Shorebird Conservation Plan Surveys 2024/25

Maroochy River Estuary and Golden Beach

Final Report (Version 0)

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Prepared for Sunshine Coast Council

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Project Summary: This report provides the results of shorebird surveys to monitor current shorebird distribution and habitat on the lower Maroochy River and Caloundra Banks at Golden Beach, identify the species and numbers that are present, and determine the type and extent of disturbance.

Cover photo: Flock of critically endangered Far Eastern Curlew roosting at the entrance to Pumicestone Passage, Golden Beach. Photo: Simone Bosshard.

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Executive Summary

Background

Sunshine Coast Council (SCC) has developed a Shorebird Conservation Program that is designed to raise awareness and educate the public around shorebirds, to manage and protect shorebird habitat, and to provide management solutions to reduce threats for shorebird conservation. The Program has a particular focus on important habitat for migratory and resident shorebirds that gather in large numbers on the sandbanks and mudflats of the lower Maroochy River and the northern Pumicestone Passage at Golden Beach, the latter being part of the Moreton Bay Ramsar site of international significance for shorebirds.

The key objectives of the Shorebird Conservation Program are to:

- Recognise and protect current and future high value shorebird habitat.
- Understand and effectively address threats to shorebirds on the Sunshine Coast.
- Ensure management is evidence-based and informed by contemporary research and knowledge of shorebirds on the Sunshine Coast.
- Achieve shorebird conservation through education, advocacy and partnerships with the community and expert advocacy groups.
- Ensure local shorebird conservation supports conservation efforts throughout the EAAF through international collaboration and partnerships.

Study Approach

This study aims to implement several key objectives of the Shorebird Conservation Program through a combination of:

- Conducting shorebird surveys of the lower Maroochy River and the Caloundra Banks to determine current shorebird distribution and habitat, identify which shorebird species are present, and determine the type and extent of disturbance; and
- Conducting an updated analysis of trends in shorebird use of high tide roost sites and low tide feeding habitat areas.

Key Results

Lower Maroochy River

Tidal flats along the lower Maroochy River supported an average of 137 and a maximum of 181 migratory shorebirds in 2024/25, which is consistent with average counts of 109 to 164 and maximum counts of 146 to 196 over the previous four years. The tidal flats supported an average of 12 and a maximum of 18 resident shorebirds in 2024/25, similar to numbers in previous years. Consistent with previous years, four migratory shorebird species dominated the counts: Pacific Golden Plover, Eurasian Whimbrel, Bar-tailed Godwit and Far Eastern Curlew. Numbers of critically endangered Far Eastern Curlew decreased from an average of 8 (maximum 13) in 2020/21 to an average of 3.3 (maximum 4) in 2024/25. Numbers of endangered Bar-tailed Godwit have been variable, with averages of between 11 and 21 and maximum counts of between 16 and 52 over the past five years.

Five main roost sites used by shorebirds and other waterbirds occur in the lower Maroochy River: Goat Island (MRGI); Nojoor Road (MRNR); north shore (MRNS); sand bar (MRSB); and tree roost (MRTR). During the four surveys in 2024/25, shorebirds were recorded roosting at only MRGI (all surveys) and MRTR (three surveys); no birds were recorded at MRNR or MRNS besides a flock of Far Eastern Curlew and Bar-tailed Godwit that alighted at MRNS for a short period after being disturbed off Goat Island. MRGI is the main roost site; some Eurasian Whimbrel and Grey-tailed Tattler appear to move between roosting at MRTR and MRGI, particularly in response to disturbance. The total number of individuals of each species was relatively consistent between surveys, dominated by Eurasian Whimbrel (average of 46), the endangered Bar-tailed Godwit (average of 19), Grey-tailed Tattler (average of 7) and the critically endangered Far Eastern Curlew (average of 4). An average total of 73 migratory shorebirds (range 61 to 86) roosted in the Maroochy River estuary in 2024/25, consistent with the overall average of 78 migratory shorebirds over the prior 4-year period 2020/21 to 2023/24.

Analysis of Queensland Wader Study Group (QWSG) data shows that the north shore (MRNS) was the most important migratory shorebird roost site in the lower Maroochy River area up until 2004. Thereafter, Goat Island (MRGI) became increasingly used by shorebirds for roosting due to increasing disturbance along the north shore. Over the past five summer seasons, migratory shorebirds have only used Goat Island and MRTR for roosting. Also, the Pacific Golden Plovers that feed in the estuary at low tide have ceased roosting on the north shore and now appear to fly 3.5 km north to roost on the rocky shoreline of Mudjimba Island that lies 1 km offshore of Mudjimba. Disturbance pressure remains high at all roost sites in the lower Maroochy River estuary, with off-leash dogs continuing to disturb birds on Goat Island.

Golden Beach

The configuration of the tidal flats that provide feeding habitat for shorebirds in the far northern Pumicestone Passage at Golden Beach has changed substantially following the creation of a new opening to the sea that broke through the northern tip of Bribie Island in January 2022. A high bank has established between the southern end of the isolated northern tip of Bribie Island and runs westward to within about 150 m of Golden Beach. While two sand banks, SBN1 and SBN2, remain the most important feeding areas, increasing numbers of shorebirds are using two new tidal flat areas that have formed since 2022, NTBI across the old entrance and SBN3 to the south of the new entrance. In 2024/25, the combined area of tidal flats supported an average combined total of 159 (maximum 297) migratory shorebirds, and an average of 37 (maximum 68) resident shorebirds during the summer (October-February) season. The most abundant migratory shorebirds included the vulnerable Bar-tailed Godwit, Eurasian Whimbrel, the critically endangered Far Eastern Curlew and Pacific Golden Plover. Shorebirds numbers were generally similar to the averages over the previous four years.

Eight shorebird roost sites are currently recognised at Golden Beach and Caloundra. An average of 188 (range 158 to 243) migratory shorebirds used roost sites at Golden Beach during the four high tide surveys in 2024/25, including up to 48 critically endangered Far Eastern Curlew, 94 vulnerable Bar-tailed Godwit, 81 Eurasian Whimbrel and 36 Grey-tailed Tattler. The average numbers of shorebirds recorded roosting during summer (October-February) in 2024/25 were generally similar to the averages over the previous four years. The formation of the new entrance to Pumicestone Passage has increased the availability of suitable alternative roost sites, with suitable roosting habitat now present on a broad sandy beach at SBN3. While the area of roosting habitat on SBN2 has increased following the increased deposition of sand at this location, it is still inundated on high spring tides. On the other hand, there is now increased accessibility by people to these roosting areas, which increases the risk and frequency of disturbance.

Recommendations

Lower Maroochy River

While it was historically one of the most important roost sites for shorebirds on the lower Maroochy River, the north shore (MRNS) has largely been abandoned as a roost site by shorebirds due to the high levels of disturbance by people using the sandy shoreline for recreation and walking dogs off-leash. Consequently, the sandy shoreline and sand bars on the eastern side of Goat Island (MRGI and MRSB) are currently the most important shorebird roost sites, which enjoy a moderate level of protection from disturbance by being accessible at high tide only by watercraft. Nonetheless, boaters with pets on board do regularly come ashore at Goat Island and walk their dogs, often off-leash, despite it being a Conservation Park where dogs are not allowed. The tidal flats on the eastern and western edges of Goat Island (MR06, MR04 and MR07) are also the most important feeding areas on the lower Maroochy River. While the MR04 and MR07 tidal flats are seldom visited by people, people regularly access the MR06 tidal flats via watercraft or wading/swimming across the southern channel at low tide, causing regular disturbance to feeding shorebirds, including by dogs being walked off-leash. The MR05 tidal flat is located close to a well-used sandy beach in a cove on the northern shore of the river. These disturbance pressures are expected to continue to increase as the human population of the region continues to grow. Recommended approaches for reducing disturbance to feeding and roosting shorebirds are provided.

