

More Than a Migratory Corridor: Humpback Whale Feeding and Calving in Bass Strait

Authors: Ella M. Hutchinson ¹, Jeffrey Weir ¹, John Dickie ², Adrian J. Flynn ³, David M. Donnelly ^{1,3}

1. Dolphin Research Institute, Hastings, Victoria, Australia
2. Wildlife Coast Cruises, Cowes, Victoria, Australia
3. Fathom Pacific, Braeside, Victoria, Australia



Postal Address Dolphin Research Institute
PO Box 77
Hastings VIC 3195
AUSTRALIA

Email research@dolphinresearch.org.au

Phone (03) 5979 7100

Website <http://www.dolphinresearch.org>

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Cover image: Humpback whale feeding on bait fish off Phillip Island, Victoria. Image by the Dolphin Research Institute, taken under scientific research permit.

The Dolphin Research Institute, Fathom Pacific and Wildlife Coast Cruises acknowledge the Bunurong People, the Traditional Owners of where we reside. We acknowledge Aboriginal and Torres Strait Islander peoples as Australia's First Peoples, and the Traditional Owners of the customary lands, seas, skies and waterways in which we work, travel and meet. We pay our respects to Elders past, present and emerging.

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Abstract

Regular sightings of humpback whales (*Megaptera novaeangliae*) off the Victorian coast during their winter migration suggest that the region is likely to form part of the eastern Australian migratory corridor. Here we report on observations of feeding and the presence of newborn and young calves on the northerly migration in Bass Strait, which indicate that this region is biologically important to the life history of the species.

Validated humpback whale sightings totalling 1,352 events were recorded in Bass Strait between 2006 and 2024. These records included 94 instances (6.95%) of feeding and the presence of 9 young calves on the northerly migration. The majority of these records were recorded by citizen scientists in the near coastal environment, but given the reduced observation effort in offshore waters, it is reasonable to assume that these behaviours also occur more widely across Bass Strait. Records of newborn and young calves in this area during winter months is unusual given calving of this species is typically associated with lower latitudes.

These observations suggest that Bass Strait is of higher ecological importance for humpback whales than simply a migratory corridor. Furthermore, these findings highlight the value of integrating data from both citizen science and scientific surveys to better understand habitat use and life history of a dispersed migratory species and spatiotemporally episodic events. This new understanding should be included for consideration during environmental assessment and decision-making processes for the wider Bass Strait region.

Introduction

This white paper provides an overview of the general understanding of the east Australian humpback whale (*Megaptera novaeangliae*) migration through Bass Strait and contributes new knowledge about humpback whales feeding and the presence of calves in Bass Strait during their northerly and southerly migration.

East Australian humpback whale population

Humpback whales in the east Australian population faced near extinction by the early 1960s due to intensive commercial whaling in the Southern and Pacific oceans. By the time the east Australian humpback whaling industry ended in 1963, population estimates ranged from 100 to 500 individuals (Chittleborough 1965; Bannister and Hedley 2002; Bravington *et al.* 2007). The cessation of commercial whaling has allowed the east Australian population to recover substantially, with projections that it will reach approximately 40,000 whales by 2030 (Noad *et al.* 2019).

Humpback whales in this population are known to follow a migratory route along eastern Australia. They spend the austral summer in Antarctica and migrate to eastern Australia, as far north as Queensland, during the austral winter, before returning south in spring (Dawbin 1966). This journey has long been considered a key characteristic of the east Australian population and is associated with mating and calving in warmer waters.

Previous research suggests that the east Australian population of humpback whales primarily feed in Antarctic waters during the austral summer, adopting what is known as the “Feast or Famine” migratory approach (Chittleborough 1965). This approach allows them build energy reserves for their migration north during winter to mate and calve. While rare, historical accounts from the whaling period also describe humpbacks occasionally feeding during migration (Dawbin 1966). More recent observations of feeding during the east Australian migration have been recorded in New South Wales, Victoria and Tasmania. Feeding during the southern migration when energy reserves are depleted appears to be common (Gill *et al.* 1999, 2015; Stamation *et al.* 2007; Owen *et al.* 2015, 2017; Andrews-Goff *et al.* 2018; Pirodda *et al.* 2021). However, some instances of feeding on the northerly migration have been documented off the southern coast of Phillip Island, Victoria (Donnelly *et al.* 2020; Pirodda *et al.* 2021).

