrymple also marked the mouth of a creek on the west side of the bay (probably Currambene Creek), with the words 'fresh water' on the beach south of its mouth. A point on the south he labelled 'Cabbage tree Point', and on the east side of the bay he identified 'Long Point', 'Long Beach', 'Carwood Point', and 'Rocky Point' (Jervis, 1936: 119).

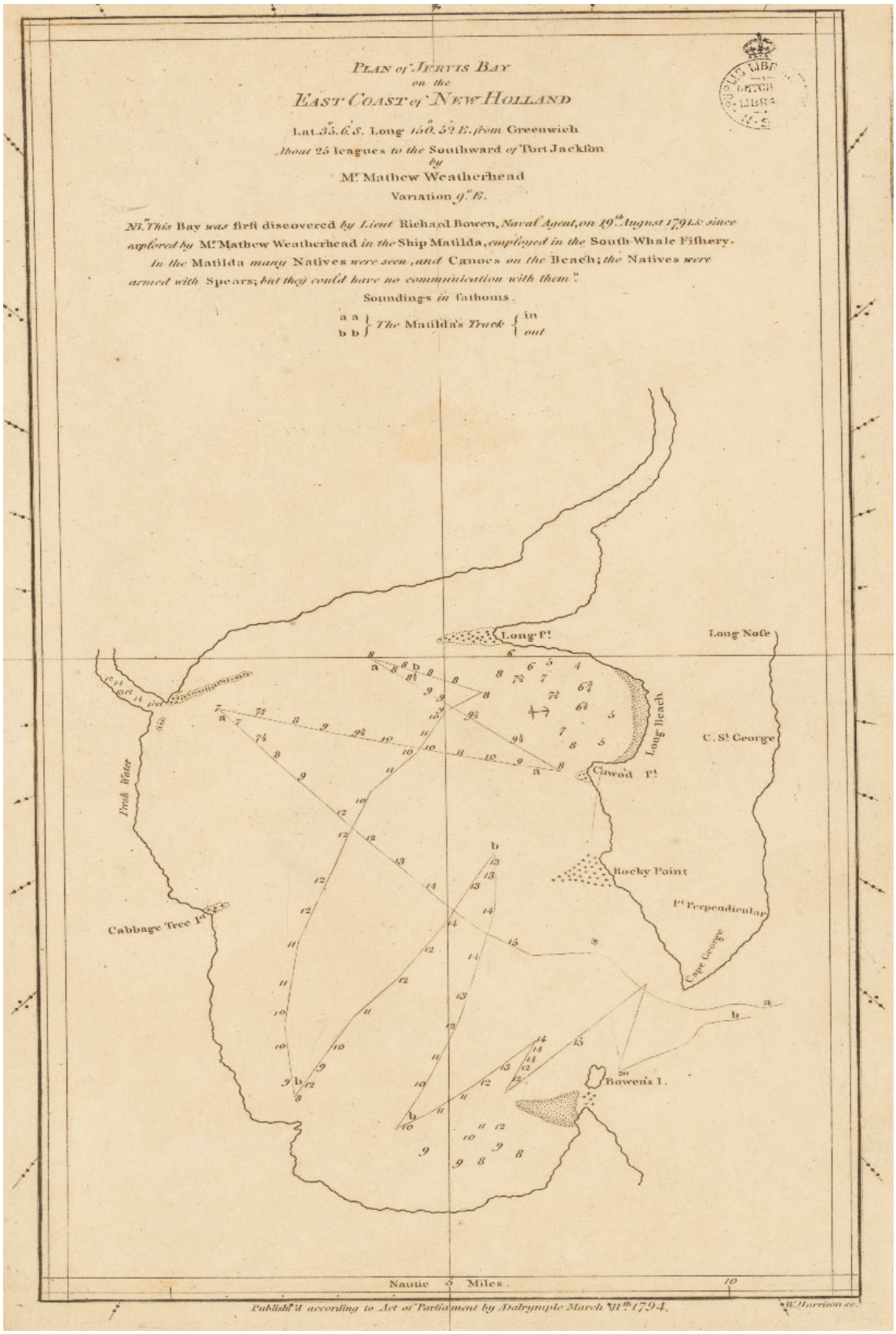


Figure 4.1: Plan of Jervis Bay on the east coast of New Holland, by Mr Mathew Weatherhead; W. Harrison sc. (Source: SLNSW, Call Number Z/Ce 80/2).

In April 1797, seventeen survivors of the wrecked *Sydney Cove* traversed north from a tiny island off northern Tasmania, passing by Jervis Bay. William Clark, one of three who returned alive to Sydney, described the hospitality of the Indigenous owners who shared fish and fresh water with him during the perilous journey (Hoskins, 2013: 97).

George Bass examined the bay in December 1797 on his voyage south to Van Diemen's Land, describing it as: *"…a wide open bay of very unpromising appearance upon first entering it. …a little cove, which from being the only place we found fresh water in, I have called Freshwater Cove… The country around the bay is in general barren. The north side is rocky, bushy and heathy. The west is low and swampy but sandy. In patched of a few acres the ground runs tolerably good, but these are distant from each other, and too much intersected by lagoon sand salt swamps to promise any advantage by cultivation. The south is grassy and bushy, and might serve for the pasturage of cattle."* (Jervis, 1936: 119-120 citing HRNSW, Vol 3: 263).

On 10 March 1801 saw Lieutenant Grant and the *Lady Nelson* crew enter Jervis Bay, where for three days they explored inland, penetrating a distance of about eight miles (Jervis, 1936: 120). They reported that the soil was sandy, sterile towards the sea and without trees and swampy in the hollows. They also surveyed what is now Bowen's Island. The *Lady Nelson* was anchored near a ceremonial site (Jervis, 1936: 120). In his report to Governor King, Grant said: *"…Jarvis's [sic] Bay or Sound is much larger and more commodious than strangers are aware of, and that shelter may be had in it from all winds. The sound itself is capable of containing two hundred sail of shipping and upwards, with plenty of wood and water at hand…"* (Jervis, 1936: 120 citing HRNSW, Vol. 4)

In late January 1805, surveyor James Meehan and Lieutenant Bartholomew Kent proceeded through Jervis Bay and overland by the Crookhaven to the mouth of the Shoalhaven River (Crabb, 2007: 7). The men found a boat in the Shoalhaven Estuary which they used to explore the river for about eighteen miles (Crabb, 2007: 7). In April the same year, Governor King sent the *Lady Nelson* under Acting Lieutenant J. Symons to find out whether a schooner called *Estramina,* a Spanish war prize, was in the Bay. The ship was intercepted and forced to surrender, in perhaps the first naval incident experienced in the Bay (Crabb, 2007: 7). Also in April 1805, the sloop *Nancy* wrecked a few miles south of Jervis Bay, at Steamers Beach (DECCEW, 2021). A local elder guided the crew to Jervis Bay where the Aboriginal population gathered to witness the spectacle. The crew decided to make their way back to Sydney overland, which they reached on 1 May 1805 (*Sydney Gazette*, 5 May 1805: 2).

Governor Macquarie and his crew visited Jervis Bay in November 1811, again aboard the *Lady Nelson,* and anchored at Bowen Island to await a change of wind. Macquarie observed the sizable local indigenous population, some of whom arrived at Bowen Island in canoes laden with fish, which were bartered for tobacco and biscuits (Jervis, 1936: 122 citing ML Ref: A772 39 f. [Microfilm Reel CY301 Frame #46]). A survey of the bay was made by a Mr Overend, while Mr and Mrs Macquarie went ashore near Currambene Creek and observed two 'native huts' close to the beach (Jervis, 1936: 122). On his return to Sydney, Macquarie issued a General Order stating: *"…he had the satisfaction to find a safe and very extensive harbour, not less than twenty miles in Circumference which promises fairly at some future period to be of some importance to the colony."* Macquarie subsequently ordered surveyor George W. Evans, to survey the eastern coast southward of Port Jackson including Jervis Bay, which Evans began on 27 March 1812 (Crabb, 2007: 8). On leaving the shores of Jervis Bay, Evans traversed along Currambene Creek, skirted around the north eastern slopes of Nowra Hill and arrived at the Shoalhaven in the vicinity of Cabbage Tree Flat, climbing Cambewarra Range to view the extensive Shoalhaven flats (Evans, 2004: 12).

4.2 Exploration by land

From 1812 onward, exploration of Jervis Bay came by way of land rather than sea. A search for a land route to the Bay from Sydney was prioritised as settlement was already extending south-west

from Sydney into the Illawarra, known as the Five Islands district. Additionally, Macquarie remained focused on Jervis Bay as a port and place of settlement, and this was combined with an attempt to find a short way to the sea from the newly discovered southern tablelands. Macquarie claimed in 1817 that "*…it would …be highly advisable to form a Settlement at Port Jarvis as soon as possible... the finest and safest Harbour in the whole Coast between this and Bass's Straits to the Southward… Port Jervis also Affords Plenty of Coal which I understand could be easily wrought…"* (Jervis, 1936: 123 citing H.R.A, Ser I, Vol. VIX, 713-714). The following year he reiterated his interest in Jervis Bay: *"If a small establishment were once formed in Jervis Bay, there might be a small chain of settlements and farms continued from thence… as well as water carriage all the way from Port Jackson to Jervis Bay, which Certainly would prove highly beneficial to the colony."* (Jervis, 1936: 126 citing H.R.A, Ser I, Vol. VIX, 713-714).

Macquarie instructed Surveyor James Meehan in 1818 "*to try if a communication can be effected from Sydney to Jarvis's Bay by land*" (Crabb, 2007: 9 citing Weatherburn 1978). Meehan, Charles Throsby, Hamilton Hume and their party left John Macarthur's 'Upper Camden Farm' on March 3, 1818, with the intention of travelling to Moss Vale and then searching for a route to the coast south of the Shoalhaven River (Crabb, 2007: 9 citing Weatherburn 1978). The party split, with Meehan and Hume failing to find a route south. Throsby succeeded in reaching Currambene Creek on 3 April 1818, in large part because of his Aboriginal guides (Crabb, 2007: 9).

Surveyor General John Oxley returned with Meehan, Hamilton Hume, and Aboriginal guide Broughton to Jervis Bay in October 1819 (Crabb, 2007: 10). Oxley described the harbour in relation to shipping:

> *"Jervis Bay is so well known, as not to require any particular Nautical Description; it is too Spacious to be a good Harbour; and, when the Wind is from the East, there is a heavy Swell in every part accessible to Shipping: the holding ground is good, and most secure and eligible Anchorage is under Bowen Island, immediately within the Entrance to the Bay, and on which there is good fresh Water.*
>
> *The Country, in the neighbourhood of Jervis Bay, does not offer the smallest inducement for the foundations of a Settlement… the principal object in settling the Port must be the facility it would afford in conveying the produce of the Interior coastwards, but …there is not …in the track of country surrounding the Bay, one eligible spot on which an Establishment might be formed…"* (Crabb, 2007: 10 citing (H.R.A, Ser I, V. 10, 254-257).

Macquarie was still of the belief Jervis Bay would make a good settlement, in the face of conflicting reports. Trader and early Shoalhaven settler Alexander Berry reported to newly appointed Governor Brisbane in 1822 that: *"… I think the Bay offers every inducement for settlement …from the most easy and ready point of communication with Argyleshire."* (Crabb, 2007: 10 citing Alexander Berry, 10 Feb 1822).

4.3 European villages

According to Crabb (2007: 11), subsequent visitors to Jervis Bay after Oxley were not so much involved in exploration as they were starting the white settlement of the area. Early red cedar getters had been visiting the area from 1811, evidenced by a *Sydney Gazette* report that the *Speedwell,* a 15 ton ship, had taken a load of cedar to Sydney from the Shoalhaven that year, and that it was only one of several ships then engaged in the trade (*Sydney Gazette*, 4 Jan 1812). The cedar cutters lived a primitive existence and occasionally clashed with Aboriginal people (Crabb, 2007: 16). In one of the clashes in 1815, three cutters were killed and, as a result, Governor Macquarie closed the district to further timber cutting, though this seems to have had little effect and the ban was soon lifted (Crabb, 2007: 16 citing Egloff 1990: 14 & Pleaden 2004: 30). The

hardwood forests around Currambene, Woollamia, St Georges Basin and Sussex Inlet provided the basis for a timber industry that continues to the present day (Crabb, 2007:17).

Settlement in Jervis Bay was delayed due to the lack of a sufficient military force, which would be needed to control convicts engaged in building the prospective village in such a remote location (Jervis, 1936: 126-127 citing H.R.A, Ser. 1, Vol. IX, p. 831). Rumours of settlement were spread in 1826, though little, if any, activity occurred. In 1828 cedar getter and Reverend Thomas Kendall applied for 1280 acres of land at the mouth of Currambene Creek, though this was refused as the site was reserved for a township, called Central Jervis Town, and Kendall was granted land further south. By the following year, the occupation of land surrounding Jervis Bay began. Early landowners included Alexander Berry, John Lamb, E. Deas Thompson, William Morgan, John Berry, John Terry Hughes, James Farmer, Sydney Stephen, Michael Hindman and William Creak (Jervis, 1936: 127). A full table of their respective landholdings can be found on page 22 of Crabb's book. These absentee colonists amassed pastoral holdings of thousands of acres alongside the main creeks of the area, and employed emigrant servants and assigned convicts to clear and plant their farms, graze beef cattle and raise dairy herds (Crabb, 2007: 23). One report of a ship's visit in 1837 mentioned "a rude building" on the shore of the bay, using for salting beef, and referred to "large herds of horned cattle" in the wilds of this part of the colony (Crabb, 2007: 24 citing James Backhouse). Wheat, grapes, citrus and stone fruit were grown for a short while, but were plagued by constant difficulties and largely unsuccessful.

As the country south of Goulburn plains was taken up by pastoralists, energy focused on discovering a route to the coast at Jervis Bay, so wool could be transported by boat to Sydney. A route was surveyed in August 1840 and the road constructed by late 1841. Jervis Bay was utilised throughout construction as a supply point for rations and implements for the seventy-strong road gang (Jervis, 1936: 131).

The first plan "for a town at the head of Jervis Bay" was made in August 1840 in connection with the wool road, and forwarded to the Governor, who named it Huskisson (Jervis, 1936: 130-132). The area of modern Vincentia was named 'South Huskisson' and preferred for a town, as wharves could be constructed sheltered from southeasterly winds by Casuarina Point (now Plantation Point). Landowners around the bay seized the opportunity to subdivide their lands in response to mushrooming development spurred by the wool road. Allotments in both South Huskisson and what is now Callala Bay were sold at auction in June 1841. Jervis writes: *"A report in the Sydney Herald of November 24, 1841, informed readers that the practicability of rapid communication between South Huskisson and Sydney had been tested several timed and the safety of the harbour established beyond doubt, the steamer Tamar having come to anchor in the middle of the night. A sloop of 300 to 400 tons was expected to proceed to port the following February to take in wool bound direct for London, a cargo of 700 to 1000 bales having been guaranteed*." (*Jervis, 1936: 133).* By 1843, the *Sophia Jane* provided a monthly steamer service between South Huskisson, Kiama, Wollongong and Sydney (Crabb, 2007: 33). By 1845, South Huskisson had three hotels, a large wool store, a general store, two wheelwrights, two farriers, a bakery, a mail office and a school. A substantial stone wharf was constructed by the landholders in the shelter of Plantation Point (Crabb, 2007: 33).