Over the past several years, Sunshine Coast Council has worked to increase public awareness of shorebirds through temporary information signage and a variety of other approaches to raising public awareness, including information on Council's website, funding local artists to paint large murals of various shorebird species including interpretive signage on public toilet blocks, and presentations at a variety of community events. Continuation of these activities is encouraged. Given the high dependency of migratory shorebirds on a single roost site in the lower Maroochy River estuary, namely the sandbank on the eastern side of Goat Island, proactive management of disturbance to this location is recommended. Since Goat Island is part of the Maroochy River Conservation Park and managed by the Queensland Parks and Wildlife Service (QPWS), a collaborative approach involving QPWS is recommended.

Golden Beach

The spatial distribution of shorebird habitats, including both tidal flat feeding habitat and roosting habitat, has changed substantially since the formation of the new entrance to Pumicestone Passage. The changes have increased the availability of alternative roost sites, with suitable roosting habitat now present on SBN3 and the area of roosting habitat on SBN2 having increased. On the other hand, these changes have also changed patterns of disturbance to shorebirds. Whereas the CBAR, SBN1 and NTBI roost sites previously experienced low to moderate levels of disturbance, the risk of disturbance has now increased. This has largely been due to the silting up of the old entrance channel that allows people to access the northern tip of Bribie Island from Caloundra on all tides. Similarly, the risk of disturbance to shorebirds feeding and roosting on SBN2 has increased. Changes in sediment deposition after the sea broke through the northern end of Bribie Island to create the new entrance has formed a high bank between the southern end of the isolated northern tip of Bribie Island and Golden Beach. The bank, which forms the SBN2 roost site, runs westwards to within about 30 m of the Golden Beach shoreline and at low tide and most high tides people, including with dogs, can cross a shallow channel here and walk along this bank near feeding and roosting birds. This recreational disturbance pressure is predicted to continue to increase as the region becomes more developed. Consequently, there is a need for proactive management of disturbance to shorebirds at the important roosting and feeding habitats at Caloundra that are identified above. Site-specific signage that clearly indicates the locations of the most frequently used high tide roosting areas to be avoided within the SBN1, SBN2, SBN3 and NTBI roost sites, together with an explanation of why disturbance to flocks of roosting birds should be avoided, would be particularly useful in this context.

Shorebird Conservation Plan Surveys 2024/25

Maroochy River Estuary and Golden Beach

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Terms and Abbreviations

BAAM	Biodiversity Assessment and Management Pty Ltd
EAAF	East Asian-Australasian Flyway
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
NC Act	Queensland *Nature Conservation Act 1992*
QPWS	Queensland Parks and Wildlife Service
QWSG	Queensland Wader Study Group
SCC	Sunshine Coast Council

1.0 INTRODUCTION

1.1 BACKGROUND

Sunshine Coast Council (SCC) has developed a Shorebird Conservation Program that is designed to raise awareness and educate the public around shorebirds, to manage and protect shorebird habitat, and to provide management solutions to reduce threats for shorebird conservation. The Program has a particular focus on important habitat for migratory and resident shorebirds that gather in large numbers on the sandbanks and mudflats of the lower Maroochy River and the northern Pumicestone Passage at Golden Beach, the latter being part of the Moreton Bay Ramsar site of international significance for shorebirds.

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During the 2020/21 to 2023/24 seasons, BAAM completed several surveys at both low tide (surveying shorebird use of feeding habitat) and high tide (surveying shorebird use of roost sites) in the lower Maroochy River and at the Caloundra Banks at Golden Beach in the northern Pumicestone Passage. At the same time, SCC has implemented strategies to manage disturbance to shorebirds on the lower Maroochy River and the configuration of shorebird habitats has been substantially altered at Golden Beach after the sea broke a new channel through the northern tip of Bribie Island. Consequently, SCC requested a further four surveys of shorebird use of roost sites at high tide and tidal flat feeding habitats at low tide during the 2024/2025 summer period.

1.2 Objectives of this Study

This study aims to implement the key objectives of the Shorebird Conservation Program identified in **Section 1.1** above through a combination of:

- conducting four high tide surveys and four low tide surveys at each of the lower Maroochy River and the Caloundra Banks to monitor current shorebird distribution and habitat, identify which shorebird species are present, and determine the type and extent of disturbance; and
- conducting an updated analysis of trends in shorebird use of high tide roost sites and low tide feeding habitat areas with the additional season of data since the analysis of 2023/24 reported by BAAM (2024), combining the survey data with historical data for the SCC local government area collected by the Queensland Wader Study Group (QWSG).

The QWSG is a special interest group of the Queensland Ornithological Society Incorporated that monitors shorebird populations in Queensland and conducts regular shorebird surveys of different parts of the Queensland coast that have large shorebird populations. The QWSG maintains a database of these shorebird survey data that is updated monthly. The surveys and review of count data supplied by the QWSG aims to provide information on the following:

- Shorebird statistics: total abundance; species observed; and species abundance;

- Shorebird behaviour: activity (roosting/foraging); and spatial data of foraging locations; and
- Frequency and type of disturbance observed.

2.0 STUDY APPROACH

The QWSG has historical data for roost sites and feeding areas monitored at both Golden Beach and the lower Maroochy River and still currently undertakes monthly monitoring of many of these sites. Therefore, the study approach combined an analysis of updated QWSG high tide and low tide data for the study area with field surveys of shorebirds using roost sites at high tide and tidal flat feeding habitats at low tide, as outlined in more detail below. Updated QWSG data were provided free of charge based on a data sharing agreement with the QWSG, whereby the raw data collected by the BAAM surveys are also provided to the QWSG for incorporation into the long-term QWSG database. This ensures the shorebird assessment is based on the best and most comprehensive available data, and data collected with SCC support contributes to appropriate and well curated long-term datasets.

2.1 High Tide Surveys

Four high tide surveys were conducted, two in November 2024, one in January 2025 and one in February 2025, at each of the lower Maroochy River and in the northern Pumicestone Passage at Golden Beach. All surveys were conducted using a small, motorised boat, which facilitated access to roosting habitats throughout the relatively large survey areas, including on the northern tip of Bribie Island. The surveys aimed to start on the rising tide to develop a better understanding of the movements of shorebirds to mid-tide and high-tide roosts from tidal flat feeding areas during the transition between high tide and low tide. However, the counting of shorebirds at the roost sites was conducted within the 3-hour period, 1.5 hours either side of high tide, when all previously known roost sites at each locality were visited. The surveys determined the total number of individuals of each species present, to enable assessment of site and habitat importance, and collected spatial data of the area used by shorebirds for roosting to facilitate mapping of roost site extents.

2.2 Low Tide Surveys

Four low tide surveys of tidal flat feeding habitat were conducted, two in November 2024, one in January 2025 and one in February 2025, at each of the lower Maroochy River and in the northern Pumicestone Passage at Golden Beach. The surveys combined observations conducted from a boat with observations from the shoreline. The use of a boat allowed the surveys to be conducted over a shorter period and allowed access to areas that are problematic to survey from the shoreline due to the width of the open water channels. The low tide surveys of the lower Maroochy River covered the full length and width of the lower Maroochy River from 1 km upstream of the Sunshine Motorway bridge through to the river mouth. The low tide surveys at Golden Beach covered the tidal flats on both sides of Pumicestone Passage from the Caloundra Bar south to Bell's Creek.

2.3 General Survey Methods

The surveys were conducted in accordance with migratory shorebird survey guidelines (Commonwealth of Australia 2015); specifically:

- The surveys for foraging shorebirds were conducted as close to the time of low tide as practicable and at a maximum of no more than two hours either side of low tide;
- The surveys for roosting shorebirds were conducted as close to the time of high tide as practicable and at a maximum of no more than two hours either side of high tide;
- The surveys were not undertaken during periods of high rainfall or strong winds;

- The surveys determined the total number of individuals of each species present, to enable assessment of site and habitat importance; and
- The surveys collected spatial data of the area used by shorebirds for roosting and feeding to facilitate mapping of roosting and foraging habitat.

Shorebirds were surveyed using a combination of a high-powered spotting telescope mounted on a secure tripod (on land) and high quality 10x40 binoculars (on the boat). Sources of actual or potential disturbance observed within or close to each survey site (close enough to cause disturbance) were recorded as a count of people, dogs on leash, dogs off leash, and watercraft during a single observation sweep of the survey site to provide a snapshot in time as per the approach of Stigner *et al*. (2016). Disturbance is an event that causes birds to cease foraging or resting activities to become alert, start walking away from the source of disturbance or take flight in response to the disturbance.