Humpback whale presence in Bass Strait

The Dolphin Research Institute developed the Two Bays Whale Project in 2015. The Project utilises validated citizen science sighting records to better understand the presence, movements, behaviours and habitat use of large whales, particularly humpback whales, in Victorian waters. The Project’s current scope includes sightings along Victoria’s coastline as well as those reported from vessels, aircraft and oil and gas platforms further offshore in Bass Strait (Fig. 1).



Figure 1: The continent of Australia with Bass Strait's location framed (blue rectangle). Bass Strait is geographically defined as the waters between (41.5°S, 140.5°E) and (37.0°S, 151°E).

Prior to the establishment of the Project, very little citizen science or publicly available sighting data existed for humpback whales in Bass Strait. Since its commencement, the Two Bays Whale Project has validated 1,127 humpback whale sightings, with contributions from dedicated marine mammal surveys, citizen scientists and eco-tourism operators across Victoria (Donnelly *et al.* 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023; Nguyen *et al.* 2022; Hutchinson *et al.* 2023).

These records have revealed seasonal patterns of humpback whale presence in the region. Observations of humpback whales on their northerly migration between April and July, have been clustered around Port Phillip and Western Port, and movements of these whales have consistently been reported as being eastward through Bass Strait (Fig. 2). Whales sighted between August and November have been consistently reported as travelling in either a westerly or southerly direction through Bass Strait (Fig. 3).



Figure 2: Validated humpback whale sightings (red circles) recorded during the east Australian northerly migration, (May-July, 2015-2024). Each sighting represents a discrete event, where replicate sightings have been removed. The two purple lines following the contour of land represent the state water boundaries (3 NM) and the commencement of the Australian Territorial EEZ (12 – 200NM).



Figure 3: Validated humpback whale sightings (blue circles) recorded during the east Australian southerly migration, (August-November, 2006-2024). Each sighting represents a discrete event, where replicate sightings been removed. The two purple lines following the contour of land represent the state water boundaries (3NM) and Australian Territorial EEZ boundaries (12 – 200NM).

The Two Bays Whale Project also maintains the Victorian Humpback Whale Fluke Identification Catalogue which aids in matching sightings of individuals across Australia through internal review of fluke images and the fluke matching platform, 'Happywhale'.

Supporting Bass Strait's role as a migratory corridor, individual humpback whales identified through fluke imagery have been documented travelling through Bass Strait on migration (Fig. 4). One individual identified in May off Cape Nelson, Victoria was resighted in Queensland two months later. Another individual first seen in June off Nullawarre, Victoria was resighted further east two days later off Cape Schanck, Victoria. Both whales were on their northerly migration. On the southerly migration, one individual was recorded moving from southern New South Wales to Wilsons Promontory, Victoria. These observations reinforce Bass Strait's function in the east Australian humpback whale migration pathway.