However, according to Davis, 2020: 109; "*The dreams of the speculative land investors* [at Jervis Bay] *were never realised. The Sydney merchants who dealt in the wool trade actively discouraged use of the port and only the two key proponents of the scheme shipped their wool down to Jervis Bay in the 1842 season."* Furthermore, the economic depression of the mid-19th century meant development was short lived and by 1848 writer Joseph Townsend reported that there were 'but two inhabited houses' in Jervis Bay (cited in Hoskins, 2013: 171). A disgruntled investor wrote to the *Sydney Morning Herald* in 1856, that no one had settled in Huskisson, "*nor has the Government made any effort at establishing the town… beyond taking the money of deluded purchasers".* He also referred

to “the equally worthless town of South Huskisson” (Davis, 2020: citing Sydney Morning Herald, 12 March 1856, 8).

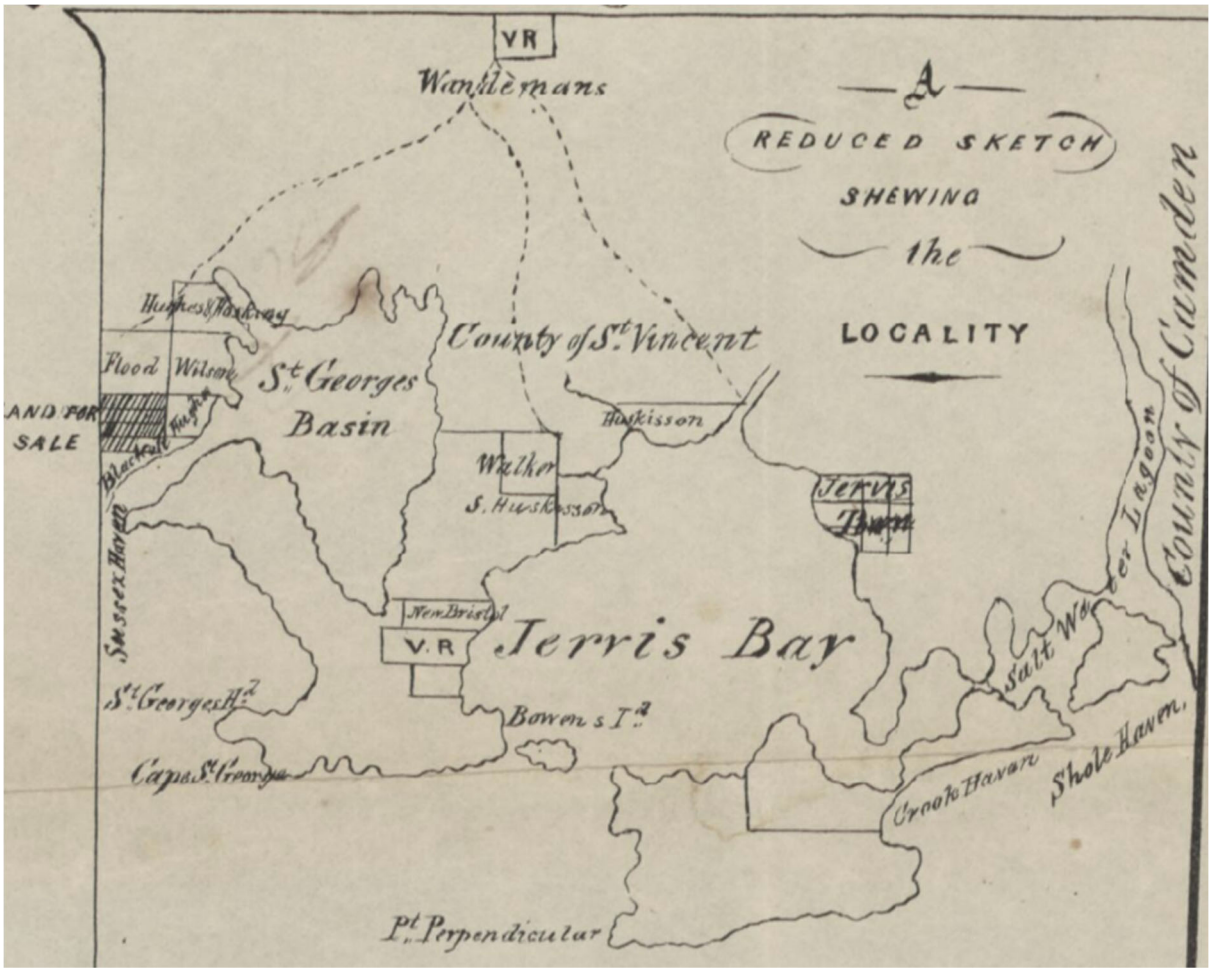


Figure 4.2: Detail from an 1840 map showing towns surrounding Jervis Bay (Source: NLA, Call Number Map F 85).

Figure 4.3: Jervis Bay in the late 1840s, near modern Vincentia, showing remains of wharf (Source: *Sketches in Australia / from drawings by R.M. Westmacott, drawn on stone by W. Spreat*, via https://jervisbaymaritimemuseum.blogspot.com/2016/03/jervis-bay-lithograph.html)

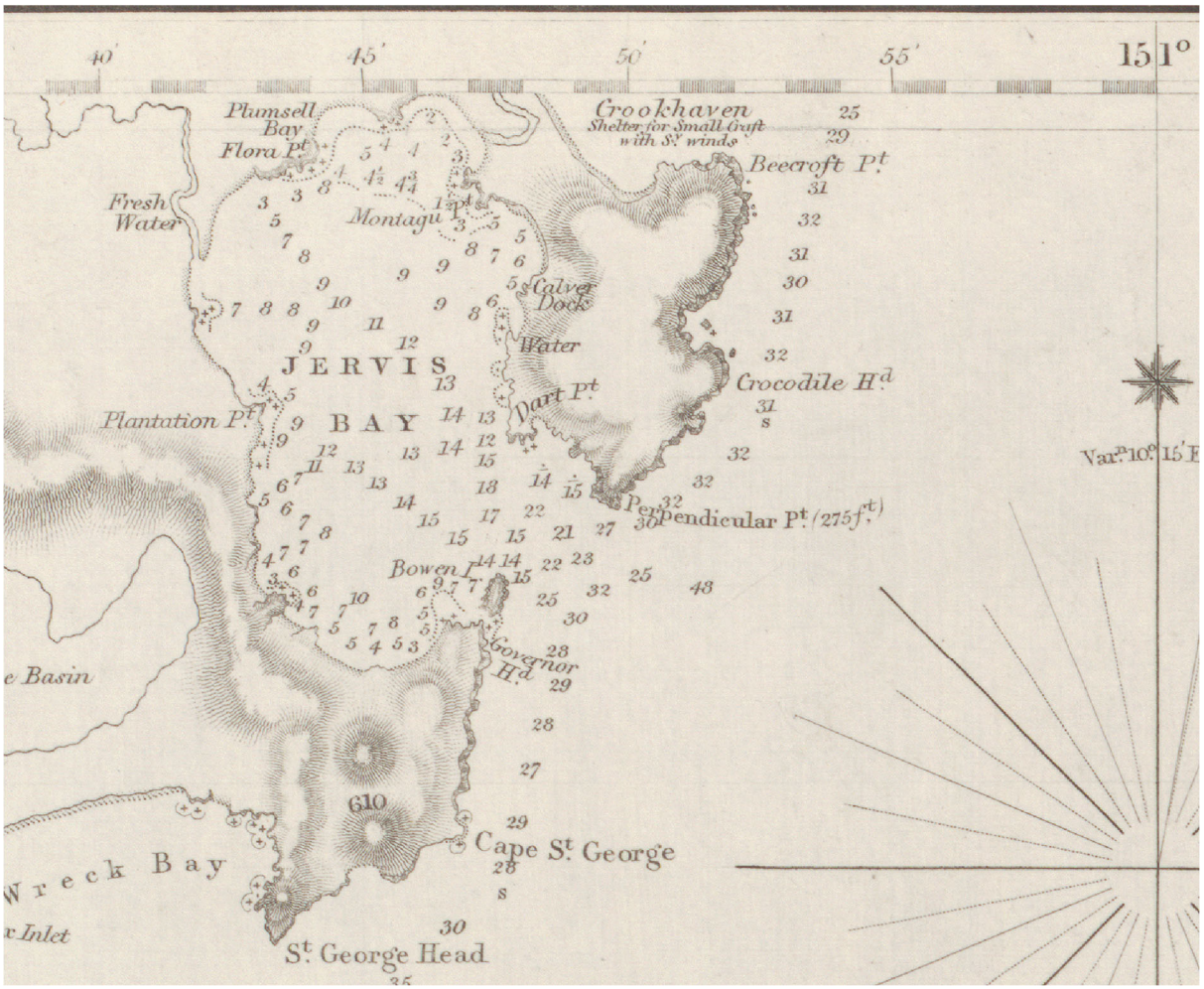


Figure 4.4: Jervis Bay in 1851 (Source: NLA, Call Number MAP British Admiralty Special Map Col./43).

4.4 Maritime transport and the Shipping Industry

Because of the disuse of the wool road after the 1840s depression and the poor state of road facilities, which were essentially dirt and gravel tracks, the movement of people and goods around Jervis Bay was largely dependent on coastal shipping (Crabb, 2007: 35). Shipping was a vital means of transport for all coastal areas of New South Wales for many years, and linked to this was the importance of boat building and maintenance, covered in the following section (Crabb, 2007: 35 citing Kingston, 2006: 19). There were services between Sydney and Jervis Bay and other ports on the South Coast from the 1840s, while the *Illawarra and South Coast Steam Navigation Co.* seems to have started operations in 1852. For a period, this company operated a bi-weekly service carrying supplies and passengers to the Huskisson and Captain's Point wharves on Jervis Bay (Crabb, 2007: 36).

As local maritime traffic increased with the development of the modern timber industry, the hazards of the precipitous lee shore became a major safety issue. In 1860, the New South Wales government built a lighthouse on Cape St George, but it was badly sited, and did little to alleviate the navigational hazards. While it was a useful landmark for shipping out to sea, it could not be seen either from north or south by vessels close inshore. Between 1864 and 1893, there were 23 shipwrecks in the vicinity of Jervis Bay (Woodhead, 2006:11).

The situation did not improve until 1899, when the St George light was replaced by the far more visible Point Perpendicular lighthouse, marking the northern shore of the entrance to Jervis Bay. This reduced the worst of the hazards, but shipwrecks continued (Woodhead, 2006:11)

The importance of local shipping services should not be underestimated, as these vessels delivered cargo and supplies to the shops, bulky items ordered from Sydney, and collected grass tree gum timber for the return journey up until the 1930s. Steamers would continue to use the Nowra wharf until the late 1930s (Crabb, 2007: 36).

4.5 Timber and shipbuilding Industries in the mid-19th Century

This portion is reproduced and extrapolated from Crabb, P. 2007. *The Jervis Bay region 1788 to 1939: An emptied landscape,* Lady Denman Heritage Complex: Huskisson, pp.17-18, 32.

> *"In 1861, George Richard Dent visited Huskisson in search of timber for the family's Sydney timber business, attracted by the tall straight trees and the safe waters of Jervis Bay. The timber cutting and milling activities he and other family members established along Currambene Creek were followed by others, with numerous sawmills at such places as Huskisson, Basin View, Wandandian, Falls Creek, and Tomerong (Blair 2000, 80-95; Oliver et al. 2001, 21-24). Initially, all the work was by hand, with pit-sawing, and later steam driven mills. Timber was moved to the coast by bullock teams and also floated on some of the small local streams.*
>
> *…Almost from the outset, local timber found an important market in the boat building industry that developed at Huskisson, initially that of George Dent, later joined by others. Timber cutting seems to have provided the initial impetus for the boat building industry. For example, ironbark was used for the stem or keel, beech for decking, and spotted gum for planking, and blackbutt and stringy bark for other parts; the bush was scoured for naturally shaped timbers. As ships grew in size, larger timbers had to be sourced from further inland and around Conjola and Wandandian. By the 1870s, there were weekly shipments of timber to Sydney. From 1870, small-scale shipyards at both Nowra and Huskisson were launching local fishing craft, but were also capable of building ocean-going vessels up to schooner size (Woodhead, 2006: 11). Large trees were needed for keels up to 24 metres in length; the keel of the Sir John Franklin, built in 1884, was 36 metres in length.*
>
> *…Much of the timber was sent to Sydney by way of wharfs at Huskisson and Sussex Inlet, along with other destinations (the Dents are reported to have exported timber to New Zealand) (Pepper 1978). The later extension of the railway to Bomaderry resulted in a significant railway sleeper industry based on iron bark. Other markets included pit props for Illawarra coal mines, structural timber for Sydney, bridge girders, wharf piles (for Port Kembla, Darling Harbour and Pyrmont), telegraph poles, and, in earlier times, blackbutt roofing shingles.*
>
> *By the end of the 19th Century, a number of the timber mills must have become much larger operations, if some reports are any indication. For example, on November 7, 1906, the Shoalhaven Telegraph reported: "A timber vessel came to Messrs. Alec Taylor & Co.'s wharf at Wandandian last week for a shipment of sawn timber from the Mills there. This is the first cargo shipped direct from the wharf for Sydney and it will be the forerunner of a regular service between Wandandian and the metropolis." The early 1900s provide numerous reports of timber mills opening, closing and changing hands, with regular shipments of timber sent to Sydney."*
>
> *"The Dent's last vessel was built in 1934 and the business was then taken over by Alfred William Settree. This brought a resurgence of shipbuilding at Huskisson, and he and then his*

family continued the business until the 1970s. At different times, other boat builders included Andre Coulon, Henry Hardman, William Wood, Thomas McCall, and William Peverley. Altogether, over 120 vessels were built at Huskisson, schooners, coastal steamers, ferries, and fishing boats. Perhaps the largest vessel was the 364 tons three-masted schooner, the Duke of Edinburgh." (Crabb, 2007: 32)

4.6 Fishing Industry

Fishing always formed part of the coastal subsistence way of life, and small fish markets sprung up soon after European settlement, although most people caught their own fish (Crabb, 2007: 48). Most of the fishing took place at Huskisson, or New Bristol from the 1860s (Crabb, 2007: 49). The only way to get fish to other markets was by curing it, as recorded by the Illawarra Mercury on 26 April 1863: *"a party of men at Jervis Bay [are] curing fish for the Braidwood market. They have several tons already salted, which they dispatch on drays to the interior"* (cited by Crabb, 2007: 48). In the 1870s, Chinese fishermen used butterfly nets to catch fish for Chinese restaurants in Sydney.