The surveys were undertaken by Dr Peter Driscoll (a shorebird specialist) with the assistance of Dr Simone Bosshard (Coastal Conservation and Planning Team Leader, SCC). The surveys were not undertaken during periods of high rainfall or strong winds.

2.4 Additional Surveys by SCC Staff

SCC staff, under the supervision of Dr Simone Bosshard, conducted additional shorebird surveys of the lower Maroochy River and at Caloundra. These surveys included one winter low tide survey of tidal flats on the lower Maroochy River and at Golden Beach, Caloundra (July 2024), and several low tide and high tide surveys of rocky headlands between Coolum and Caloundra. These surveys were conducted in accordance with the general survey methods outlined in **Section 2.3** above.

2.5 Tracking Shorebirds of the Sunshine Coast

As part of the Shorebird Conservation Action Plan, SCC aims to better understand how migratory and resident shorebirds use their habitats and move around the Sunshine Coast and adjacent areas. The regular monitoring of shorebird abundance and disturbance at the two primary shorebird areas on the Sunshine Coast, namely northern Pumicestone Passage and Lower Maroochy River, has highlighted the challenges of managing shorebirds, including threatened species, at these locations. These challenges include that most habitats used by shorebirds occur outside SCC's jurisdiction in either Marine Parks, Conservation Parks or intertidal areas. Little is known about the movements of shorebirds that prefer rocky headland habitats, such as the Sooty Oystercatcher (*Haematopus fuliginosus*) and Wandering Tattler (*Tringa incana*).

Wandering Tattler is one of the least well-known migratory shorebirds in Australia (Higgins and Davies 1996) and considered uncommon. Queensland is a stronghold for the species in Australia, despite the small numbers occurring. No studies of the species in Australia have been attempted so little is known of the species home ranges, site fidelity or migratory habits. Wandering Tattlers are more common in North America, breeding in Alaska and Canada, but small numbers do breed in Siberia (Higgins and Davies 1996). Studies have shown the importance of breeding areas to the threats that different populations of migratory shorebirds face (Morrick et al. 2021). Consequently, identifying the breeding areas of Wandering Tattlers that visit Australia requires investigation. Within Australia the species prefers rocky habitats that are increasingly under pressure for recreational use so further knowledge on the habits and movements of this species would be beneficial in understanding their needs.

Sooty Oystercatcher, a resident shorebird of rocky shorelines, has been better studied in Australia and is known to be sedentary, but with the ability to move large distances within Australia (Hansen et al. 2014). Yet, knowledge of this species in Queensland is significantly lacking in terms of their ecology and the threats they face.

SCC has teamed up with the QWSG to undertake a collaborative project, started in 2024, to fit satellite tracking devices to shorebirds, focused on Sooty Oystercatcher and Wandering Tattler, to improve understanding of their habitat usage, local movements, and migratory pathways to address some of these knowledge gaps, provide valuable data for use locally in education and to better inform management decisions in locations where these species occur.

3.0 RESULTS AND DISCUSSION

3.1 Survey Timing and Conditions

The survey dates and survey conditions during the surveys of the lower Maroochy River and Golden Beach are summarised in **Appendix 1**. All surveys were conducted during conditions that were suitable for conducting a shorebird survey.

3.2 Lower Maroochy River

3.2.1 Low tide surveys

The four summer surveys of foraging shorebirds covered seven different areas of tidal flat exposed at low tide. The locations of these areas are shown in **Figure 3.1**. **Table 3.1** summarises the summer-season survey results over four seasons between 2020/21 and 2024/25. Tidal flats along the lower Maroochy River supported an average of 137 and a maximum of 181 migratory shorebirds in 2024/25, which is consistent with average counts of 109 to 164 and maximum counts of 146 to 196 over the previous years. The tidal flats supported an average of 12 and a maximum of 18 resident shorebirds in 2024/25, similar to numbers in previous years. Consistent with previous years, four migratory shorebird species dominated the counts: Pacific Golden Plover, Eurasian Whimbrel, Bar-tailed Godwit and Far Eastern Curlew. Numbers of critically endangered Far Eastern Curlew decreased from an average of 8 (maximum 13) in 2020/21 to an average of 3.3 (maximum 4) in 2024/25. Numbers of vulnerable Bar-tailed Godwit have been variable, with averages of between 11 and 21 and maximum counts of between 16 and 52 over the past five years (**Table 3.1**).

The most important tidal flat area for foraging migratory shorebirds has consistently been MR06 on the eastern side of two vegetated sand islands (Channel Island and Goat Island, hereafter referred to collectively as Goat Island) (**Table 3.1, Figure 3.2**). Other important tidal flats are MR04 and MR07, both on the western side of Goat Island. MR5 is exposed to more potential sources of disturbance (see **Table 3.2**), causing higher variability in the numbers of shorebirds recorded.

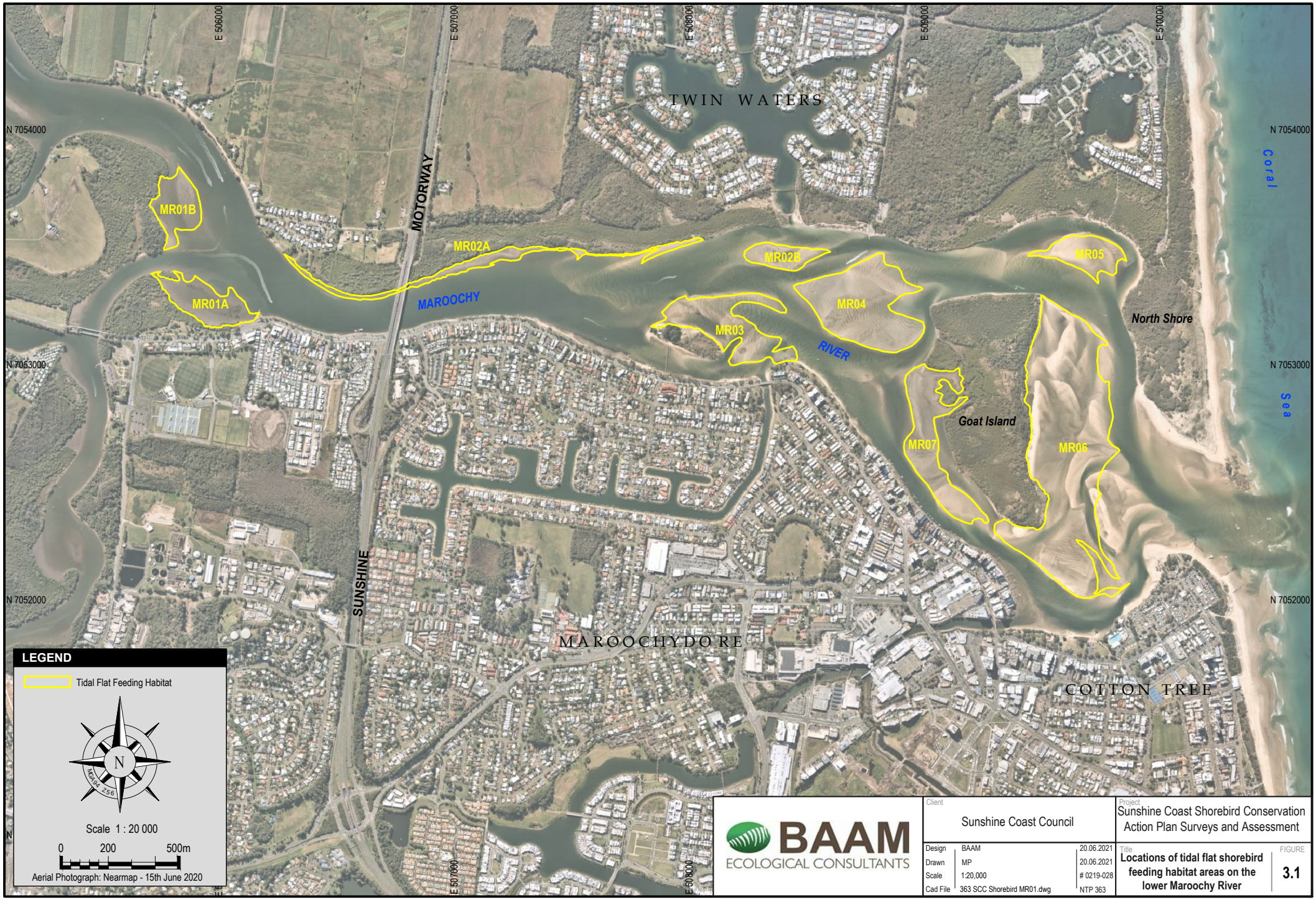


Table 3.1. Summary of shorebird species and the average ± 1 standard deviation and maximum (in brackets) numbers recorded in each of the seven low tide survey areas (MR01 to MR07) during summer season surveys of the lower Maroochy River in 2020/21 (top row, 5 surveys), 2022/23 (second row, 4 surveys), 2023/24 (third row, 4 surveys) and 2024/25 (fourth row, 4 surveys).