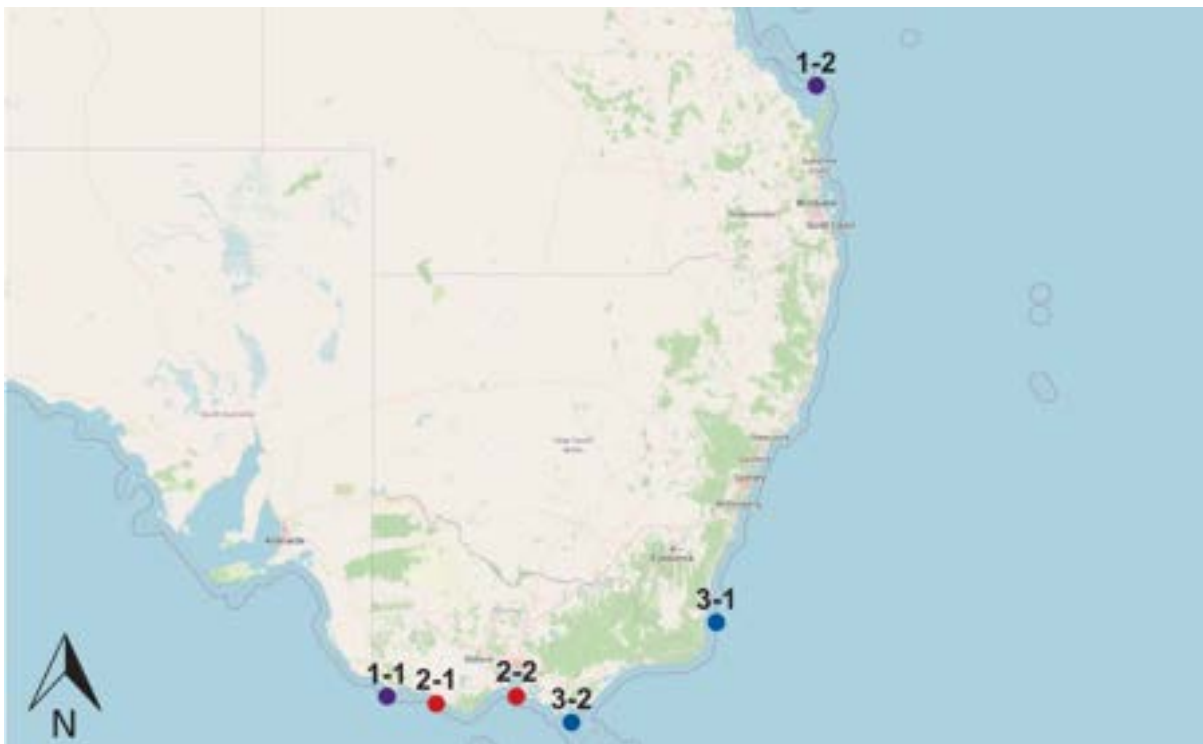


Figure 4: Movements of individual humpback whales in eastern Australia using fluke identification imagery. Numbers correspond to sightings of fluke-identified individuals. (1-1) A humpback whale photographed at Cape Nelson, Victoria in May, resighted (1-2) in Queensland two months later. (2-1) A humpback whale photographed off Nullawarre, Victoria in June, resighted (2-2) two days later at Cape Schanck, Victoria. (3-1) A humpback whale photographed in southern New South Wales, resighted (3-2) at Wilsons Promontory, Victoria seven days later. The two purple lines following the contour of land represent the state water boundaries (3NM) and Australian Territorial EEZ boundaries (12 – 200NM).

In addition to fluke imagery, a humpback whale calf was tracked using a distinctive injury it had sustained to its back and flank. First sighted in Hervey Bay, Queensland, in September 2018, the same calf was resighted 41 days later off Wilsons Promontory, Victoria. This movement was documented through citizen science reports from whale watching tourism vessels.

Satellite tracking of humpback whales tagged on the southerly migration off the Sunshine Coast, Queensland and Eden, New South Wales showed that tagged individuals followed the New South Wales coastline into Bass Strait before migrating further south (Andrews-Goff *et al.* 2018). All 21

humpback whales that were tagged in Eastern Australia were recorded moving south along the New South Wales coast and through Bass Strait. While most of these whales continued south via the east coast of Tasmania or into the Tasman Sea, one individual was recorded travelling along the west coast of Tasmania. These movements are consistent with broader patterns observed through the Two Bays Whale Project.

Prior to this white paper, no comprehensive collation of feeding events or calf presence in Bass Strait had been undertaken. The data presented below is the result of long-term observations by citizen scientists and collaborations with multiple organisations as part of the Two Bays Whale Project.

Data analysed in this white paper has been collated from multiple sources:

- Two Bays Whale Project (Hosted by the Dolphin Research Institute)
 - Timed land based marine mammal surveys
 - Dedicated marine mammal vessel surveys
 - Citizen science reports
 - Wildlife Coast Cruises sighting reports
- Fathom Pacific
 - Marine mammal aerial surveys from selected, non-embargoed projects
 - Citizen science data
 - Dedicated land-based observer program

Citizen science data provide detailed information on humpback whale presence, migratory timing, movements, and behaviours, offering valuable insights into whale ecology across broad spatial and temporal scales. It is particularly useful in areas where dedicated surveys may not currently take place. Formal aerial and vessel-based surveys play a critical role in complementing these data, detecting behaviours with greater accuracy and identifying feeding humpback whales in areas where citizen science data is not available. Together, these methodologies contribute to a more comprehensive understanding of humpback whale behaviour in Bass Strait.