Both the commercial fishing industry and recreational fishing began from the 1880s. In 1884, the South Coast District Fishing Company was formed. A correspondent wrote that the purpose of the company was to supply "*Sydney from this place with all kinds of fish, fresh and cured. As our bay abounds with all kinds of fish, the affair, if properly managed, should prove a great success"* (Crabb, 2007: 49). The South Coast Co-operative Fishing Company Ltd., headquartered in Wollongong, fished for snappers and lobsters along the coast between Wollongong and Ulladulla. Jervis Bay was the centre of fishing operations where nets were used for fish, in addition to sharks and porpoises hunted for skins, teeth and oils (Crabb citing Antill 1982: 131).

From the late 1880s and '90s Jervis Bay fish including whiting, as well as lobsters, were sent to market in Sydney. Specialist fishermen came to the Bay in the 1920s, such as the Goldsmith family, who initially undertook shore-based net fishing and hand lining (Crabb, 2007: 49). By the late 1930s, trawlers were operating out of Huskisson, fishing within and beyond the Bay, with reports of 45 feet seine net trawling vessels. It is unclear boats from elsewhere entered the bay to fish (Crabb, 2007: 49).

4.7 Whaling Industry

Both the *Atlantic* and the *Matilda*, who visited Jervis Bay in 1791 as part of the third fleet, were whaling vessels. The Bay was a favoured anchorage, providing water, wood and a place to transfer supplies (Crabb, 2007: 46). There are records of whalers and sealers on the coast and in the Jervis Bay area in the 1790s - as early as August 1794, David Collins in *An Account of the English Colony of New South Wales*, thought there was nothing unusual in a Mr. Melville going on a 'fishing' [whaling] trip to Jervis and Bateman Bays (Crabb, 2007: 46 citing Bladen 1893b, 553 & Pleaden 2004, 10).

Crabb (2007: 46-48) gives a description of the whaling industry in and around Jervis Bay:

> *"The later growth of the Australian whaling industry came with the development of shore-based or bay whaling (Jackson 1978, 137-139). This involved hunting whales that came into bays, using whaleboats with oars and hand-thrown harpoons; the whaling ships, with their deck-carried whaleboat came later. At this early stage, the whalers were only interested in oil obtained from the blubber, and there was much waste (Bindon 1986).*
>
> *Around 1840, Captain William Kinghorne began operations with a whaling ship and a station on the north-eastern side of Jervis Bay at Cabbage Tree Point, near the site of Central Jarvis Town, but, given the prevailing economic depression, the operations only lasted about three years.*

…In the mid to late nineteenth century, whalers from the United States and other countries made a lot of use of Jervis Bay. In the 1860s and later, the southern whaling fleet and others used the Bay for transferring cargo, recruiting crew (as well as losing deserters), and also obtained wood (at least some of which was cut by local fishermen) and water from around Bristol Rocks and Green Patch.

…New Bristol was a provisions port for Ben Boyd's whalers sailing between Twofold Bay (Eden) and Sydney in the 1850s. In the early 1870s, American whalers put in to Jervis Bay "to recruit" crew members, including Aboriginal men. The Bay was also used for careening vessels and sometimes for flensing. In the late 1860s and early 1870s, the Kiama Independent contained a number of reports of American and Tasmanian whalers being in Jervis Bay. For example, Robert Edwards, an American whaler, under Captain Hamblin, with 800 barrels of oil, put into Jervis Bay…Some reports indicated that crew conditions on the whalers were far from good, with the crew of the Mary Hamilton mutinying in November 1872.

The early years of the twentieth century saw a resurgence of whaling activities in and around Jervis Bay, when in 1912 the NSW State Government permitted Norwegian whalers to use a small part of the Bay for their whaling ships, the Loch Tay (an 8,000 ton floating factory ship) and at least three whale chasers, Campbell, Lionel and Sorrell. The vessels belonged to the Australian Whaling Company... On October 16, 1912, the Shoalhaven Telegraph reported that "Between 40 and 50 whales had been captured by the Whaling Company at Jervis Bay since commencing operations." Later in the same month, the local newspaper reported that "The whaling business at Jervis Bay is booming" (Shoalhaven Telegraph, October 30, 1912).

However, the activities were not without problems. No more than a month later, it was reported that "The result of the whale boiling down and treatment operations at Jervis Bay is to so pollute the waters as to seriously affect the fishing and oyster industries there (Shoalhaven Telegraph, November 27, 1912). Thus it was not sur prising that when, in 1914, the Norwegian company tried to establish a whaling station in Jervis Bay near Montagu Roadstead on Beecroft Peninsula, beside a wharf with a track to the lighthouse. The Commonwealth Government opposed this… not least because of the smells and pollution… The Norwegians left because of the continued opposition from the Commonwealth and the Navy and the fact that the limited size of the catch at that time made the operation unprofitable…".

In 1919, a local business proposed to erect a shore-based whaling station and factory in the bay, but this too, was opposed by the Commonwealth Government (Crabb, 2007: 48). From this point, Australian whaling was carried on mainly from the west coast of the continent (Hoskins, 2013: 179).

4.8 Jervis Bay in the twentieth century

Dent's establishment of the timber industry, which in turn supported the boat building and fishing industries, revived investor interest in Jervis Bay. In 1868, Huskisson was re-pegged and redeveloped, albeit very gradually. Sussex Inlet developed from the 1890s, and Callala Beach was laid out in 1912. In 1915 Callala Bay was laid out on the original site of '*Central Jarvis Town'*, while Woolamia dates to 1917, and Vincentia was established in 1925 on the site of South Huskisson (Crabb, 2007: 37).

In 1908, after an extensive search, the present site of the Nation's capital, about 300 kilometres south-west of Sydney, was chosen. The 'Seat of Government Act 1908' stipulated the Australian capital should have its own port and access to the sea. Therefore, on 1 January 1911, the new 2,360 square kilometre 'Federal Capital Territory' (later named Australian Capital Territory) was created,

including the seaport of Jervis Bay. In 1915, jurisdiction over what is now the Territory of Jervis Bay was also transferred from New South Wales to the Commonwealth by way of the *Jervis Bay Territory Acceptance Act 1915* (Crabb, 2007: 37). According to Crabb (2007:37), the planned port was an important factor in the NSW Government declining to grant the Commonwealth Government sovereign rights to the whole of Jervis Bay, resulting in the current boundary encapsulating a 67.8 square kilometre area, containing most of Bherwerre Peninsula, with Commonwealth Waters located to the north of the peninsula.

Over the course of the early twentieth century there were calls to adopt a Royal Commission recommendation that a railway be built from Canberra to Jervis Bay, however this was never constructed. Such 'Grand Visions' including the proposed Federal Port, naval facilities, and railway line, along with the completion of naval college HMAS Creswell in 1915, resulted in numerous township and estate plans and much land speculation from the 1920s on (Crabb, 2007: 38).

Tourism became prominent in Jervis Bay from the late 1920s. The 'grand visions' for the territory were touted by developers to attract holidaymakers and speculators to their subdivisions like 'Pacific City' - see Figure 4.7 (Sant, 2004: 8). The advent of reliable motor travel and the Great Depression were both major influences on the growing popularity of low cost driving/camping holidays. Many guest houses sprung up, and private hotels provided direct transport to Jervis Bay from the Bomaderry railway station, while there were regular, well patronised coach services between Jervis Bay and Nowra (Crabb, 2007: 41).

Holiday makers and tourists made use of the bay for pleasure craft from the late nineteenth century. Large and small yachts cruised the bay, and a St Vincent's sailing club was operational by September 1901. St George's Basin had its own sailing club from 1909 (Crabb, 2007: 51).

Tourism remains the most significant pillar of Jervis Bay's economy, with over 450,000 visitors entering the territory each year (DITRDCA, n.d).

Figure 4.5: 1911 plan of Jervis Bay with proposed breakwaters in red (never constructed), in connection with Federal Port scheme (Source: NLA, Call Number MAP G8971.P3 1911).

Figure 4.6: Huskisson c.1913. A boat building yard, with a large boat partly constructed, is in view on the shore. (Source: State Library of South Australia, Call Number PRG 280/1/11/153).

Figure 4.7: 1920's locality plan by Henry F Hallorhan & Co. showing proposed breakwaters and holiday village developments (Source: SLNSW, Call Number Z/TP/J1/43).

4.9 Defence operations in Jervis Bay

Jervis Bay was used by naval vessels of both the Colonial fleet and British Royal Navy. According to Swinden (1995:30), *"Ships of the Royal Navy had visited Jervis Bay during the 19th and early 20th century, when Australia's Naval defence lay with the Royal Navy's Australian Squadron".* In 1898, the squadron was *"engaged at shell practice in its favourite resort, Jervis Bay"* (Crabb, 2007: 53 citing Town and Country Journal, 14 May 1898). Gunnery practice was a major use of the Bay by the British Navy and the Australian Auxiliary Squadron, especially after *"a portion of the Beecroft Peninsula was leased as a bombing range, and naval gun target practice commenced in 1895"* (Crabb citing Egloff 1990, 23). This was in spite of the fact that an Aboriginal Reserve had been set up on the Peninsula

in 1881. Taylor (1988: 20) wrote that the *"Aboriginals literally fled for their lives"* and that a *"few were actually killed by these bombardments".*

Crabb writes the following about Naval uses of Jervis Bay:

> *"The Bay was not just used by British and Australian naval vessels for gunnery practice - in 1895, German warships were also using it for practice… In August 1908, the American fleet visited Jervis Bay and was given a civic welcome in Nowra…*
>
> *The establishment of the Commonwealth of Australia and its new capital… brought renewed naval interest in Jervis Bay. As was noted earlier, the fine natural harbour was seen as having the potential to be a port for Canberra; it also had potential to be a naval base. Captain Creswell, Commanding Naval Director, visited Jervis Bay in 1923 to assess its suitability for naval construction, docks, and as a naval base... About the same time, the British Lord Kitchener reported on the defence of Australia for the new Commonwealth Government: "If Sydney was ever attacked it would be by indirect assault from a hostile fleet anchored in Jervis Bay…" He also advocated the building of a naval college on Jervis Bay, as had another British Admiral, Henderson, previously in 1909.*
>
> *…The Royal Australian Navy was active in Jervis Bay from its founding in 1911… There were proposals in 1913 for a naval dockyard and …college. The Australian fleet visited Jervis Bay for the first time in October 1913. HMAS Australia, Melbourne and Sydney rendezvoused with HMAS Encounter, Parramatta, Yarra and Warrego in Jervis Bay. After two days of extensive painting and preparation, the ships made their first entry as an Australian Beet into Sydney Harbour (Swinden 1995, 30).*
>
> *The waters of the bay, west of a line from Longnose Point to the northern tip of Bowen Island, were declared Naval Waters in 1918. …In spite of the …many proposals, the only naval facility that was established in Jervis Bay was the Royal Australian Naval College (RANC)… it opened in 1915 and remained on Jervis Bay until 1930 when it was moved to Victoria, after which the site and most of the buildings became a holiday resort… There was little if any naval activity in Jervis Bay during …World War I. There was, however, one incident of interest… on July 5, 1917, a number of officers and cadets from the RANC were invited on-board two [allied] Japanese light cruisers, the Chikuma and the Hirado, to observe gunnery and torpedo exercises off Jervis Bay…*
>
> *Little seems to be known about the activities of naval vessels that certainly visited the Bay during the presence of the RANC… up to the out-break of World War II. Despite the closure of the College, the Navy continued to have a presence in the bay. Ships regularly visited ... Until World War II the naval presence was limited to a Deet canteen ... for visiting ships . ... The Quarterdeck and some sporting facilities ... were used by service personnel from visiting ships" (Swinden 1995:30)." (Crabb, 2007: 53-56).*

Figure 4.8: 1931 map of Jervis Bay by the British War Office, Australian Section (Source: NLA, Call Number MAP G8960 s63).

World War 2

This section has been adapted and amended from Woodhead (2006:12-18).

> *"Australia began to increase its defence preparedness from 1938 onward, as international tensions increased leading up to WW2. Nowra airport was earmarked as a potential RAAF base in 1939, and was intended to be upgraded, though little had been done before the entry of Japan into the war at the end of 1941 (Wilson 2003, p. 125)*
>
> *In the flurry of activity in early 1942, units of both the Netherlands East Indies Air Force and United States Army Air Corps 22nd Bombardment Group were temporarily based at Nowra. In May 1942, Australian Beaufort bombers of 7 Squadron RAAF were based at Nowra to defend the approaches to Sydney, and also organised into a Base Torpedo Unit to train torpedo bomber crews. The Air Board's decision to train RAAF crews as torpedo bombers was controversial, done without consultation with the Navy. (Wilson 2003, p. 130) However, the squadron was still not on an operational basis late in July when the Greek freighter George S Livanos was torpedoed by a German U-boat east of Jervis Bay.*
>
> *Perhaps as a result of that experience, RAAF torpedo training commenced on 4 August, and the first training accident came seven weeks later, on 24 September, when Beaufort A9-109 crashed into Jervis Bay without loss of life. For the next twelve months, the Base Torpedo Unit (BTU) operated from Nowra. Then, to house the expanded operations at Nowra, a second airstrip was built near HMAS Creswell in 1943 and named Jervis Bay Airfield. The BTU was split into numbers 5 and 6 Operational Training Units, with 6 OTU detached to Jervis*

Bay, its crews housed in the former Naval College buildings. (Wilson 2003, p. 128; Bonython 1979, p. 67)

The largest category of aircraft wrecks in the Jervis Bay area were Bristol Beauforts which crashed during torpedo training between 1942 and 1944; about twenty crashed during flights from Nowra, and about ten of these wrecks are in Jervis Bay or the open sea nearby. The Beaufort was a light twin-engined bomber designed for the torpedo-bombing role; about 700 of the Mark IA were built in Australia during the Second World War. Its design was based on the pre-war Blenheim bomber which had proved completely defenceless in the face of German fighter attacks early in the war, as it was very slow and poorly armed. The Australian-built Beauforts were significantly improved in design, their performance enhanced by two American Pratt & Whitney Twin Wasp engines, but even so their use in the Pacific theatre was confined where possible to action against soft targets, such as torpedo attacks on poorly defended merchant vessels. As the war progressed the Beaufort's role was taken over by the faster and more powerful Beaufighter…

The majority of serious Beaufort accidents at Jervis Bay occurred either as a result of loss of engine power over the sea, or striking the water while practising dummy torpedo runs. In the month of April 1943, four aircraft were lost with nine fatalities. There was another horror episode in January 1944 when four Beauforts were lost and eleven crew killed in just 16 days… there are no archival records suggesting that any crashed aircraft were salvaged. The majority of crashes occurred in deep water, and usually their locations were only reported within an accuracy of a mile or more, so would be beyond the ability of divers of the time to locate.