Name	EPBC*	NCA*	MR01	MR02	MR03	MR04	MR05	MR06	MR07	Total
Far Eastern Curlew	M, CE	E	0	1.0±1.2 (3)	0.2±0.4 (1)	1.2±1.3 (3)	0	4.4±2.7 (8)	1.2±0.8 (2)	8.0±3.7 (13)
			0	0	0	0.5±0.6 (1)	0.3±0.5 (1)	2.8±1.3 (4)	1.0±1.2 (2)	4.5±1.3 (6)
			0	0.3±0.5 (1)	0	0.5±0.6 (1)	0	2.8±0.5 (3)	0.5±0.6 (1)	4.0±0.8 (5)
			0	0	0	0.5±0.6 (1)	0.3±0.5 (1)	1.8±1.0 (3)	0.8±0.5 (1)	3.3±1.0 (4)
Eurasian Whimbrel	M	S	0.4±0.9 (2)	0.6±0.5 (1)	0.2±0.4 (1)	7.0±2.5 (9)	1.2±1.3 (3)	22.4±5.3 (29)	3.4±3.2 (8)	35.2±8.5 (46)
			0.8±1.0 (2)	1.0±0.8 (2)	1.0±1.4 (3)	7.0±2.9 (11)	0	36.5±24.1 (72)	6.5±3.7 (9)	52.8±21.3 (82)
			0	1.0±1.4 (3)	1.5±1.7 (3)	11.5±10.7 (27)	1.0±0.8 (2)	27.5±5.9 (32)	8.3±3.1 (11)	50.8±14.5 (71)
			0.3±0.5 (1)	1.3±1.3 (3)	0.5±0.6 (1)	12.5±6.8 (20)	1.5±1.0 (3)	17.0±6.7 (27)	6.8±0.5 (7)	39.8±10.9 (55)
Bar-tailed Godwit (W Alaskan)	M, E	E	0	1.0±1.4 (3)	0.6±1.3 (3)	13.4±6.1 (23)	0	4.2±2.5 (6)	1.8±2.7 (6)	21.0±9.0 (35)
			0	0	0	3.0±2.4 (5)	0.3±0.5 (1)	4.0±6.2 (13)	3.3±3.9 (8)	10.5±8.2 (21)
			0	0	0.5±1 (2)	7.3±7.3 (17)	0	10.0±15.6 (33)	0	17.8±22.9 (52)
			0	0.3±0.5 (1)	0	7.3±3.9 (13)	0	2.3±2.8 (6)	1.5±1.9 (4)	11.8±3.1 (16)
Pacific Golden Plover	M	S	0	0	0	4.8±6.7 (14)	0	36.6±24.1 (58)	2.8±6.3 (14)	44.2±20.8 (65)
			0.3±0.5 (1)	1.5±3.0 (6)	0.3±0.5 (1)	10.5±15.6 (33)	11.5±20.4 (42)	22.5±36.3 (76)	3.5±7.0 (14)	50.0±52.1 (111)
			0	0	0	13.8±24.3 (50)	0	72.3±56.1 (133)	2.3±4.5 (9)	88.3±60 (138)
			0	1.0±2.0 (4)	0	32.0±24.8 (53)	13.0±20.8 (44)	31.3±40.1 (84)	0	77.3±52.0 (113)
Greater Sand Plover	M, V	V	0	0	0	0.4±0.9 (2)	0	0	0	0.4±0.9 (2)
			0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0
Great Knot	M, V	E	0	0	0	0	0	0.4±0.9 (2)	0	0.4±0.9 (2)
			0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0
Grey-tailed Tattler	M	S	0	0	0	0	0	0	0	0
			0	0	0	0	1.3±2.5 (5)	0	0.3±0.5 (1)	1.5±2.4 (5)
			0	0	0	0	0	0	2.8±3.8 (8)	2.8±3.8 (8)
			0	0	0	0	0	0	4.5±4.1 (8)	4.5±4.1 (8)
Curlew Sandpiper	M, CE	CE	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0
			0.3±0.5 (1)	0	0	0	0	0	0	0.3±0.5 (1)

Name	EPBC*	NCA*	MR01	MR02	MR03	MR04	MR05	MR06	MR07	Total
Pied Oystercatcher		LC	0.8±1.1 (2) 0 0 0	0 0 1.0±1.2 (2) 0.3±0.5 (1)	0 0.5±1.0 (2) 0.3±0.5 (1) 0	0.2±0.4 (1) 0.5±1.0 (2) 0.8±1.5 (3) 0.3±0.5 (1)	0 0 0 0.3±0.5 (1)	1.8±0.8 (3) 1.8±2.4 (5) 2.8±1 (4) 1.3±1.0 (2)	1.6±1.8 (4) 3.0±1.6 (5) 1.5±1 (2) 2.8±1.0 (4)	4.4±1.9 (7) 5.8±3.0 (10) 6.3±3.3 (11) 4.8±1.3 (6)
Sooty Oystercatcher		LC	0 0 0 0	0 0 0 0.5±1.0 (2)	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0.5±1.0 (2)
Masked Lapwing		LC	1.4±1.3 (3) 0.8±1.5 (3) 3.0±4.8 (10) 2.5±2.6 (6)	0 0 0.3±0.5 (1) 0.5±1.0 (2)	0 0 0.8±1.5 (3) 0	0 0 0 0	0 0 0 0.8±1.5 (3)	0.4±0.9 (2) 0.5±1.0 (2) 0 0	0 0 0 1.3±1.9 (4)	1.8±1.8 (4) 1.3±2.5 (5) 4±6.2 (13) 5.0±3.6 (8)
Red-capped Plover		LC	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 1.0±2.0 (4) 0.5±1 (2) 0	3.2±4.7 (11) 1.0±1.2 (2) 1.8±1.5 (3) 0	0 0 0 0	3.2±4.7 (11) 2.0±2.8 (6) 2.3±2.2 (5) 0
Beach Stone Curlew		V	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0.3±0.5 (1) 0.8±1.5 (3) 0	0 0 0 0.5±1.0 (2)	0 0.3±0.5 (1) 0.8±1.5 (3) 0.5±1.0 (2)
Pied Stilt		LC	0 0 2.0±2.2 (5) 1.0±1.4 (3)	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 2.0±2.2 (5) 1.0±1.4 (3)
Total migratory shorebirds			**0.4±0.9 (2) 1.0±1.2 (2) 0 0.5±1.0 (2)**	**2.6±2.3 (5) 2.5±2.4 (6) 1.3±1.5 (3) 2.5±2.6 (6)**	**1±2.2 (5) 1.3±1.3 (3) 2.0±.2.4 (5) 0.5±0.6 (1)**	**26.8±10 (35) 21.0±14.6 (42) 33.0±20.3 (63) 52.3±18.1 (66)**	**1.2±1.3 (3) 13.3±22.6 (47) 1.3±1.0 (2) 14.8±20.3 (45)**	**68.0±29.8 (96) 65.8±44.7 (115) 113±48.6 (167) 52.8±34.6 (99)**	**9.2±9.4 (25) 14.5±10.8 (27) 13.8±9.6 (28) 13.5±4.8 (18)**	**109.2±36.3 (146) 119.3±42.4 (173) 164.3±47.8 (196) 136.8±43.4 (181)**
Total resident shorebirds			**2.2±1.5 (4) 0.8±1.5 (3) 5±5 (11) 3.5±2.9 (7)**	**0 0 1.3±1.5 (3) 1.3±1.0 (2)**	**0 0.5±1.0 (2) 1±1.4 (3) 0**	**0.2±0.4 (1) 0.5±1.0 (2) 0.8±1.5 (3) 0.3±0.5 (1)**	**0 1.0±2.0 (4) 0.5±1 (2) 1.0±1.4 (3)**	**5.4±4.8 (13) 3.5±4.0 (7) 5.3±2.4 (7) 1.3±1.0 (2)**	**1.6±1.8 (4) 3.0±1.6 (5) 1.5±1 (2) 4.5±2.4 (8)**	**9.4±5.6 (16) 9.3±5.1 (15) 15.3±7.5 (23) 11.8±5.4 (18)**
Total other waterbirds			6.6±7.5 (18) 5.3±7.1 (15) 6.8±9.2 (20) 14.8±13.8 (29)	4.6±3.8 (9) 7.5±2.4 (10) 34.8±49.8 (109) 11.3±10.6 (25)	3.4±7.6 (17) 3.5±3.9 (9) 21±33.9 (71) 0.5±0.6 (1)	19.4±9.2 (32) 24.3±23.5 (50) 8.5±11.8 (25) 22.0±16.7 (47)	3.6±8 (18) 1.0±2.0 (4) 3.8±5.7 (12) 20.5±36.4 (75)	722.8±699.2 (1754) 506.8±638.7 (1463) 1654.5±1046.6 (2691) 1165.3±2019.6 (4190)	20.2±11.6 (36) 29.8±7.9 (41) 36±22.5 (63) 31.0±24.5 (66)	780.6±689.2 (1805) 578.0±639.5 (1537) 1765.3±1016.5 (2805) 1265.3±1969.5 (4215)