Data obtained by the Two Bays Whale Project were validated through a robust internal quality control process at the Dolphin Research Institute and were largely supported by photographic evidence. A strict quality control process was also applied by Fathom Pacific, supported by its inhouse Cetacean Mapping and Adaptive management Processing System (CetaMAPS) database.

Humpback whale feeding data were validated through imagery, multiple reports of the same sighting or were reported by a reliable source such as trained marine fauna observers, eco-tourism operators and citizen scientists that are familiar with cetacean behaviours. Any reports of feeding that were unable to be validated were removed, giving high confidence in these records. All sightings of calves were validated using imagery, regardless of the reporting source.

A calf is defined as an animal that is less than half the length of the nearest adult of the same species.

Observations

General humpback whale sightings and behaviours

A total of 1,352 humpback whale sightings were recorded in Bass Strait and neighbouring embayments (Port Phillip & Western Port) between 29 October 2006 and 9 October 2024, with the majority recorded between 14 June 2015 and 9 October 2024. The Two Bays Whale Project recorded 1,128 sightings and Fathom Pacific recorded 224 sightings.

Travelling was the most frequently observed behaviour, followed by surface active behaviours (e.g. breaching), with feeding being the third most common behaviour (Tab. 1).

Table 1: Proportion of observed humpback whale behaviours recorded (n = 1,352).

Behaviour Reported	Proportion (%)
Travelling	62.42 (n = 844)
Surface active	20.93 (n = 283)
Feeding	6.95 (n = 94)
Milling and other	5.03 (n = 68)
Unknown	4.66 (n = 63)

Humpback whale feeding events are likely higher than 6.95%, this is due to the rejection of potential feeding reports during the validation process and the challenges citizen scientists face when evaluating whale behaviour from shore.

Humpback whale feeding observations in Bass Strait

Figure 5 shows the locations of validated reports of humpback whales feeding across the Bass Strait region. To assist discussions around these feeding observations, four zones were developed (Fig. 5). The data presented here represents currently available sighting reports and does not necessarily reflect the only areas that are utilised by humpback whales for foraging in Bass Strait. The nominated zones are not based on explicit water mass boundaries but are described as follows:

- Zone 1 is defined as the waters west of Cape Otway to the state border of Victoria and South Australia.
- Zone 2 as the waters between Cape Otway and Wilsons Promontory.
- Zone 3 as the waters east of Wilsons Promontory to the state border of Victoria and New South Wales.
- Zone 4 as the waters west of King Island (39.3°S, 143.0°E) to (41.0°S, 144.0°E).

Observations in Zones 1 and 2 were recorded during aerial surveys and by citizen scientists when whales were sighted relatively close to shore. Observations in Zone 3 were recorded by citizen scientists, and observations in Zone 4 were recorded during aerial surveys.