The RAAF abandoned torpedo bombing in April 1944, and torpedo training ceased at Nowra. This was because the war in the Pacific theatre had turned in the Allies' favour, and there were fewer Japanese ships operating within range of Australian air bases…

The events of the Second World War had convinced the Defence Department that Australia needed its own naval aviation capacity. In late 1947 the Royal Australian Navy took over RNAS Nowra, and it was renamed HMAS ALBATROSS the following year… RAN Hawker Sea Furies and Fairey Fireflies of 805 and 816 Squadrons were based at Nowra from 1949 onward. HMAS ALBATROSS itself was used as a land base for Australian carrier-based aircraft for the next 33 years…

In 1950 the Beecroft Peninsula on the northern side of Jervis Bay was leased from the New South Wales government for use as an air and naval bombardment range. In 1956, the Federal Government decided to return the RAN College to Jervis Bay. The new college was commissioned as HMAS Creswell on 20 January 1958 (DCCEEW, 2021b). Helicopter operations became an important part of RAN exercises from the 1960s onward. RAN 723 Sqn, equipped with Bristol Sycamore helicopters, operated from RNAS Nowra from 1957. Westland Wessex helicopters were in service at Nowra from 1962 to 1989. Six were lost over water in the vicinity of Jervis Bay between 1964 and 1974, usually because of engine failure."

4.10 Ship and aircraft wrecks

The first recorded shipwreck in the Jervis Bay area was in 1805, when the sloop *Nancy* ran aground at Steamers Beach. Between 1864 and 1893, there were another 23 shipwrecks in the vicinity of Jervis Bay (Woodhead, 2006: 11). To the south of Jervis Bay, Wreck Bay acted like a trap – Ships frequently accidentally found themselves too far inside the shallow bay, from which point there was no room to manoeuvre. So many ships were driven ashore, that in 1886 a reader of the *Sydney*

Morning Herald described coastal shipping as 'a scheme for manufacturing widows and orphans ...' (DCCEEW, 2021).

Woodhead (2006) compiled an inventory of Defence and Civilian wrecks in and around Jervis Bay, plotting them on Admiralty Chart AUS 193. Each wreck was given a dispersal radius in nautical miles and this radius also plotted on the map. The aquaculture leases (subject site) are located within the dispersal radius areas for the below Defence wrecks, as seen in Figure 4.9.

Table 4-1: Defence aircraft lost within Jervis Bay that have the potential to be within the subject site based on a likely loss area radius identified by Woodhead (2006).

Id	Site Name	Type	Where Lost	When Lost	Coordinates (WGS 84)	Loss Radius (nm)
D9	Beaufort A9-96	Fixed wing aircraft	Jervis Bay, Northern End	1943	35° 01.25', 150° 43.89'	5.0
D16	Fairy Firefly WD887	Fixed wing aircraft	Opposite Huskisson, Jervis Bay	1956	35° 03.58', 150° 42.03'	3.0
D17	Fairy Firefly VX381	Fixed wing aircraft	Hare Bay, Jervis Bay	1956	35° 00.92', 150° 44.25'	0.0

Additionally, Woodhead (2006) identified several as yet unlocated and unmapped plane wreck sites inside Jervis Bay. These were also subclassified into Defence and Civilian wrecks.

Table 4-2: Unlocated and unmapped Defence wreck sites inside Jervis Bay

Id	Site Name	Type	Where Lost	When Lost	References
D11	Beaufort A9-219	Fixed wing aircraft	Jervis Bay, inside	1943	AMASAH
D26	Westland Wessex N7-225	Helicopter	Jervis Bay	1967	AMASAH
D28	Bell Iroquois N9-3102	Helicopter	Jervis Bay, inside - recovered	1970	AMASAH
D29	Northrop N10-9185	Unmanned fixed wing aircraft	Jervis Bay, Inside	1971	AMASAH
D30	Fairey Gannet XG796	Fixed wing aircraft	Jervis Bay, inside	1966	AMASAH
D32	Douglas Skyhawk N13-872	Fixed wing aircraft	Beecroft Peninsular, within firing range (on land?)	1975	AMASAH
D35	Beaufort A9-09	Fixed wing aircraft	Jervis Bay, inside	1944	D
D36	Beaufort A9-107	Fixed wing aircraft	Jervis Bay, inside	1944	D

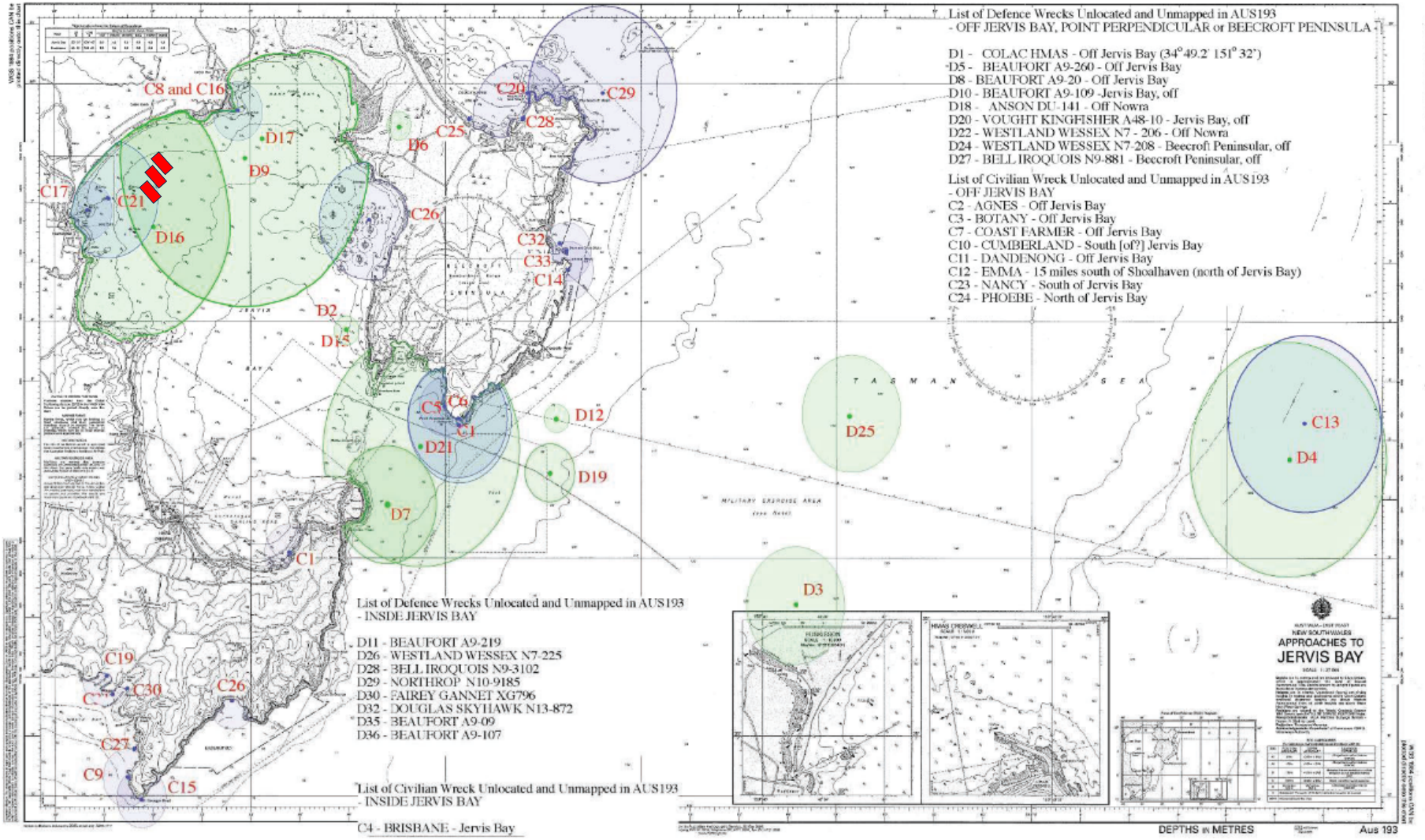


Figure 4.9: Map of wrecks in Jervis Bay with corresponding inventory/ID number. Subject site shown in red (Source: Woodhead, 2006: 62).

4.11 Summary

The potential for shipwrecks to be present within and around the subject site is based on both an understanding of the maritime trade and transportation along the coast, and the known recorded shipwrecks that have occurred. The earliest uses of Jervis Bay were from whaling vessels in the early 1790s. The area was visited in the early 1800s as part of attempts to survey the coastline and bay as whole. It was not until 1812 that Surveyor Evans mapped the Currambene Creek and possible locations for future village settlements.

The earliest Europeans to the area were red cedar cutters, noted to have been visiting Jervis Bay from as early as 1811, with the timber transported back to Sydney via ship. Settlement around the Bay were delayed due to a lack of a sufficient military force, which would be needed to control convicts engaged in building the prospective village and supporting infrastructure. It was not until late 1829 that requests for land holdings were made to the NSW Governors. The main transportation was via shipping until 1841, when a road was made back to Sydney, however, the road was always in a poor condition. Also, a regular steamer service from Huskinson was in operation from 1843, and most transport was predominately undertaken via ship to both Shell Harbour and Wollongong. After the failure of the township in the 1850s, the shipbuilding industry began along Currambene Creek, which brought with it the construction of wharves in Jervis Bay.

The shipbuilding industry sustained a small population in the Huskinson region. By the late 1890s Defence identified the Beecroft Peninsula as a suitable naval training area for live fire practice. This, and the growth of seaside recreation in the 1890s, lead to Huskinson and other smaller satellite villages being established and maintained.

Based on the understanding of the history of Jervis Bay, there is a low potential for undocumented and unknown shipwrecks to be lost the vicinity of the mussel farm lease area subject site. Ships using bay for refuge during storms and squalls would have found shelter inside the mouth of the bay. For a wrecking event to have occurred within or close to the subject site, it would have occurred in shallow waters where it would have been likely for survivors to have report the wrecking event.

There are no know shipwrecks within the subject site, or in the immediate area surrounding the investigation area. This is because the entrance into Currambene Creek seem to be a preferred destination for vessels loading and unloading. Given the protected waters inside the bay, and vessels were navigating towards the creek, there was no reason for vessels to be passing through the subject site.

The closest located shipwrecks include the unidentified wreck believed to be the suspected wreck of the *Lady Hampden*, located approximately 1.1 km to the north of the mussel aquaculture lease subject site. The vessel was modified to look like a naval vessel and act as a decoy in case of enemy submarine or aircraft attack in 1941. The anchored vessel was struck by corvette HMAS *Deloraine* on October 30 1941 and set free from its anchor lines. *Lady Hampden* drifted and eventually was driven ashore at Callala Beach. Despite attempts to refloat the vessel, *Lady Hampden* was eventually sold and stripped and used by the Defence as target practice. The remaining hull of the wreck was removed at the end of WWII through the use of explosives. The wreck of the *Lady Hampden* is not expected to be within the subject site, however, there is the possibility for remains of the shipwreck to have drifted in to the subject site from wave and currents.

Another shipwreck, *Missie*, is recorded as wrecked on approach to the entrance of the Currambene Creek. The wreck location is believed to be south – southeast to the entrance of the creek, however, the exact location is unknown as the vessel was lost in a squall. Reported as being lost in ‘50 fathoms’ of water (91 m), it is possible that this was misreported and may have been 5 fathoms (9

m). The wrecked capsized and could have possibly drifted prior to sinking and settling on the seabed. The vessel was under ballast, meaning it was not carrying any cargo. There is a low possibility that the wreck may have drifted away from the river mouth and back into deeper waters of Jervis Bay. While there is a low potential for a shipwreck to be present within the subject site, there is the potential for shipwreck material, including parts of the wreck, to have been transported along the seabed from current and wave action, towards the subject site.

There are a total of three aircraft wrecks that have been reported as potentially been lost within the subject site. These include the Beaufort A9-96 lost towards the northern end of Jervis bay. While on a training mission in 1943, the Beaufort A9-96 banked too low, resulting in an engine propeller to make contact with the water, causing the bomber to crash and break up on impact. The radius for both the wreck of the plane, as well as for the spread of debris, was assessed in the Woodhead report as being up to 5 nm.

The aircraft Fairy Firefly WD887 and the Fairy Firefly VX381 collided over Jervis Bay on a navigation training mission on 27 November 1956. The Firefly VX 381 lost one third of its starboard wing and crashed into Hare Bay, while the exact location of the crash site of the Firefly WD887 was unknown, and reported crashed into the sea ‘of Huskinson’. The bodies of the pilot and observer on the Firefly WD887 were not recovered.

5. Data Analysis

The following section provides a summary of key information from studies and assessments that can better inform the potential for UCH and maritime archaeological sites.

5.1 Previous Maritime Archaeological Reports

Wolfe, A. and Waterman, P. 1989. Maritime Archaeological Resources of Jervis Bay, Jervis Bay Environmental Study Technical Memorandum 2/89, Report to Facilities Division, Department of Defence.

This was the first professional maritime archaeological assessment on the shipwrecks, whaling stations, shipbuilding areas and crashed aircraft of Jervis Bay, prepared in relation to an environmental impact statement (EIS) for the relocation of naval facilities to Jervis Bay. Building on reports by Loney (1980) and Byron (1985), Wolfe and Waterman attempt to document and assess the significance of the maritime cultural resources of the bay. Their stated aims were to provide an introduction to the maritime archaeology of Jervis Bay in NSW, indicate the occurrence of maritime cultural resources at locations under consideration for the development of naval facilities; and to discuss potential management options for the maritime cultural values of the area in the light of the proposed relocation of naval facilities to the region. First, the early exploration and history of Jervis Bay is outlined to provide context for the assessment. The history of seven shipwrecks is given as a case study, and a significance statement for these provided. A significance statement is also given for remains relating to the whaling and shipbuilding industries. A very brief section on the Beauforts concludes with another statement of significance. Environmental Management considerations are explored in section 6, which includes implications for the management of the wrecks, fleet base site, and armament depot site, their relationship to the environmental management plan, and future work required. Conclusions and recommendations were the requirement for further research, including a possible archaeological research program, a comprehensive Environmental Management Plan, involvement of relevant maritime history organisations, and increased funding for the management of relics.

Smith, T. 2004. "Plane Sailing: The archaeology of aircraft losses over water in New South Wales, Australia", *Bulletin of the Australasian Institute for Maritime Archaeology*, Vol. 28: pp. 111-122.