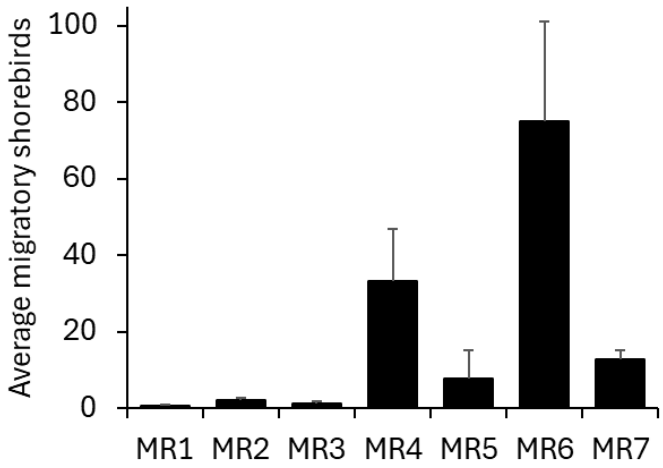


Figure 3.2. Average (±1 standard error) migratory shorebirds using each of seven tidal flat areas (MR1 to MR7) in the lower Maroochy River estuary over the past four years.

The large numbers of other waterbirds observed at MR06 in each of the past four years (**Table 3.1**) were mostly a variety of terns roosting in large flocks at low tide. In 2024/25, they included up to 3,900 Common Tern (EPBC Act: migratory) and 241 Little Tern (EPBC Act: vulnerable, migratory). Estuaries along the Sunshine Coast, including at Caloundra, Noosa and Maroochydore, are internationally significant roosting sites for both Common Tern and Little Tern, particularly at night, with most terns flying in from the ocean to roost in the late afternoon and early evening (Chan and Dening 2006, Chan et al. 2008).

SCC staff conducted one low tide survey in winter, the results of which are summarised in **Table 3.2**. Seven Double-banded Plovers, which migrate from breeding grounds in New Zealand to spend the winter months in Australia, were recorded, together with six Eurasian Whimbrel. A resident pair of Beach Stone-Curlew was also recorded on the tidal flats of Goat Island, a species listed as vulnerable to extinction under the NC Act.

Table 3.2. Results of one winter low tide survey of the lower Maroochy River (MR02b to MR07) conducted by SCC staff.

Common name	EPBC*	NCA*	23/07/2024
Eurasian Whimbrel	M	S	6
Double-banded Plover	M	S	7
Pied Oystercatcher		LC	3
Beach Stone Curlew		V	2
Total migratory shorebirds			**13**
Total resident shorebirds			**5**
Total other waterbirds			441

The QWSG has undertaken regular low tide surveys of shorebirds feeding on the tidal flats of the lower Maroochy River (including areas MR02 to MR07) since the 2011 shorebird year. Combining the QWSG (including only counts within two hours of either low tide or high tide) and BAAM survey data, **Figure 3.3** shows the average total count of migratory shorebirds each summer (October to mid-March) and winter (May to August) season. Low tide counts have been variable between years, with no apparent trend (**Figure 3.3**). In years in which surveys at both low tide and high tide were undertaken, the average abundance of migratory shorebirds was generally greater at low tide than at high tide, suggesting that at least some of the birds that feed on the tidal flats along the lower Maroochy River do not roost within the lower Maroochy River.

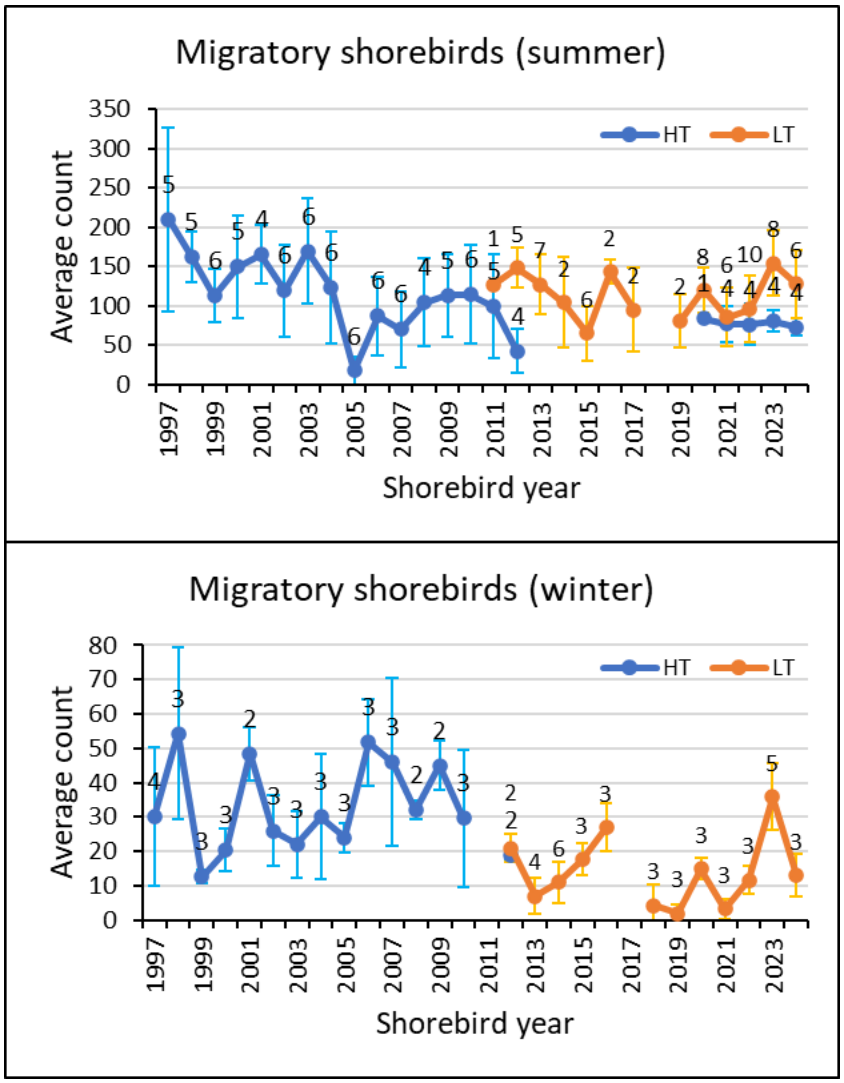


Figure 3.3. Average (±1 standard deviation) total migratory shorebirds recorded roosting at high tide (HT) and feeding at low tide (LT) in the lower Maroochy River each summer (October to mid-March) and winter (May to August) season based on QWSG data and this study. Number of counts each year shown above each point.