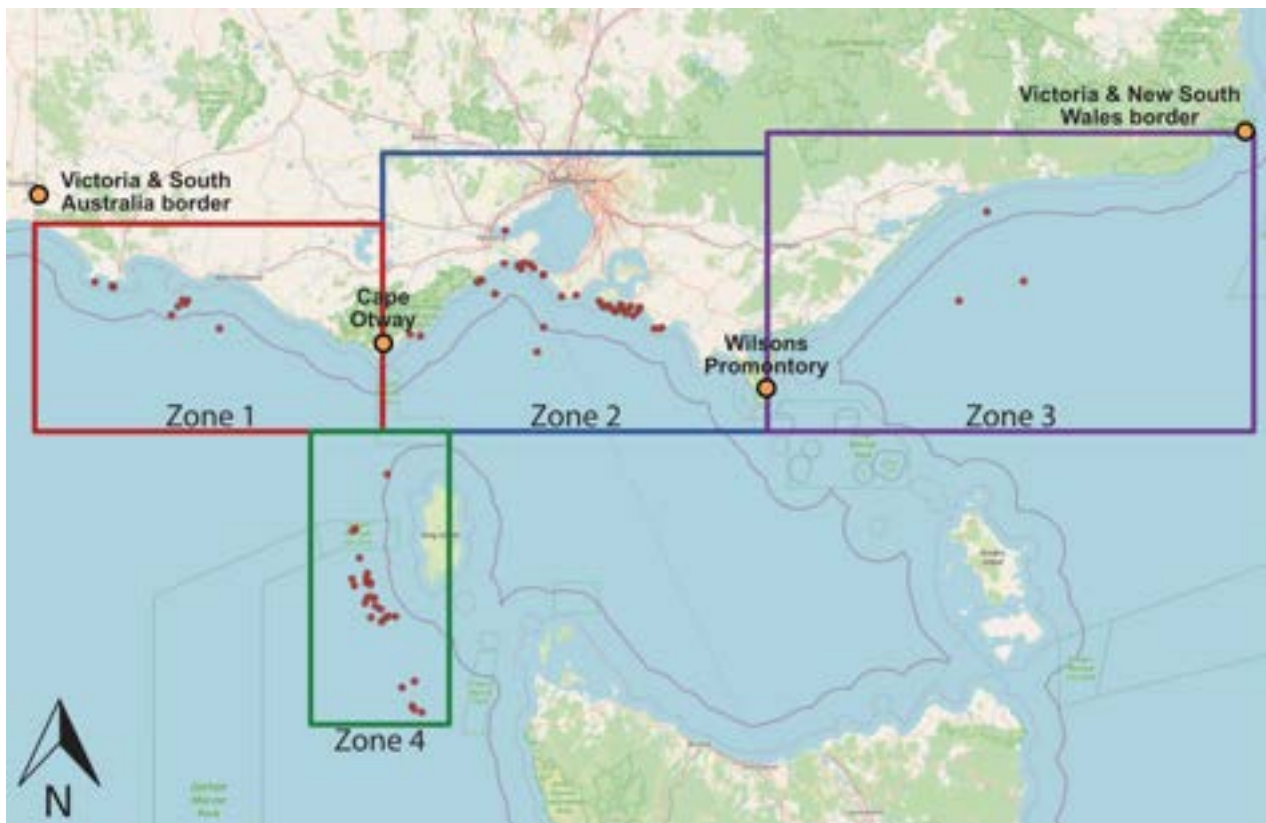


Figure 5: Validated sightings of feeding humpback whales (red circles) in Bass Strait between June 14 2015 and October 9 2024. An additional feeding sighting from October 29 2006 has also been included. The two purple lines following the contour of land represent the state water boundaries (3NM) and Australian Territorial EEZ boundaries (12 – 200NM).

Feeding observed in Zones 1, 3 and 4 is consistent with higher productivity near to the continental shelf break, where upwelling brings nutrient-rich waters to the surface (Kämpf *et al.* 2004). This process supports the growth of primary producers and leads to enhanced abundance of krill and bait fish, both of which are primary food sources for humpback whales. Observations of humpback whales feeding on krill in Zones 1 and 4 have been made by trained marine fauna observers. Humpback whale presence in the region was expected, given Bass Strait is utilised as a migratory corridor. However, the relatively high number of feeding events in the region had not previously been reported in the area. Of particular interest were observations of small aggregations of whales feeding near to the edge of the continental shelf break, reinforcing the likely importance of these highly productive areas to the species (Fig. 6).



Figure 6: Aggregation of humpback whales feeding in Zone 1. Image by Fathom Pacific, taken under scientific research permit.

Although there are validated sightings of humpback whales in Zone 3, especially to the east of Wilsons Promontory from tour vessels, the only validated feeding events for the Zone are citizen science records from offshore platforms (one records) and recreational fishers (two records) (Figure 5). Records of feeding off southern New South Wales (Owen *et al.* 2015, 2017; Pirotta *et al.* 2021), close to Zone 3, coupled with evidence from satellite tagging data (Andrews-Goff *et al.* 2018) and anecdotal reports, suggest that feeding could extend throughout Zone 3. Aerial surveys similar to those conducted in western Bass Strait would add further understanding of the behaviour of humpback whales in the region.