Smith's article provides a brief historical overview of submerged aircraft sites, which may result from deliberate mass dumping events, or military and civilian aircraft losses. He identifies a range of probable sites and factors regarding their management, including; physical location, access difficulties, degree of degradation, and State or Commonwealth legislative controls. Smith points out the majority of aircraft destroyed on land were salvaged, whereas aircraft lost at sea have a higher potential to remain intact. Smith also briefly discusses the role of fishing trawlers in identifying wreck sites. Brief case studies are provided, including one on Jervis Bay.

As discussed above, the two aquaculture leases forming the subject site are located within the dispersal radius area for Fairy Firefly VX381. Smith provides the following comments on this aircraft:

> *"The only commonly dived aircraft wreck site in NSW is that of a Fary Firefly that crashed into Hare Bay within Jervis Bay, whist undergoing navigational training on 27 November 1956. The aircraft, VX 381, collided with Firefly WD 887 which was never found. Based at HMAS Albatross, the crew of the missing aircraft were not recovered, those aboard VX 381 survived (Wolfe, 1989:26). Carrier borne anti-submarine torpedo bombers, Firefly's first flew in 1941 and 107 were received by the Royal Australian Navy, flown from both the carriers HMAS*

Sydney and HM Vengeance during the 1950s. This particular aircraft, VX 381, was located in 1983 in just thirteen metres of water, although very difficult to detect due to its low relief. Sitting on a silty bottom, the NSW Heritage Office obtained GPS coordinates for the wreck following a successful magnetometer survey in 1995… Unfortunately, divers have recovered many of the cockpit instruments over the years…

Jervis Bay lies adjacent to the naval training facility at Nowra (HMAS Albatross), and was a favoured low flying/torpedo attack training area... This resulted in a significant number of crash events including up to fourteen Beaufort bombers… While many of these losses were recovered… accidental hookups confirm the presence of some aircraft remains on the seabed…"

Smith then provides further details on his anecdotal source, former RAAF member Dick Grant. Other potential aircraft wreck sites around NSW are outlined, and an overview of thematic surveys provided. A section on management constraints surveys then-current legislation, effects of seawater on physical fabric, and the salvage, recovery and restoration possibilities available. Smith concludes that aircraft form a unique art of NSW's underwater archaeological resource, though ongoing research is required.

Woodhead for DMM, 2006. Shipwrecks and Aircraft Wrecks, Shoalhaven Region, Heritage Management Plan, Vols. 1 and 2, report prepared for Department of Defence, Oct 2006.

This Heritage Management Plan was prepared for the Department of Defence by the regional Comprehensive Maintenance Contractor, DMM, to provide information and recommendations for the management of shipwrecks and aircraft wrecks in the Shoalhaven region. This would allow the Royal Australian Navy, and to a lesser degree the Army and Air force, to utilise the waters of Jervis Bay as a training and practice area while also conserving the cultural values of ship and aircraft wrecks. Furthermore, the report is intended to assist Defence in protecting, managing and promoting the heritage values of wrecks within the Defence controlled areas of the Shoalhaven region. In the context of the Environment Protection and Biodiversity Conservation Act 1999 (Com.), Historic Shipwrecks Act 1976 (Com.), and NSW Heritage Act 1997 (State), it was found that Defence's key obligation was to not undertake activities or actions that may or will have a significant impact on the environment including wreck sites.

Key findings of the report were:

- *The Shoalhaven area contains a large number of wrecks, particularly in the waters of Jervis Bay and its approaches;*
- *Many of the wrecks are known only in terms of an indicative area in which they lie, as definitive data providing locations is often not available;*
- *The Fairy Firefly wreck in Jervis Bay is of a high level of heritage value, given its intactness, accessibility and rarity;*
- *Naval activities have the potential to impact on wrecks within the Bay, but minimal risk of impacts in the EAXA (Eastern Australian Exercise Area) due to its size and depth;*
- *Land located wrecks do not form a significant collection on Defence controlled areas. This is due in part to fewer and less reliable records available for assessment (see Appendix A – notes on information sources) and to the much greater incidence of aircraft wrecks on land being retrieved.*
- *It would appear that the lack of wreck sites in Australia listed under EPBC Act legislation is a result of the strong state-based systems in place specifically for managing wrecks and their associated artefacts. The EPBC Act requires that the environment is protected and conserved, the State Acts and Historic Shipwrecks Act provide the mechanisms by which this can be achieved.*

The authors of the study recommended:

- *A practical approach to managing wreck sites within Defence areas has been presented and takes into account the current gaps in information on known wreck sites. Management recommendations are detailed in Section 3 – Heritage Management. In summary the key recommendations are:*
- *Protocols should be put in place ensuring Defence activities do not disturb wreck sites.*
- *Protocols should be put into place to investigate the seabed wreck sites prior to potential impacts.*
- *To promote the heritage values of wreck sites and management protocols to Defence personnel, and where appropriate the wider community*

Section 1 of the report provides background information of the Shoalhaven area to place the study in perspective and provides the project methodology. In brief, the methodology involved a desktop survey, comparative analysis, preparation of a historical summary, and consultation with stakeholders.

Section 2 of the report contains the Heritage Assessment of sites identified as possessing heritage value and provides information on the relevant legislation. A summary of heritage significance is developed, reproduced below:

> *"Many sites and areas within the Shoalhaven area are included in several State and Commonwealth heritage listings, including land based heritage places such as Beecroft Peninsula, Jervis Bay Territory, Jervis Bay and surrounds (a complete list is provided in Section 2.2.1: Commonwealth Legislation). The shipwrecks and aircraft wrecks within the waters identified as part of this HMP, are also recognised, as evidenced by many of them being included on the NSW shipwreck database. The comparative analysis contained in this report has identified Jervis Bay in particular as a place with a unique wreck history in the Australian context. Jervis Bay shares a similar ship and aircraft wreck heritage with that of Port Phillip Bay, Victoria in that they are both significant for their associations with Defence training activities. The majority of wrecks occurring in the region were as a result of Defence training accidents over sea during World War Two.*
>
> *Due to the purely desktop nature of this report, individual wreck sites have not been surveyed, so an assessment of heritage significance for individual sites has generally not been possible, as the condition and integrity of the sites will often have a bearing on its level of significance. One site however, stands out amongst the rest as a highly valuable heritage asset. The Fairy Firefly VX 381 in Jervis Bay is both significant for its testament to the activities and dangers experienced by the airmen who have operated over Jervis Bay, and for its rarity within an Australian context as a wreck site in an excellent state of preservation.*
>
> *As the management recommendations of this report are implemented, new physical and documentary evidence may come to light to identify other wreck sites of a high level of heritage significance."*

Section 3 of the Woodhead report provides the tools for managing the ship and aircraft wrecks previously identified, within the context of Defence use of the area. Recommendations for the interpretation and promotion of heritage values are made. Heritage management recommendations are also developed, in consideration of how to manage civilian as well as Defence wrecks. Section 3 also provides guidelines on future research needs for the area. Management recommendations relevant to the current proposal are reproduced below:

> *3.3.2 In Water Wreck Heritage Management*
>
> *The in-water wreck resource within the study area is characterised by:*

• A high number of sites whose exact locations are unknown.
• All sites are protected under Sections 23, 24 and 28 of the EPBC Act, requiring that actions potentially involving a significant impact not be undertaken, or be the subject of a referral to the Minister prior to being taken.
• Many of the identified sites are automatically protected under either the (Cwlth) HSA 1976 or the (NSW) HA 1977…

Also, in Section 3 of the report, Underwater Cultural Heritage Protocols (UCHP)'s were developed for efficient implementation and risk minimisation. Relevant UHCPs are reproduced below:

UCHP 1 - Investigation of seabed prior to impact
The objective of this protocol is to determine whether sites are located within the impact area. This protocol should be undertaken in consultation with a qualified maritime archaeologist.

The manner of the investigation is dependent on the scale of the proposed impact, its location – rocky seabed, deep water etc. – and the type of sites and/or relics anticipated to be present. The HMP Data Sheets should provide a guide as to the number and types of sites that are likely to be present across the study area.

For small proposed impact areas in relatively shallow waters, a diving inspection may be sufficient. Remote sensing techniques such as magnetometer, side scan sonar or seismic profiling can be used to examine large sections of seabed or deep waters… The choice of remote sensing techniques should take into consideration the characteristics of the seabed being examined as well as the predicted condition and composition of the site or sites being looked for…

…Anomalies of possible cultural origin identified by remote sensing should be examined by divers or ROV to determine their nature and identity.

If a site and/or relic is not identified in this investigation no further action is required (see UCHP 5). If a site and/or relic is identified carry out UCHP 2, 3 and/or 4.

UCHP 4 – If impact unavoidable carry out a Heritage Impact Assessment

It may not be feasible to alter the proposed seabed impact, which will result in the disturbance of a located site and/or relic. In this case a Heritage Impact Assessment should be undertaken by a qualified maritime archaeologist…

The Assessment will examine the proposed impact on the cultural significance of the site and/or relic and will recommend mitigation measures. Such measures may be – but not confined to – activities such as an archaeological survey of the site prior to impact, rescue excavation (recovery of relics) or the implementation of site stabilisation methods such as placement of sandbags or even artificial seagrass over the site. The measures recommended will be proportional to the assessed significance of the site…

Appendix B of the report is an extremely useful Wreck Spreadsheet. Every wreck in the Jervis Bay area uncovered during the desktop survey has been allocated an Inventory/ID number. Each wreck site is then listed against columns for site name, wreck type, where lost, when lost, located, coordinates, radius in nautical miles, and references. There are separate spreadsheets for Defence and Civilian wrecks.

Volume 2 of the report contains individual data/inventory sheets for every wreck in the Wreck spreadsheet.

Comber Consultants, 2020. Thematic Study New South Wales Shipwrecks. Report prepared for Heritage NSW, Department of Premier and Cabinet.

The aim of the NSW Shipwreck thematic study is to provide a thematic study of shipwrecks subject to the New South Wales *Heritage Act 1977* (Comber and Associates 2020). The main identified maritime heritage themes and subthemes help identify the heritage significance associated with shipwrecks in NSW waters. Potential shipwrecks located within and/or adjacent to the subject site have been classified next to their most appropriate maritime themes, as listed below in Table 5-1.

Table 5-1: NSW Maritime Shipwreck Themes associated with Shipwrecks within and immediately adjacent to the subject site.

Shipwreck	Year lost	Maritime theme & sub theme
Missie	1869	Commerce and Industry - the transport of goods and services Events: Shipwrecks as Events
Lady Hampden	1941	Defence: Defence & War in Coastal Waters Events: Shipwrecks as Events

5.2 Jervis Bay Coastal Processes Investigation

As mentioned in Section 3.2 above the relocation of two of the existing mussel aquaculture leases 250 towards the northwest and the creation of a new lease between these two are located in water depth of between 11 m and 14 m relative to the Lowest Astronomical Tide (LAT), and seabed appears to be dominated by unconsolidated sediments.

The seabed topography appears from the MBES data and from the still captures from the ROV data to be ripple pale seabed with some areas of drift algae present. This is the dominant seabed topography for all three lease areas. The appearance of the ripple pale seabed highlights the seabed at this depth is subjected to interaction with wave and current action.

DPIRD have made available research relating to the water movement within Jervis Bay. Research has shown that the thermally driven current within Jervis Bay move in a clockwise direction once they enter the bay, becoming cooler water as they circulate through the bay and eventually exiting. This process leads to the waters in side Jervis Bay flushing out approximately every 21 days (Holloway 1996).

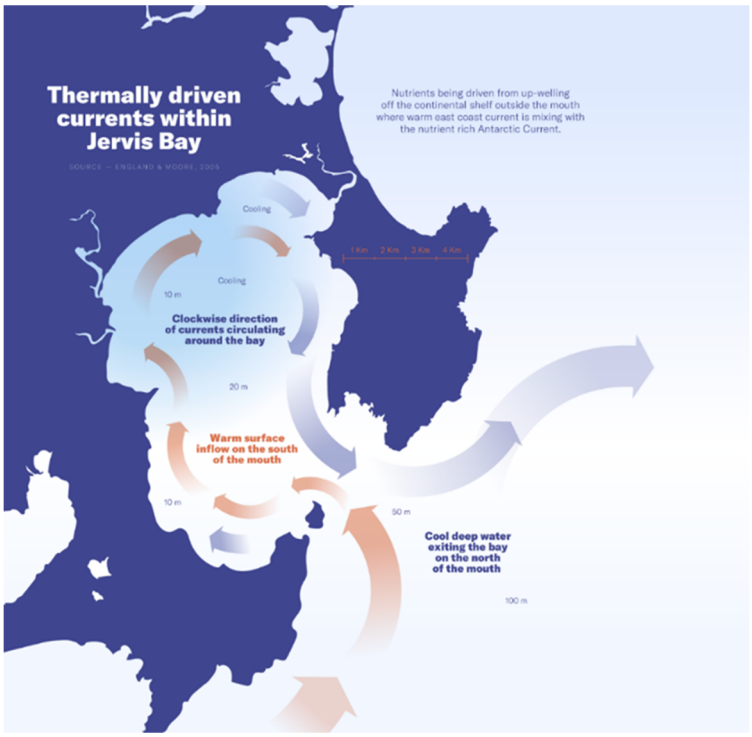


Figure 5.1: Water exchange between warmer waters entering the bay and causing the oscillation and movement of water around and back out the bay every 21 days (Source Holloway et al.,1996)

5.3 Review of geophysical data

The seafloor mapping of the lease areas was collected on 18 December 2024 by Astute Surveying. The objectives of the survey were to accurately measure the seabed for possible heritage related objects on the seabed (Astute Surveying 2025: 2). The scope of the seafloor mapping included the collection of Multibeam (Astute Surveying, 2025: 5).

Multibeam Hydrographic Survey

The MBES survey used a Norbit i77h Multibeam Echo Sounder System, which has the ability to collect multibeam (MBES). The sonar was attached to the side of the vessel, and the accuracy of the recording is stated to be within 1m horizontally and 0.25 vertically.

The MBES survey covered 100 % of the investigation area (Figure 5.2).

A review of the MBES data shows the location of the ripple pale seabed topography across the whole of the investigation area (Figure 5.3). This was the observed across the whole the investigation area (Figure 5.2 and Figure 5.3).

A review of the MBES data did not identify any potential shipwreck or other potential anomalies within the investigation subject site. The proposed location for the three leases is flat gently sloping seabed from northwest to southeast (Figure 5.2 and Figure 5.3).