Figure 3.4 shows the long-term trends in the average total counts of the most common migratory and resident shorebirds each summer (October to mid-March: migratory shorebirds excluding Double-banded Plover), winter (May to August: only Double-banded Plover) or throughout the year (resident shorebirds). Low tide counts have been variable between years, with no apparent trends besides a decline in Eastern Curlew (**Figure 3.4**).

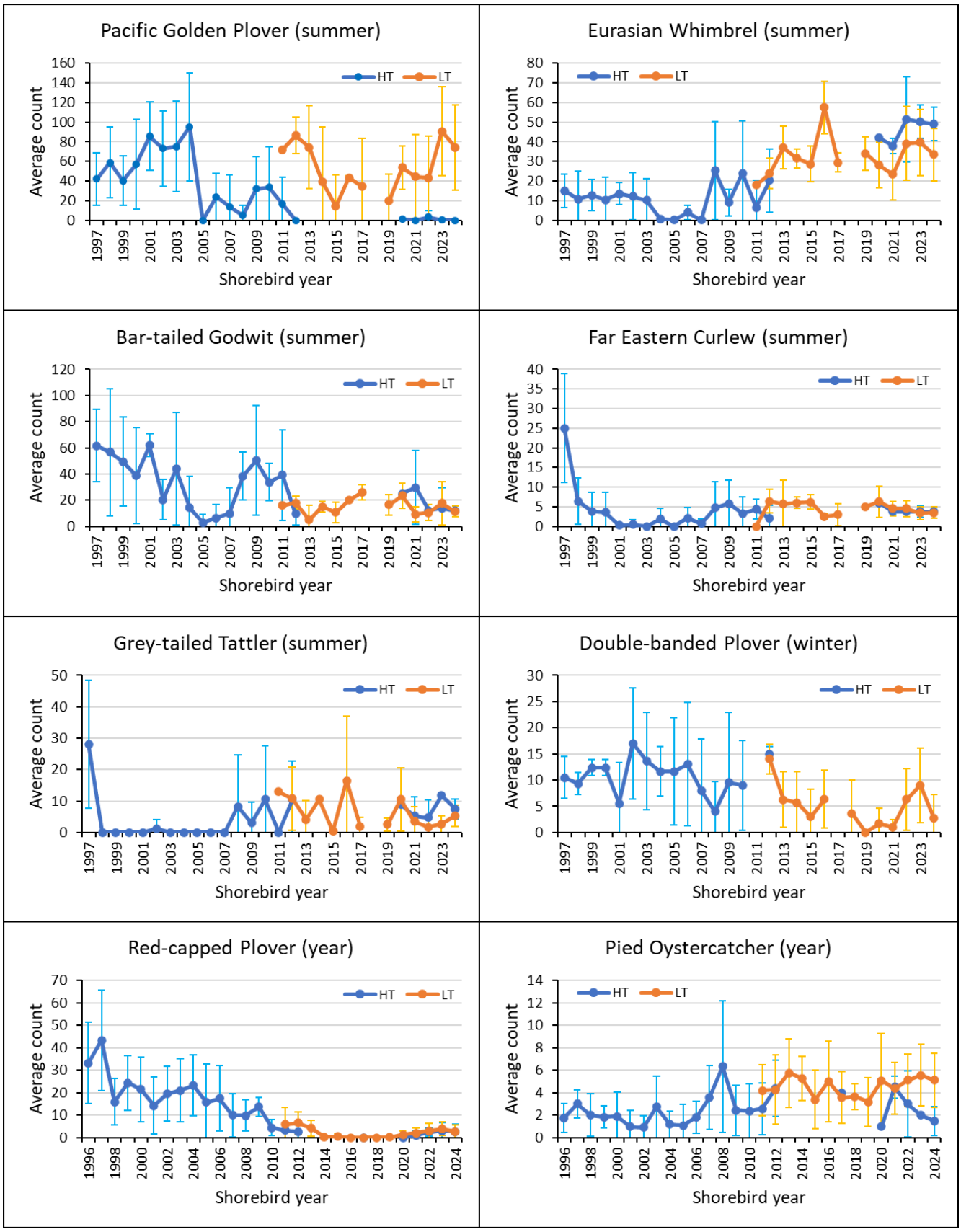


Figure 3.4. Average (±1 standard deviation) total count of different shorebird species recorded roosting at high tide (HT) and feeding at low tide (LT) in the lower Maroochy River each summer (October to mid-March), winter (May to August) or throughout the year based on QWSG data and this study. Number of counts each year shown above each point.

3.2.2 High tide surveys

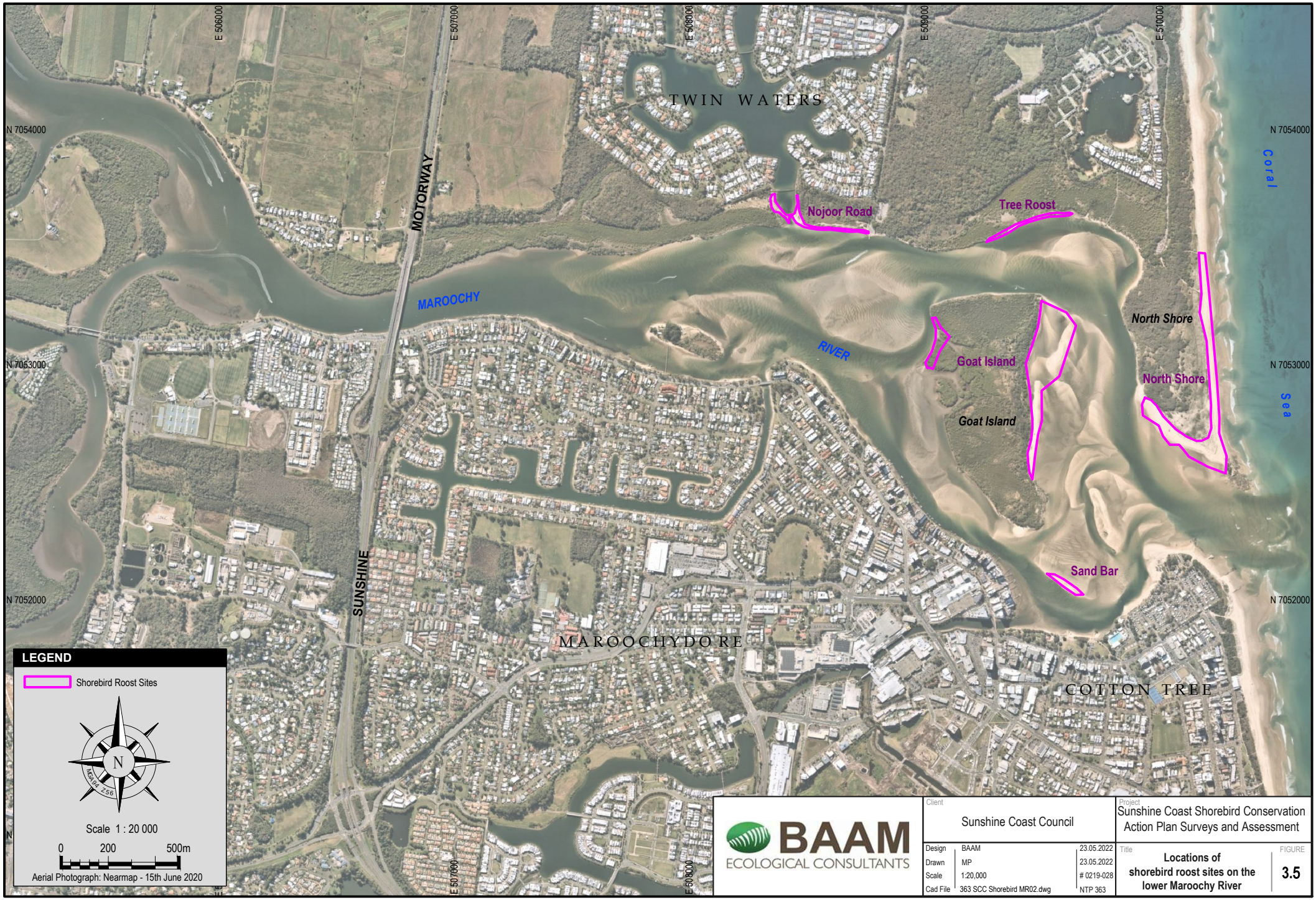
Five main roost sites used by shorebirds and other waterbirds occur in the lower Maroochy River (see **Figure 3.5** for their current locations): Goat Island (MRGI); Nojoor Road (MRNR); north shore (MRNS); sand bar (MRSB); and tree roost (MRTR). The results of the high tide surveys are presented in **Table 3.3**, compared to the averages of surveys over the period 2020/21 to 2023/24. During the four surveys in 2024/25, shorebirds were recorded roosting at only MRGI (all surveys) and MRTR (three surveys); no birds were recorded at MRNR or MRNS besides a flock of Far Eastern Curlew and Bar-tailed Godwit that alighted at MRNS for a short period after being disturbed off Goat Island. MRGI is the main roost site; some Eurasian Whimbrel and Grey-tailed Tattler appear to move between roosting at MRTR and MRGI, particularly in response to disturbance (see **Table 3.4**). The main roosting area at MRGI is a raised sandbank on the eastern side of Goat Island. The total number of individuals of each species was relatively consistent between surveys, dominated by Eurasian Whimbrel (average of 46), the vulnerable Bar-tailed Godwit (average of 19), Grey-tailed Tattler (average of 7) and the critically endangered Far Eastern Curlew (average of 4). An average total of 73 migratory shorebirds (range 61 to 86) roosted in the Maroochy River estuary in 2024/25, consistent with the overall average of 78 migratory shorebirds over the prior 4-year period 2020/21 to 2023/24 (**Table 3.3**). The other waterbirds roosting on Goat Island at high tide were mostly Greater Crested Tern and Australian Tern.