Unlike Zones 1, 3 and 4, Zone 2 is located entirely on the continental shelf and does not extend to the shelf break. Krill abundance in Zone 2 is likely lower than in other zones due to the Zone's distance from the continental shelf break and strong upwelling systems. As a result, humpback whales in this Zone are likely targeting alternative prey, such as bait fish, which are available in sufficient abundance to support feeding. Humpback whales in the east Australian population are known to feed on both bait fish and krill (Owen *et al.* 2015). Furthermore, trained marine fauna observers have documented humpback whales feeding on bait fish in Zone 2 (Fig. 7).

(a)



(b)



Figure 7: **(a)** Humpback whale feeding on bait fish off Phillip Island, Victoria in Zone 2. Image by the Dolphin Research Institute, taken under scientific research permit. **(b)** Two humpback whales feeding on bait fish off Point Addis, Victoria in Zone 2. Image by Fathom Pacific, taken under scientific research permit.

Humpback whale calf sightings in Bass Strait

Since 2006, a total of 18 humpback whale calves have been recorded in Bass Strait. Nine cow-calf pairs were recorded on the northerly migration between the months of April and July, and nine were recorded on the southerly migration between August and November.

While no direct observations of calving in Bass Strait have been documented, the small size of some calves on the northerly migration indicates that they were born within days or possibly weeks prior to them being sighted. As calves are dependent on their mothers and assumed to be nursing and resting, their presence in Bass Strait is evidence of the region's importance in these critical life history stages.

The northerly migration of Southern Hemisphere humpback whales is associated with mating and calving in the warm, sheltered waters of northern Australia, off the west and east coasts of the mainland (Dawbin 1966). The recent sightings of young calves during the northern migration in southern Australian waters – including those presented here, and sightings in southwestern (Jolliffe *et al.* 2024) and southeastern Australia (Donnelly *et al.* 2015, 2018, Fig. 8) – suggest that this understanding may be more nuanced than previously thought.



Figure 8: Humpback whale cow with a newborn calf off Phillip Island, Victoria. Image by the Dolphin Research Institute, taken under scientific research permit.

These calf sightings, although limited, raise important questions regarding the potential for calving further south than previously thought and highlight the need for continued monitoring and research into the movements and behaviour of humpback whales in Bass Strait.

Concluding remarks

This white paper provides evidence that, in addition to being a migratory corridor for east Australian humpback whales, Bass Strait is potentially an important feeding and calving habitat for the species.

The data presented here were gathered from multiple sources that are representative of a multi-organisation collaboration between the Dolphin Research Institute, Fathom Pacific, Wildlife Coast Cruises and ConocoPhillips Australia. The integration of scientific survey data and contributions from citizen science projects – data that has historically been underutilised or inaccessible – demonstrates the value of using all available information to assess the biological importance of regions such as Bass Strait to large cetaceans.

The use of diverse data sources has not only revealed new understandings of humpback whale ecology in Bass Strait but also highlighted the region's role in feeding and calving behaviours that were previously not documented from the region. These new understandings should be integrated into environmental assessments, policy development, and offshore management decisions. With the number of proposed offshore development projects increasing, it is important that these new understandings are incorporated into the assessment processes associated with offshore developments. This new information should be also included in future species conservation assessments so that appropriate conservation statuses are assigned.

Collaborative approaches that combine formalised scientific research with validated citizen science contributions will be key to accelerating information gain and improving the knowledge of cetacean distribution and behaviour in the Bass Strait region. Open sharing of contemporary data will allow the best available scientific information to be applied for conservation and management.

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Permits

Two Bays Whale Project data were collected under DEECA research permits 10007509, 10008727, 10009768 and 10010952.

Fathom Pacific data were collected under DEECA research permit 1001064 and Parks Australia permit PA2023-00109-1.

Wildlife Coast Cruises data were collected under Parks permit 1467, Beagle marine park activity permit PA2024-00028-1 and DEECA marine mammal permits WWT23004, WWT23005, WWT23003.

Contact

For any inquiries related to this white paper please contact the Dolphin Research Institute:

Email: research@dolphinresearch.org.au

Phone: 5979 7100

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