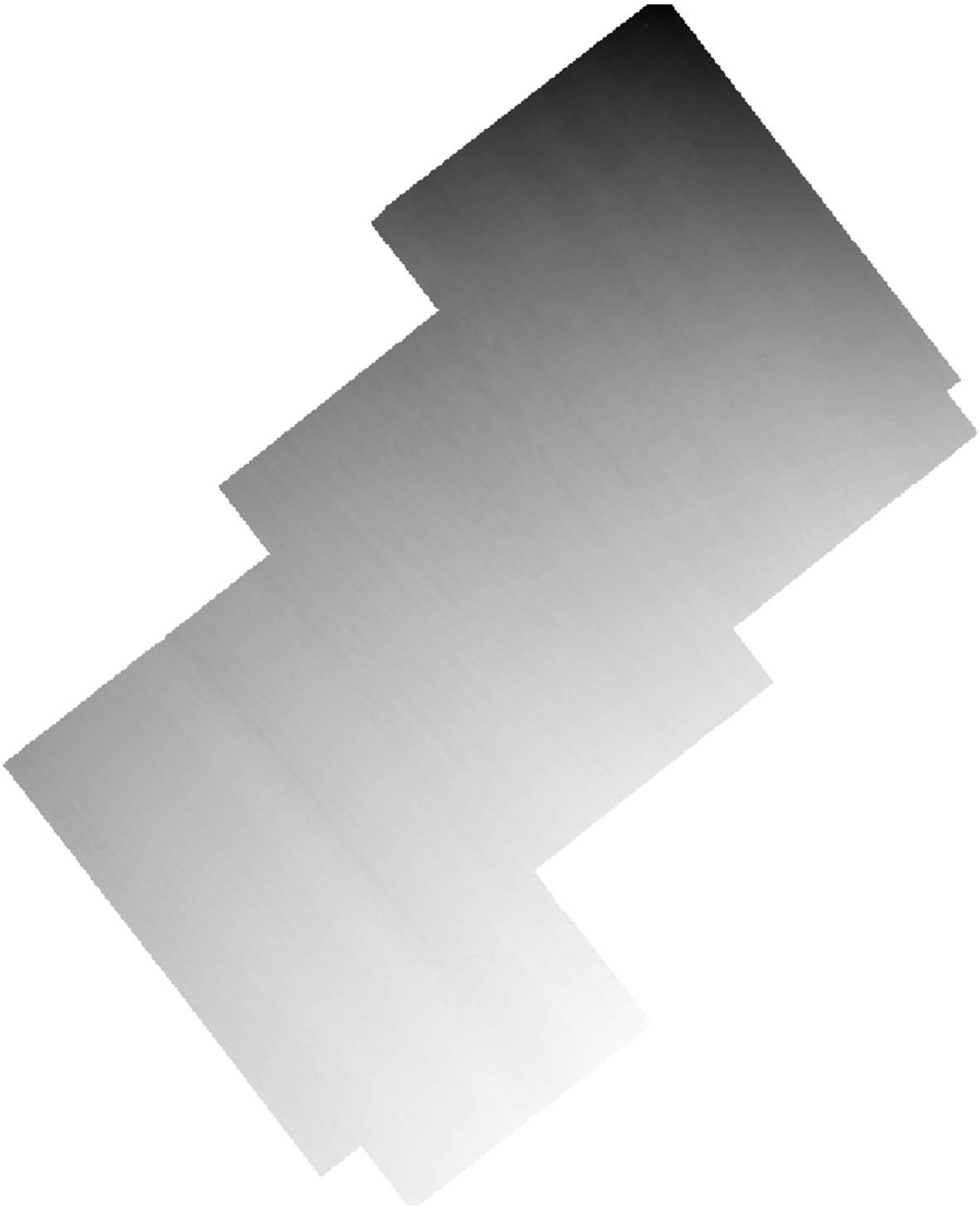


Figure 5.2: MBES survey results from the mussel aquaculture lease subject site (Source: Astute Surveying, 2023).

Figure 5.3: Example of ripple pale sand formation on the seabed within the MBES survey area (Source: Astute Surveying, 2025).

5.4 Potential for Aboriginal Objects and Inundated Landscapes

Based on the results of the Aboriginal heritage investigation and the information provided by Astute Surveying and South Coast Mariculture, there is a low potential for Aboriginal objects to be present in the subject site.

A review of the MBES seabed data shows that the proposed locations for the mussel aquaculture lease areas are within relatively flat seabed areas with only a gentle slope from northwest to southeast. The presence of unconsolidated ripple pale seabed topography is evidence of transitory sediments that are influenced by the wave and currents inside the bay. These are not considered to be potential earlier landscape features, but associated with more modern, Holocene deposition events, i.e. sediment deposition since inundation.

The archaeological predictive model based on previously recorded sites indicates that they were located close to the coastline and along the river. The review of the MBES data and still images taken from ROV transect videos has not resulted in the identification of any landforms or other elements that could indicate the present of Aboriginal objects of sites within the subject site. The potential for submerged and/or covered underwater cultural heritage objects is also considered to be low.

The Department of Primary Industries and Regional Development have carried out consultation with the Jerrinja Local Aboriginal Land Council over the course of the initial SSI application and subsequent previous Modification Application. Discussion regarding connection to Country and values of the community to Jervis Bay, including its waters, have been discussed. DPIRD have also asked Jerrinja LALC regarding UCH and submerged landscapes. The consultation resulted in no objections to the original or relocation and creation of the third aquaculture leases, and there were no indications of any UCH in the current and proposed lease areas (Pers. Comms Ian Lyall 24/09/2024).

5.5 Potential for Historical Underwater Cultural Heritage Sites

Based on historical research, searches of both the Commonwealth and State heritage databases and a review of the MBES data, there are no known shipwrecks and a low potential for unknown (or undocumented) shipwrecks to be present within the subject site.

A review of the MBES data does not show any potential shipwrecks or other anomalies present within the subject site, especially within the three proposed mussel farm lease areas. Only seabed features of ripple pale seabed topography were present in both the geophysical data sets and from the ROV surveys.

Based on the maritime history of the area, there is a low potential for undocumented or unknown shipwrecks at the subject site. This is based on vessels prior to 1820s passing by this section of coast, as there were no facilities or townships. There is the low potential for one shipwreck, *Missie*, to be present. This is based on the ambiguous location of where the vessel wrecked in 1869 of where the vessel overturned, to where the vessel may have ended up wrecked.

In addition to this, there is a low potential for any shipwreck related material to be present within the subject site. the wrecks of *Missie* and the later wreck of *Lady Hampden* are associated with wrecking and post wrecking events that may lead to shipwreck material to be present within the subject site. the potential for this, and other material, to be present may be low, however, it cannot be discounted as the shipwreck material can be transported along the seabed by wave and current action.

There is also a low potential for any remains of aircraft wrecks to be present within the project area. Remains of the Beaufort A9-96 through braking up on impact, as well as the loss of the Firefly VX 381 in the waters off Huskinson, have not been seen in the MBES data. The presence pf aircraft wreck material would have been clearly seen in the seabed data.

5.6 Summary

Based on a review of the historical information, including results of the relevant database searches, geophysical data, and other relevant information, the subject site is considered to have low archaeological potential for UCH. There is a low potential for one shipwreck to be present in the greater area. This is based on the ambiguous information relating to the shipwreck and wrecking event. This wreck, *Missie*, overturning and sinking 1868 on a tack approach to the mouth of the Currambene Creek., However, there is no evidence of the shipwreck or shipwreck material present in the geophysical data. Similarly, there is no evidence of aircraft or aircraft wreckage on the seabed within the subject area.

6. Impact Assessment

6.1 The Proposal

It is proposed to install 312 screw anchors to establish the new mussel aquaculture farm lease area. It is proposed to screw in the anchors to tether the floating aquaculture farm which consists of surface/subsurface buoys from which mussel culture droplines would be suspended. Existing screw anchors would be left *in situ* and not removed from the seabed.

The impact from the proposal would be from the installation of a total 312 screw anchors across the three lease areas. These would be directionally drilled using a drill rig suspended above the seabed. Only the screw anchor of the drill rig would contact the seabed. The installation process would only have a direct impact on the seabed during the installation of the anchor at its location, and would not cause any close or far field impacts on the seabed (Plate 6.1 and Plate 6.2).

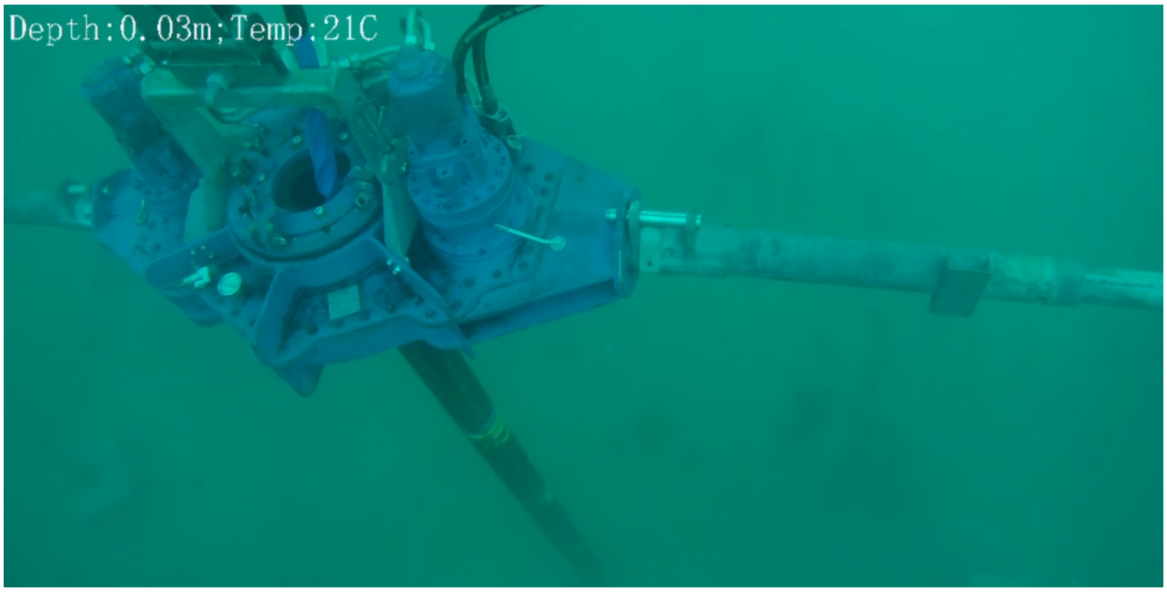


Plate 6.1: Suspended drill rig installing a screw anchor into the seabed (Source: DPIRD)

Plate 6.2: Close up view of the drill rig installing a screw anchor below the seabed (Source: DPIRD).

6.2 Potential impacts

The potential impacts to underwater cultural heritage are from both direct and indirect impacts from the proposed works. For the creation of the mussel aquaculture farms, the direct impact would be from the installation of the 312 screw anchors into the seabed. The impact of these anchors is very precise, and would not cause near or far field impacts to the surrounding seabed. This is evident from the presence of the ripple pales in the seabed adjacent to the screw anchor being installed in Plate 6.2. Once installed, the droplines would be suspended above the seabed with the use of buoys.

The three main impacts to shipwrecks and other cultural heritage material are categorised as mechanical, chemical and biological.

- *Mechanical* damage, is where the physical integrity of the site is affected by the impacts of wave, surge, current, sand abrasion as well as cultural behaviour such as dredging, dragging anchors or vessels running aground. Increases in mechanical damage to a site can result from increases in tidal flows and increased exposure of sites to sediment erosion.
- *Chemical* damage relates primarily to the corrosion of the metal components of a site. Changes in pH levels, salinity, light levels (heat) and water movement can dramatically increase electrochemical (corrosion) activity for metal components immersed in seawater.
- *Biological* damage occurs where organic materials, such as wreck or wharf timbers, are exposed to biological organisms such as marine borers and bacteria, and in some cases vegetation. In relation to marine heritage sites, increased biological damage will occur if buried sites, or partially exposed sites, are further exposed, due to sediment erosion. This can expose areas where an equilibrium has been reached between the organic and the shipwreck material, however, the removal of the organic material exposes the portion of the shipwreck to additional chemical and/or mechanical forces.

If underwater cultural heritage sites are influenced by one or more of the above described impacts, it may cause accelerated deterioration, that may include damage to the structural integrity of the heritage site, including the potential for collapse, deterioration or deflation of the site. Any of these impacts would potentially result in impacts to heritage significance and archaeological potential.

The proposed placement of the three lease areas and the associated 312 screw anchors are not expected to have a direct impact on any known or potential UCH sites, including Aboriginal objects, shipwrecks or other articles. The locations for the lease areas consists of gentle sloping sandy seabeds, that have long, ripple pale sand features on the seabed. The review of the MBES data shows that the three proposed locations do not show any potential shipwreck or other anomalies that could indicate the potential for UCH material or sites.

There are not expected to be any impacts to UCH sites from the installation of the screw piles and from the operation of the mussel aquaculture leases. The installation of the anchors is unlikely to cause any scouring as they are embedded below the seabed. No scouring has been observed around the anchors and tether connections on existing mussel aquacultural leases (Plate 6.3).

Regarding the operation of the aquacultural farm, and specifically with the biowaste generated from the mussel farms, this is not expected to accumulate or change the pH or marine grown in the surrounding area. The current lease holder, South Coast Mariculture, have undertaken a series of three ROV investigations of the seabed under the existing mussel aquacultural areas. Over the three years of their investigations (2019, 2020 and 2022) there have been no visible changes to the seabed directly under or immediately around the dropline areas (South Coast Mariculture 2024: 15). It is also well understood from scientific research that the waters within Jervis Bay are flushed out as part of the natural coastal process approximately every 21 days. As such, it is not expected that any

buildup of suspended biowaste from the operation of the mussel farms that would result in a chemical impact on any UCH present in the wider Jervis Bay area.

Plate 6.3: Top section of a screw anchor showing where the dropline is tethered to the screw anchor (Source: South Coast Mariculture 2024: 8).

Under the *New South Wales Department of Planning and Environment, Guidelines for preparing a Statement of Heritage Impact,* 2023, various 'Matters for Consideration' require a response. These are set out below.

Table 6-1: Response to Considerations for Specific Types of Work, posed by the Guidelines for preparing a Statement of Heritage Impact (2023).

Relevant Considerations for Specific Types of Work	***Response***
How has the impact of the new work on the heritage significance of the existing landscape been minimised?	The installation of the 312 screw anchors into the seabed would be placed in areas of flat seabed. There are no known seabed or submerged landscape features present in the subject site. Review of the MBES data shows the area as being a gently sloping seabed from the northwest towards the southeast. An understanding of the maritime history of the area and a review of the shipwreck databases has shown that there are no known shipwrecks at the subject site, and a low potential for any undocumented and unknown shipwrecks to be present. Once the screw anchors have been installed into the seabed, there is expected to be minimal changes to the seabed in the local area. There is no expected to by any souring at the locations where the droplines attached to the screw anchors, and the transport of sediment over and around the structures are expected to not cause any seabed changes. The fixing of the screw anchors within the seabed is not expected to impact any known or potential UCH sites that maybe present in the area. There are not expected to be any far-field changes to sediment transportation or currents from the installation of the screw anchors or from the operation of the aquaculture leases. Understanding of the hydrodynamics of Jervis Bay, the water inside the bay flushed out every 21 days. As such, there are no expected to be any impacts to known or potential UCH within Jervis Bay from any biowaste generated by the mussel aquaculture farm.