Table 3.3. Summary of the total numbers of shorebird species and other waterbirds roosting at the MRGI and MRTR roost sites in the lower Maroochy River during summer high tide surveys in 2024/25 compared to the average over the previous seasons 2020/21 to 2023/24.

Common name	Species	EPBC*	NCA*	04/11/2024	18/11/2024	13/01/2025	12/02/2025	2024/25 Average ±1SD	2020-2024 Average ±1SD
Far Eastern Curlew	*Numenius madagascariensis*	M, CE	CE	4	3	4	4	3.8±0.5	3.9±1.1
Eurasian Whimbrel	*Numenius phaeopus*	M	S	42	53	42	59	49±8.4	46.2±13.4
Bar-tailed Godwit (W Alaskan)	*Limosa lapponica baueri*	M, E	E	11	12	12	12	11.8±0.5	19.2±18
Pacific Golden Plover	*Pluvialis fulva*	M	S	0	0	0	0	0±0	1.2±3.6
Red-necked Stint	*Calidris ruficollis*	M	S	0	2	0	0	0.5±1	0.5±1.1
Grey-tailed Tattler	*Tringa brevipes*	M	S	4	6	9	11	7.5±3.1	7.4±5.3
Beach Stone-curlew	*Esacus magnirostris*		V	0	0	0	0	0±0	0.5±1
Pied Oystercatcher	*Haematopus longirostris*		LC	1	2	2	3	2±0.8	3±2
Sooty Oystercatcher	*Haematopus fuliginosus*		LC	0	0	0	0	0±0	0.2±0.6
Red-capped Plover	*Charadrius ruficapillus*		LC	5	6	0	0	2.8±3.2	2±2.6
Total migratory shorebirds				61	76	67	86	72.5±10.9	78.3±18.7
Total resident shorebirds				6	8	2	3	4.8±2.8	5.7±3.2
Total other waterbirds				46	16	9	98	42.3±40.5	242.2±549.2

* Status under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) or Queensland *Nature Conservation Act 1992* (NCA): CE = critically endangered; E = endangered; LC = least concern; M = migratory; S = special least concern (migratory); V = vulnerable.

Four of the Maroochy River roost sites (MRGI, MRNR, MRNS and MRSB) were regularly monitored by the QWSG from 1997 to 2012. **Figure 3.6** shows the average annual summer-season (October to mid-March) count of migratory shorebirds at each of the four roost sites that monitoring of high tide roost sites has been undertaken since 1998. The north shore (MRNS) was the most important migratory shorebird roost site in the lower Maroochy River area up until 2004 (**Figure 3.6**). As public use of north shore increased, including for walking dogs, use of the north shore by shorebirds declined and Goat Island (MRGI) became increasingly used by shorebirds for roosting. The QWSG discontinued monitoring of roost sites on the lower Maroochy River after 2012 due to increasing levels of disturbance affecting the counts. Based on QWSG data, the north shore has experienced the highest frequency of disturbance across all categories, including the presence of dogs (see **Section 3.2.3** below).



Over the past four summer seasons, migratory shorebirds have only used Goat Island for roosting, with no birds observed using the north shore (MRNS), Nojoor Road (MRNR) or sand bar (MRSB) roost sites (**Figure 3.6**), besides a flock of Far Eastern Curlew and Bar-tailed Godwit that alighted at MRNS for a short period after being disturbed off Goat Island during a survey in 2024/25. While migratory shorebirds regularly used all four roost sites in earlier years, they now appear to rely almost exclusively on Goat Island for roosting, probably due to increased disturbance at the alternative roost sites. The restriction of birds to using a single roost site reduces the resilience of shorebirds to disturbance since there are fewer alternative roost sites available should disturbance cause them to leave a particular roost site.

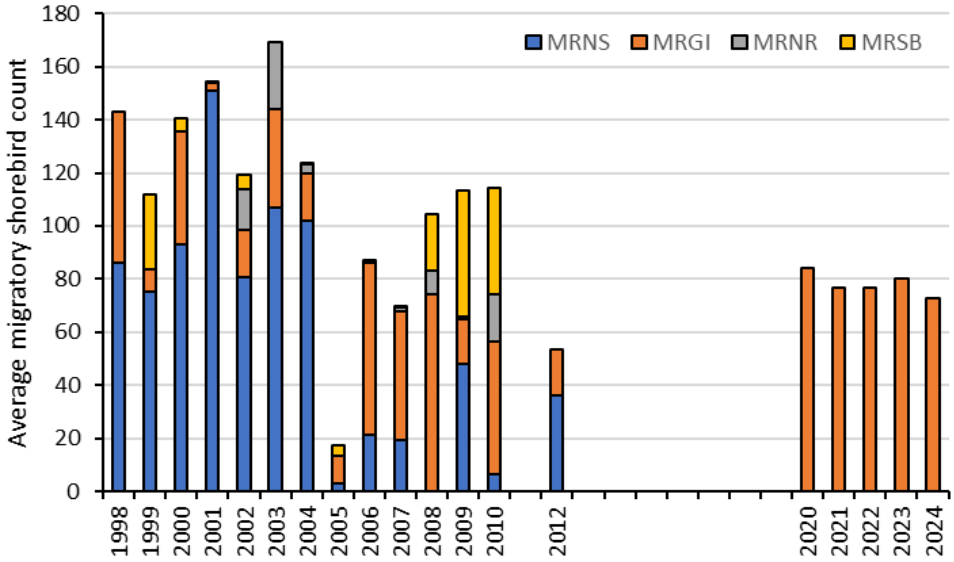


Figure 3.6. Average annual summer-season (October to mid-March) count of migratory shorebirds at high tide (within 2 hrs either side of high tide) at each of four roost sites in the lower Maroochy River since 1998 based on QWSG data and this study. Counts at MRTR are included within MRGI.