Will any known or potential archaeological relics be affected by the landscape works? How will this be mitigated? Has advice been sought from a suitably qualified archaeologist?	There are no known shipwrecks and a low potential for undocumented and unknown shipwrecks to be present within the subject site. The location for the three leases are on flat sandy seabed, away from any reef or other seabed landscape formations. There is no evidence from the MBES data for shipwreck, anomalies or other potential UCH sites to be present. After the anchors for the new mussel droplines have been installed into the seabed, there is predicted to be no localised scouring. The potential to impact on UCH articles that are present in the area is considered to be negligible. Yes, the advice of a suitably qualified maritime archaeologist has been sought. Chris Lewczak is the primary author of this report.
Do the proposed works impact views to, from and within adjacent heritage items?	The proposed establishment of the mussel aquaculture leases would not impact on any known or potential maritime heritage views or vistas.

7. Conclusions and Recommendations

7.1 Conclusions

- The NSW Department of Primary Industries and Reginal Development is relocating two existing mussel aquaculture leases and establishing a third aquaculture lease at Jervis Bay. The works would include the installation of 312 screw anchors into the seabed that would support the droplines for the mussel aquaculture farm.
- The location of the mussel farm leases would be within a depth of water between 11 m and 14 m and is on relatively flat sandy seabed away from all known seabed landscape features.
- Reviewing Aboriginal heritage information data, there is likely to be a negligible potential to result in harm to Aboriginal objects from the installation the screw anchors. A review of ROV data conducted by South Coast Mariculture and geophysical survey results by Astute Surveying identified the seabed is dominated by ripple pale sand topography, There is no evidence of any reefs or other features on the seabed.
- Based on the results of AHIMS search results, there is a concentration of Aboriginal heritage objects and sites being located close to the foreshore and other resource locations, such as the river. Applying the predictive model to the three lease site locations shows there are no seabed features that could be interpreted as being paleochannels or similar resource locations
- Historical research, review of the geophysical data and historic shipwreck databases has identified no known or potential undocumented or unknown shipwrecks to be present within the investigation area. The preferred locations for the three lease areas are on flat, gently sloping seabed that are void or any features, including potential shipwrecks or other UCH anomalies.
- The screw anchors and dropline tether attachments are not expected to cause any localised scouring to the seabed. The operation of the aquaculture leases, including generated biowaste, is not expected to have a direct or indirect impact to known or potential UCH articles within Jervis Bay.
- The construction of three mussel farm aquaculture farm lease areas would not result in an adverse impact to any unknown or undocumented shipwreck in the investigation subject site. Given the low potential for potential shipwrecks, shipwreck material or other UCH articles at the subject site, any scouring would have a negligible impact on UCH.

7.2 Recommendations

Based on the results of this assessment, it is recommended that:

- No permit is required for this project under the *Heritage Act, 1977*, as the activity is not considered to 'directly or indirectly physically disturb' protected shipwrecks. A copy of this report will be provided to the Heritage NSW maritime archaeologist for their review and endorsement and additional information included to satisfy their requirements.
- The unexpected finds procedure included as Section 8 of this report should be followed if potential underwater cultural heritage site or articles are unexpectedly identified during the drilling of screw anchors for the new mussel farm leases.

8. Unexpected Finds Procedure

This unexpected finds procedure has been provided to assist DPIRD in identifying and managing unexpected cultural heritage that may be encountered during the placement and future monitoring of the mussel aquaculture farm lease areas in Jervis Bay.

This unexpected finds procedure has been informed by the UCH assessment prepared for this project and includes:

- Unexpected finds, stop work triggers and notification procedures
- Recording examples

Based on the proposed works, it is understood that a total of 312 anchors would be installed across the three lease areas that would be established for the mussel aquaculture farms. The new structures would be placed in a water depth between 11 m to 14 m. Once placed on the seabed, the droplines would be tethered to the screw anchors and would remain floating with the use of a buoy system. There would not be any additional anchoring or securing to the seabed.

There are no known shipwrecks within the location for the mussel aquaculture farm lease structures, and a low potential for undocumented or unknown shipwrecks to be present. In the event that any potential objects are recovered from the water during these works, or are visible during any future inspections of the farm structures, that they must be kept wet and protected until a maritime archaeologist is notified and advice can be provided.

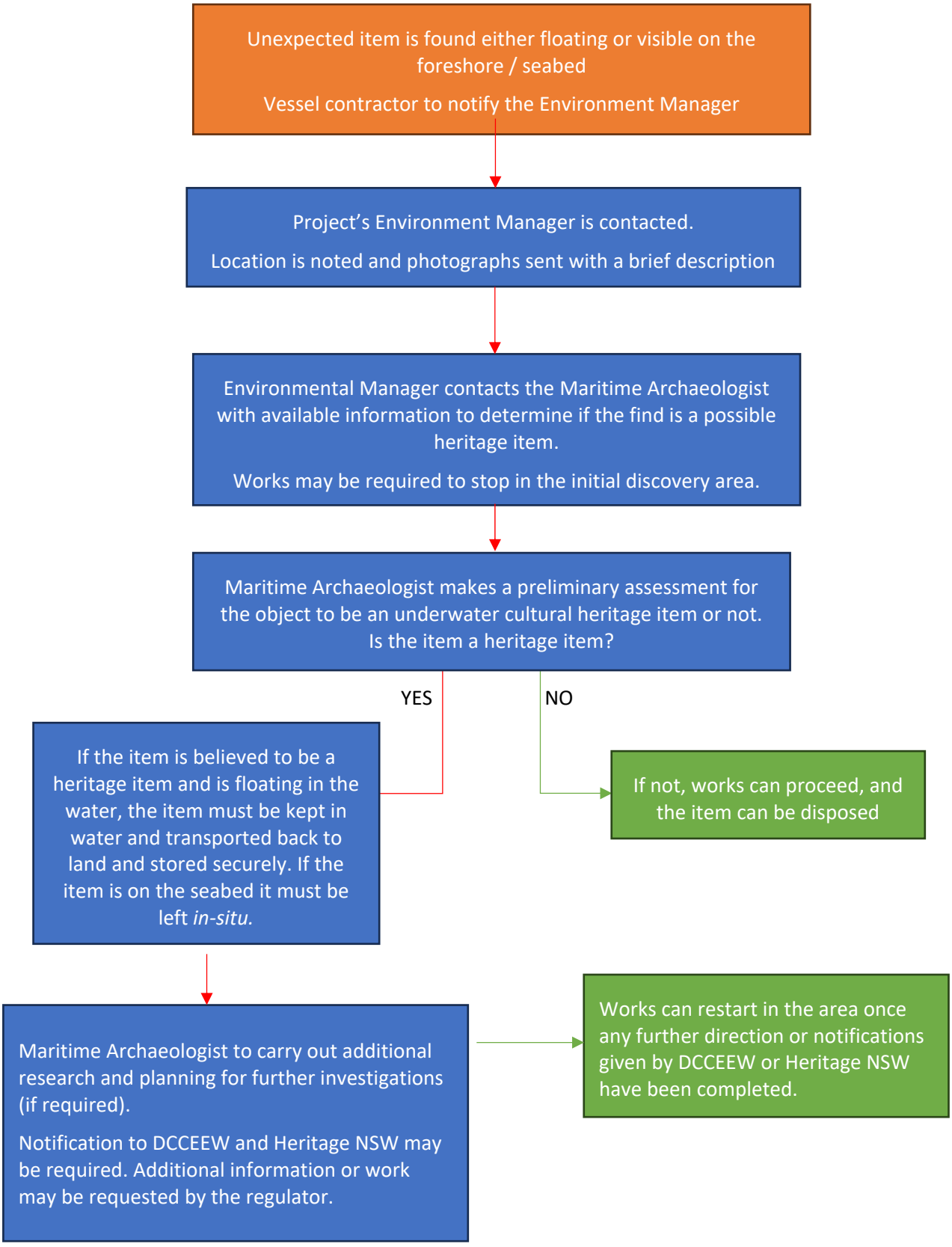
8.1 The Procedure

The unexpected finds procedure is as follows

1. On discovery of a potential archaeological find, or identified relic, the relevant environmental management representative on the vessel must notify the Project's Environmental Manager. Photographs and a GPS position of where the potential found was encountered should be taken and passed on with the notification of the objects discovery. Examples of how to take photographs and the types of materials that could be expected are provided in Section 8.2 below.
2. The Project's Environmental Manager must contact the Project Maritime Archaeologist with all supporting information so the Maritime Archaeologist can determine if the item is a possible heritage item.
3. The Project Maritime Archaeologist must be given time to assess the find and its heritage significance, and, if the object is possible a singular item or there is potential for a larger deposit or site.
4. If the find is assessed as being a possible heritage item, work is to cease in the immediate area where the discovery of the object was found/encountered until further investigation can be made. Notification of the discovery of a shipwreck is required to be made to Heritage NSW under S.146 of the *Heritage Act, 1977.*
5. Heritage items that are identified on the seabed should be left *in situ*. If the item was recovered floating in the water, the object should be kept wet, placed in a tub filled with ocean water (if not too large) and taken back to shore and the next available opportunity to be stored in a secure location at the DPIRD depot at, or close to Jervis Bay. The Project Maritime Archaeologist would then attend site as soon as possible to make further recordings and recommendations based on their assessment of the item. Recommendations would include possible long term conservation of the find and future storage or display.

The Project Maritime Archaeologist would need to determine if the find is from a potential shipwreck or other underwater cultural heritage site, or, if the object is from a debris field or similar scatter. If part of a shipwreck is discovered, it would likely require some time to investigate, determine its location and provide mitigation measures. Individual finds relating to potential dumped debris may have been transported into the area via natural coastal processes, and is likely to be less significant, and likely to continue without much delay.

Failure to follow the unexpected finds procedure may result in a breach of the *NSW Heritage Act 1977*, and/or the Commonwealth *Underwater Cultural Heritage Act 2018.* Penalties for breaches of either of these Acts may apply.


Unexpected item is found either floating or visible on the foreshore / seabed
Vessel contractor to notify the Environment Manager
Project's Environment Manager is contacted.
Location is noted and photographs sent with a brief description
Environmental Manager contacts the Maritime Archaeologist with available information to determine if the find is a possible heritage item.
Works may be required to stop in the initial discovery area.
Maritime Archaeologist makes a preliminary assessment for the object to be an underwater cultural heritage item or not. Is the item a heritage item?
YES
NO
If the item is believed to be a heritage item and is floating in the water, the item must be kept in water and transported back to land and stored securely. If the item is on the seabed it must be left in-situ.
If not, works can proceed, and the item can be disposed
Maritime Archaeologist to carry out additional research and planning for further investigations (if required).
Notification to DCCEEW and Heritage NSW may be required. Additional information or work may be requested by the regulator.
Works can restart in the area once any further direction or notifications given by DCCEEW or Heritage NSW have been completed.

8.2 Photograph recording examples and possible material examples

DISCOVERY OF PREVIOUSLY UNIDENTIFIED HERITAGE OBJECTS DURING ACTIVITIES
EXAMPLE PHOTOGRAPHIC RECORDING GUIDE

1. SCALE IN EVERY PHOTO
   Scale can be
   - Tape Measure
   - Photo Scale.

2. PHOTOS FROM DIFFERENT ANGLES
   Flip the object over, or photograph the sandstone from side.

3. CLOSE UP OF DETAILS
   Including features, text and marks.
   Detailed photos can be taken in the site office at the end of the day.

4. PHOTOS MUST BE IN FOCUS
   Details need to be clear when zooming in.

5. OBJECTS CAN BE CLEANED
   Water can be used to gently remove dirt in order to highlight or reveal details.

6. OBJECTS MUST BE KEPT SOMEWHERE SAFE
   Objects can be put into zip lock bags or blocks can be stacked somewhere safe.

EXAMPLE OF TIMBER ITEMS

Examples of how to photograph unknown timber items.

Scale in every photograph.

The background of each photograph should be kept as clean as possible to see the item clearly.

EXAMPLE OF METAL ITEMS

Examples of how to take detailed photographs of metal items.

Photographs of the whole item should be taken before taking detailed photographs.

Scale should be present in every photograph and located close to the detail being shot.

Different angles of the same detail should be taken.

Multiple small objects can be photographed in one shot. Items should be spaced so each can be clearly seen.

The scale needs to be visible so accurate measurements can be taken from the photos.

Detailed photos should still be taken if objects have writing or other stamped features on them.

EXAMPLES OF GLASS ITEMS

How to photograph a whole bottle.

Scale kept straight on either below or to one side of the bottle.

How to photograph detail present on a glass bottle.

Scale kept straight and close to the detail being photographed.

How to photograph detail around the base of a glass bottle.

Scale is in line and kept straight.

How to photograph the detail on the base of a bottle.
The photo can be taken on an angle to help see the outline of embossing

Scale is level with the section of the bottle to be photographed and kept straights.

References

Primary sources and facsimiles

Alexander Berry: Report of his exploration of South Coast of New South Wales from Shoalhaven to past Bateman's Bay. Alexander Berry to Sir Thomas Brisbane, 10 February 1822. State Records Reel 6054; 4/1759.

Bladen, F. M. (ed.). 1893. *Historical Records of New South Wales, Volume 1, Part 1 – Cook, 1762-1780.* Government Printer: Sydney.

Bladen, F. M. (ed.). *Historical Records of New South Wales, Volume 3.* Government Printer: Sydney.

Bladen, F. M. (ed.). *Historical Records of New South Wales, Volume 4.* Government Printer: Sydney.

Macquarie, Lachlan. *Memoranda & Related Papers.* 22 December 1808-14 July 1823. Original held in the Mitchell Library, Sydney. ML Ref: A772 39 f. [Microfilm Reel CY301 Frame #46].

Watson, F. (ed.). 1917. *Historical Records of Australia,* Series I, Volume 9, January 1816-December 1818. Government Printer: Sydney.

Watson, F. (ed.). 1917. *Historical Records of Australia,* Series I, Volume 10, January 1819-December 1822. Government Printer: Sydney.

Secondary Sources

Antill, R. G. 1982. *Settlement in the South: a record of the discovery, exploration and settlement of the Shoalhaven River Basin 1803-1882.* Weston Publishing Co., Kiama.

Bell, P. 2006. Aircraft Crash Sites on Commonwealth Land in the Jervis Bay Territory and City of Shoalhaven, report to Woodhead International, Adelaide.

Benjamin, J., O'Leary, M., McDonald, J., Wiseman, C., McCarthy, J., Beckett, E., Morrison, P., Stankiewicz, F., Leach, J., Hacker, J. and Baggaley, P. 2020. *Aboriginal artefacts on the continental shelf reveal ancient drowned cultural landscapes in northwest Australia*. Published in PloS one, 15(7).

Bindon, K. 1986. "The whaling station that almost was!" *The Shoalhaven Chronograph,* 16(1), pp. 1-2.

Blair, M. 2000. *From Bullocks to Bypass: a local history of the NSW South Coast village of Tomerong.* Self: Tomerong.

Comber Consultants, August 2020, *New South Wales Shipwrecks Thematic Study.* Unpublished report prepared for Heritage NSW, Department of Premier and Cabinet.

Crabb, P. 2007. *The Jervis Bay region 1788 to 1939: An emptied landscape,* Lady Denman Heritage Complex: Huskisson.

Davis, L. 2020. 'Spotted Gum and Ironbark: An Environmental History of the South Coast New South Wales Forest Industry', Davis, 2020: Thesis, Western Sydney University.

Department of Environment, Energy, Climate Change and Water (DEECCW), June 2024. *Assessing and Managing Impacts to Underwater Cultural Heritage in Australian Waters, guidelines on the application of the Underwater Cultural Heritage Act 2018,* Canberra.

Department of Planning and Environment, 19 June 2023, *Guidelines for preparing a statement of heritage impact.*

Director of National Parks and Booderee National Park Board of Management. 2015. *Booderee National Park, Plan of Management 2015-2025*, Canberra: Director of National Parks.

Egloff, B. J. 1990. *Wreck Bay: An Aboriginal fishing community.* Aboriginal Studies Press: Canberra.

Evans, R. 2004. *Ships and Settlement on the Shoalhaven*. Nowra: Self.

Heritage Branch, Department of Planning, 2009, Assessing significance for historical archaeological sites, Department of Planning.

Holloway, PE 1996, 'A field investigation of water exchange between a small coastal embayment and an adjacent shelf', Coastal and estuarine studies, American Geophysical Union, pp. 145–158

Hoskins, I. 2013. *Coast.* Sydney: NewSouth.

Jackson, G. 1978. *The British Whaling Trade.* A & C Black Ltd.: London.

Jackson, G. n.d. "Shore Based Whaling in Jervis Bay", Sydney: Self.

Jervis, J. 1936. "Jervis Bay: Its Discovery and Settlement", *Journal and Proceedings of the Royal Australian Historical Society,* Vol. 22 (2): pp. 118-135.

Kingston, B. 2006. *A History of New South Wales.* Cambridge University Press: Melbourne.

Lipscombe, T. 2017. "Jervis Bay – what Lt James Cook really Named", *Placenames Australia, Newsletter of the Australian National Placenames Survey an initiative of the Australian Academy of Humanities, supported by the Geographical Names Board of NSW,* June: pp. 1-4.

Oliver, R. et al. 2001. Lady Denman Conservation Management Plan, Lady Denman Heritage Complex, Huskisson.

Pepper, J. 1978. "Timber industry in the Shoalhaven". *The Shoalhaven Chronograph,* 7(5): pp. 1-4.

Pleaden, R. F. 2004. *Coastal Explorers.* Clyde River & Batemans Bay Historical Society Inc., Batemans Bay.

Sant, B. 2004. *Grand Visions for Jervis Bay: Paradise Preserved?,* Canberra: Big island Graphics.

Smith, T. 2004. "Plane Sailing: The archaeology of aircraft losses over water in New South Wales, Australia", *Bulletin of the Australasian Institute for Maritime Archaeology,* Vol. 28: pp. 111-122.

Sullivan, M. E. 1977. Aboriginal Sites of Brerwerre Peninsula, Conservation Memorandum No. 5, Conservation and Agriculture Branch Department of the Capital Territory.

Swinden, G. 1995. "Naval history" in Cho et al. (eds.), *Jervis Bay: A place of cultural, scientific and educational value.* Australian Nature Conservation Agency: Canberra, pp. 29-34.

Taylor, K. 1988. *The Heritage of Jervis Bay.* National Trust of Australia (ACT): Canberra.

Weatherburn, A. K. 1978. "The explorations and surveys of James Meehan between the Cowpastures, Wingecarribee River, Goulburn Plains, Shoalhaven River and Jervis Bay 1805, 1818 and 1819", *Journal of the Royal Australian Hjstorical Society*, 64(3): pp. 167- 81.

Wolfe, A. and Waterman, P. 1989. Maritime Archaeological Resources of Jervis Bay, Jervis Bay Environmental Study Technical memorandum 2/89, Report to Facilities Division, Department of Defence.

Woodhead for DMM, 2006. Shipwrecks and Aircraft Wrecks, Shoalhaven Region, Heritage Management Plan, Vols. 1 and 2, report prepared for Department of Defence, Oct 2006.

Internet Sources

Booderee National Park, 2024. 'Our History', *Booderee National Park,* accessed 1 oct 2024 from: https://parksaustralia.gov.au/booderee/discover/history/.

Department of Environment, Energy, Climate Change and Water (DEECCW), 2021. 'Maritime History', Booderee National Park, Culture and History, accessed 30 Sep 2024 from: https://www.dcceew.gov.au/parks-heritage/national-parks/booderee-national-park/culture-and-history/maritime-history#shipwrecks-in-the-jervis-bay-area-18051928.

Department of Environment, Energy, Climate Change and Water (DEECCW), 2021b. 'European History', Booderee National Park, Culture and History, accessed 30 Sep 2024 from: https://www.dcceew.gov.au/parks-heritage/national-parks/booderee-national-park/culture-and-history/european-history#royal-australian-naval-coll%E2%80%A6.

Department of Environment, Energy, Climate Change and Water (DEECCW), 2022. 'Aboriginal culture and history', Booderee National Park, Culture and History, accessed 1 Oct 2024 from: https://www.dcceew.gov.au/parks-heritage/national-parks/booderee-national-park/culture-and-history/aboriginal-culture-and-history#the-future.

Department of Infrastructure, Transport, Regional Development, Communications and the Arts (DITRDCA), 'Economic Development', *Jervis Bay Territory,* accessed 1 Oct 2024 from: https://www.infrastructure.gov.au/territories-regions-cities/territories/jervis-bay-territory/economic-development#:~:text=Tourism%20is%20the%20most%20significant,of%20the%20Booderee%20National%20Park..

Wreck Bay Aboriginal Community Council (WBACC), 2020. 'Aborigines of Jervis Bay', accessed 30 Sep 2024 from https://wbacc.gov.au/aborigines-of-jervis-bay/.

Maps and plans

Australia. Department of Home Affairs. Lands and Surveys Branch. 1912, *Plan of Jervis Bay* The Dept, [Canberra] viewed 30 September 2024 http://nla.gov.au/nla.obj-366406915

Bird & Chalmers & Bakers (Firm). 1840, *Plan of sixteen agricultural farms, St George's Basin contigious to the township of Huskisson, Jervis Bay* Bakers Litho, Sydney viewed 30 September 2024 http://nla.gov.au/nla.obj-229905301

Great Britain. Hydrographic Dept & Potter, J. D & Stokes, J. Lort & J. & C. Walker. 1852, *Australia, East Coast* Published according to Act of Parliament at the Hydrographic Office of the Admiralty ; Sold by J.D. Potter, agent for the Admiralty charts, 31 Poultry, London viewed 30 September 2024 http://nla.gov.au/nla.obj-233813703

Great Britain. Hydrographic Dept & Beecroft, R & Potter, J. D & Stokes, J. Lort & J. & C. Walker. 1853, *Australia, East Coast, Jervis Bay Australia, East Coast, Bateman Bay* Published according to Act of Parliament at the Hydrographic Office of the Admiralty ; Sold by J.D. Potter, agent for the Admiralty charts, 31 Poultry, London viewed 30 September 2024 http://nla.gov.au/nla.obj-233813049

Great Britain. Hydrographic Department & Potter, J. D & Wharton, W. J. L & Balfour, A. F & Davies & Company. 1899, *Australia, New South Wales, Jervis Bay* Published at the Admiralty 5th June 1895, under the Superintendence of Rear Admiral W.J.L. Wharton F.R.S. Hydrographer ; Sold by J.D. Potter, Agent for the Admiralty charts,145 Minories, London viewed 30 September 2024 http://nla.gov.au/nla.obj-232118723

Great Britain. War Office. General Staff. Australian Section, cartographer & Green, H. J & Australia. Army. Royal Australian Engineers. Survey Section, surveyor. 1931, *Jervis Bay, New South Wales* Australian Section Imperial General Staff, [Melbourne] viewed 30 September 2024 http://nla.gov.au/nla.obj-324226109

New South Wales. Department of Lands & Scrivener, C. R. 1909, *Map shewing Jervis Bay and most suitable area for Commonwealth purposes, also position of 3 and 5 fathom lines* The Dept, Sydney viewed 30 September 2024 http://nla.gov.au/nla.obj-366586792

New South Wales. Royal Commission on Railway Decentralisation & Marshall, J & De Burgh, E. M & Gullick, W. A. 1911, *Jervis Bay harbour schemes submitted by the Chief Engineer for Harbours in connection with a proposal to establish an over-sea port at Jervis Bay* Royal Commission on Railway Decentralisation, [Sydney] viewed 30 September 2024 http://nla.gov.au/nla.obj-234154264

Public Record Office, MPG 1/304, 'An eye Drought of Jervis Bay New South Wales taken by Captn. Weatherhead Master of the Matilda', Australian Joint Copying Project handbook. Part 6 : Board of Trade; Treasury; Exchequer and Audit Department; Privy Council; Board of Longitude - class and piece list, p. 54. (AJCP ref: https://nla.gov.au/nla.obj-1165151430/view).

Appendix A: NSW Maritime Heritage Database Shipwreck Search Results

NSWMHD ID	Name	Year Lost	Vessel Type	Where Lost	Status
53	Aeolus	1867/10/28	Ketch	Jervis Bay, Hole in the Wall	Not Found
62	Agnes	1883//	Ketch	Jervis Bay, off	Not Found
1759	Atacama	1898/02/01	Barquentine	Jervis Bay, 50-70mls east of	Not Found
2405	Avro Anson NJ - 141 off Jervis Bay	1943/4/11	Multi-role aircraft	Approximately 20 nautical miles east of Jervis Bay	Not Found
2412	Beaufort Bomber (A9 - 268) Jervis Bay	1943/4/14	Bomber	Jervis Bay	Not Found
2600	**Beaufort Bomber (A9 - 27) Jervis Bay**	**1943/4/14**	**Bomber**	**Jervis Bay**	Not Found
1851	Botany	1936/10/09	Dredge	Jervis Bay, off	Not Found
1861	Brisbane	1832/08	Cutter	Jervis Bay, off	Not Found
3889	Carina	1895/04/06	Smack	Jervis Bay, Bowen Island,	Not Found
1912	Caroline	1859/01/27	Brigantine	Jervis Bay, Point Perpendicular, ashore	Not Found
1958	Chimborazo	1878//	Steamer screw	Jervis Bay, Point Perpendicular	Not Found
1987	Coast Farmer	1942/07/20	Steamer screw	Jervis Bay, off	Not Found
153	Colac Ex HMAS	1987/03/4	Corvette	Jervis Bay, off	Not Found
1664	Coraline	1940/09/03	Launch	Jervis Bay, Point Kialla	Not Found
1678	Cumberland	1797//	Unknown	Jervis Bay, south	Not Found
1692	Dandenong	1876/09/11	Steamer screw	Jervis Bay, off	Not Found
1514	Emma	1864/06/	Schooner	Shoalhaven, 15 miles sth (nth of Jervis Bay)	Not Found
2387	**Fairey Firefly (VX 381) Jervis Bay**	**1956/11/27**	**Anti-submarine**	**Jervis Bay**	Found, location known (Outside subject site)
2406	**Fairey Firefly (WD 887) Jervis Bay**	**1956/11/27**	**Anti-submarine**	**Jervis Bay**	Not Found
1356	George S. Livanos	1942/07/20	Steamer screw	Jervis Bay, 15 miles off	Not Found
1207	John Dory	1941/02/19	Unknown	Jervis Bay, 3 miles north Point Perpendicular	Not Found
1225	Julie Heyn	1865/05	Barque	Jervis Bay, Cape St George	Not Found
2426	Kungah Maris	1993/12/10	Pinnace	Jervis Bay, off	Not Found
1048	Maid of Riverton	1870/12/24	Schooner	Jervis Bay, reef, entrance to Currambene Creek	Not Found

NSWMHD ID	Name	Year Lost	Vessel Type	Where Lost	Status
923	Martha and Elizabeth	1855/05/26	Schooner	Jervis Bay, Point Perpendicular	Not Found
970	Merimbula	1928/03/27	Steamer screw	Jervis Bay, Beecroft Head	Found, location known (Outside subject site)
2765	Missie	1869/09/	Ketch	Jervis Bay, Currambene Creek	Not Found
876	Nancy	1805/04/18	Sloop	Jervis Bay, to south of, (Point Perpendicular?)	Not Found
793	Palmerston	1929/05/29	Steamer screw	Jervis Bay, 18 mls south	Not Found
673	Phoebe	1876/05/	Barquentine	Jervis Bay, north of?	Not Found
691	Plutus	1882/12/09	Steamer screw	Jervis Bay, north of, on sand near Plutus Reef	Found, location known (Outside subject site)
717	Prince Patrick	1867/01/23	Brigantine	Jervis Bay, Montague Bay, beached	Not Found
2767	Reliance	1943//	Trawler	Jervis Bay, Huskisson, Callala Beach	Not Found
2817	Unidentified - Steamers Beach, Jervis Bay - possibly Mynora	//	Unknown	Steamers Beach, Jervis Bay area	Not Found
2731	Unidentified Aircraft - Jervis Bay, Cabbage Tree Creek	1943/04/12	Torpedo bomber	Cabbage Tree Creek, Jervis Bay	Not Found
2797	Unidentified Barrels - Green Point, Jervis Bay - possibly Kinghornes Whaling Station	//	Whaling station	Jervis Bay	Found, location known (Outside subject site)
2467	Unidentified Callala Beach, Jervis Bay - possibly Lady Hampden	//	Ferry	Calla Beach, Jervis Bay	Found, location known (Outside subject site)
3993	Unidentified Currambene Creek 3	//	Unknown	Currambene Creek, Jervis Bay	Found, location known (Outside subject site)
2402	Unidentified Currambene Creek Jervis Bay Boat Wreck	//	Fishing Boat	Currambene Creek, Jervis Bay near Myola	Found, location known (Outside subject site)
2601	Voyager (II) HMAS	1964/2/10	Destroyer	Off Jervis Bay	Not Found

NSWMHD ID	Name	Year Lost	Vessel Type	Where Lost	Status
193	Wandra	1915/12/15	Steamer screw	Jervis Bay, Drum & Drumsticks	Found, location known (Outside subject site)
227	William Combe	1931/04/16	Steamer screw	Jervis Bay, Drum & Drumsticks Islet	Not Found