Analyses of data for the period 2011 to 2022 found that abundance at roost sites at high tide through the summer period had declined significantly for Pacific Golden Plover, Bar-tailed Godwit, Far Eastern Curlew and Red-capped Plover, but increased significantly for Eurasian Whimbrel and Pied Oystercatcher, whereas there had been no trend in Grey-tailed Tattler and Double-banded Plover (Lloyd *et al*. 2024); the 2024 data were consistent with these trends (**Figure 3.4**). During the previous surveys in 2022/23 (BAAM 2023), flocks of Pacific Golden Plovers that had been feeding on tidal flat sites MR05 and MR04 gathered on sandbars as the tide rose, before leaving the Maroochy River estuary heading in north-easterly direction. Pacific Golden Plover used to regularly use the north shore for roosting (**Figure 3.4**). Although Pacific Golden Plover were present foraging on the tidal flats in relatively large numbers, their substantially reduced counts at high tide relative to low tide since 2011 (**Figure 3.4**) indicates that they have shifted to roosting at an alternative site to the north. Lloyd *et al*. (2024) hypothesized they may be using Mudjimba Island, a small (1.3 ha), infrequently visited island with a rocky shoreline located 1 km offshore and 3.5 km north of the Maroochy River mouth. On 26 November 2024, a Sunshine Coast Council team photographed a flock of Pacific Golden Plover roosting on the rocky shoreline of Mudjimba Island, confirming their use of the island for roosting.

3.2.3 Disturbance

Shorebird roost sites and tidal flat feeding habitat areas in the lower Maroochy River are subject to multiple sources of potential disturbance to roosting or feeding shorebirds, including people using the area for recreation, dogs being walked on and off-leash, and various watercraft. The intensity of potential sources of disturbance and observations of actual disturbances recorded during the surveys is summarized in **Table 3.4**. Dogs off-leash continue to disturb shorebirds on Goat Island, where no dogs are permitted.

Table 3.4. Summary of the numbers of people, dogs and watercraft observed in the vicinity of roosts at high tide (HT) and tidal flats at low tide (LT) during the surveys of the lower Maroochy River estuary.

Date	Tide	People	Dogs	Boats/ kayaks/ boards	Jetskis	Observations
04/11/24	HT	5	4	2		1 boat and 1 canoeist approached roosting shorebirds to within 50 m but caused no disturbance; the boat came ashore on Goat Island with 5 people and 4 dogs but they did not approach the roosting birds.
04/11/24	LT	12	6	3		2 kayaks in the channel and 1 boat dragged up on MR4. 4 people pumping yabbies on MR5. 8 people with 6 dogs on North Shore.
18/11/24	HT	2			2	2 jetskis caused a flock of Eurasian Whimbrel roosting on Goat Island to take flight and then settle further away. 2 people in kayaks put ashore on northern bank of Goat Island.
18/11/24	LT	40	6	6		2 kayaks and a boat on MR6. 2 people on standup boards and 1 boat with 4 people came ashore on MR5 but well away from birds and did not cause disturbance. Up to 35 people and 5 dogs off-leash on mainland shore opposite MR5. 2 people on MR6, 1 walked to within 30 m of birds and 1 pumping yabbies further from birds.
13/01/25	HT	7	6	2	1	1 person with 2 dogs off-leash came ashore on Goat Island, the dogs ran through the roosting birds causing 2 bouts of putting roosting shorebirds to flight; this caused the 42 Eurasian Whimbrel to leave Goat Island and settle in the nearby mangrove tree roost (MRTR) while the Eastern Curlew and Bar-tailed Godwits settled on the North Shore (MRNS) for a short time before returning to Goat Island after the person and dogs had left. 6 people and 4 dogs on North Shore.
13/01/25	LT					No sources of disturbance recorded.
12/02/25	HT					Shorebird flock roosting on Goat Island was consistent in number for more than an hour leading up to and after high tide. No direct disturbance observed.
12/02/25	LT					No sources of disturbance recorded.

3.3 Caloundra

3.3.1 Low tide surveys

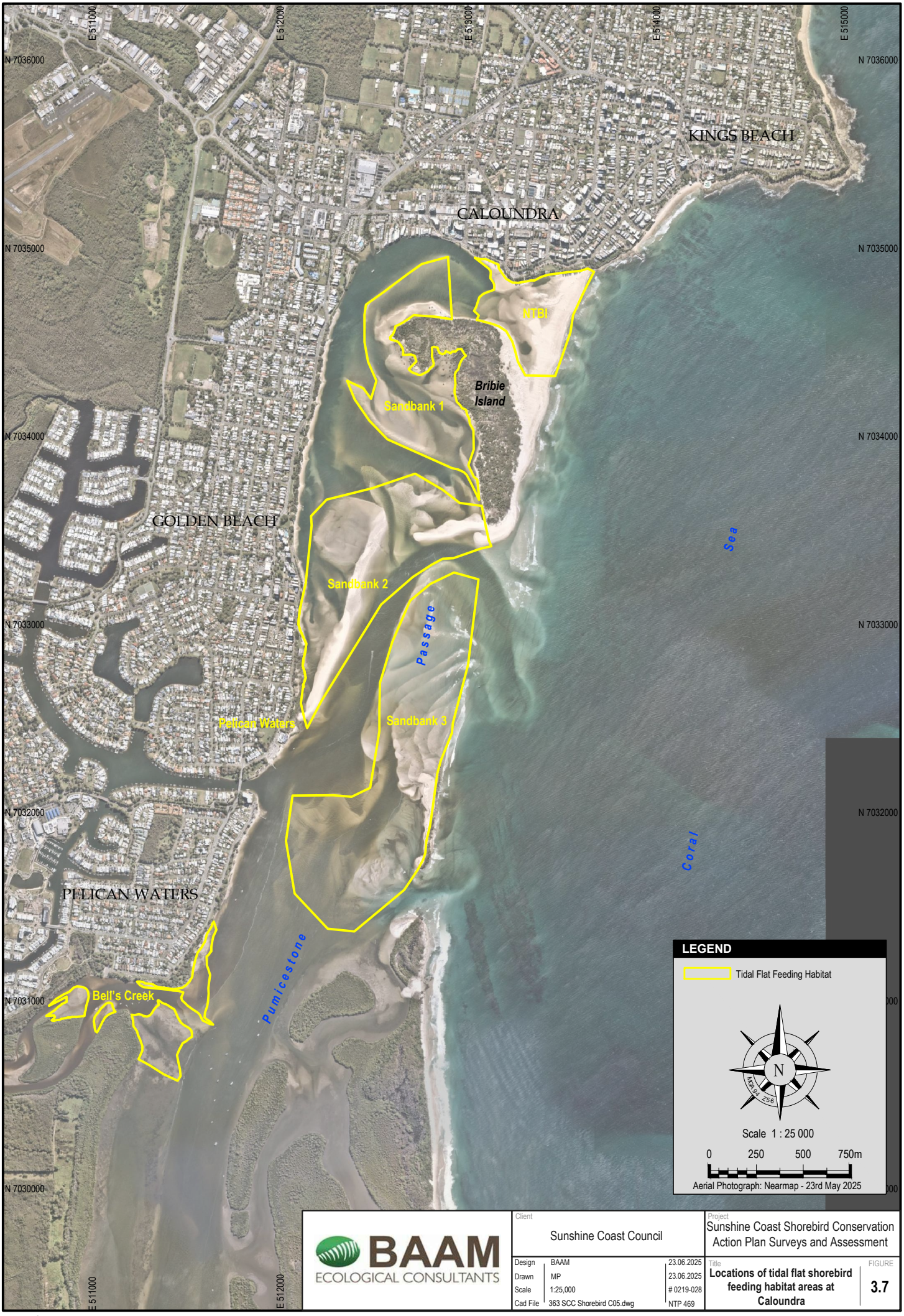
Six main areas of tidal flat feeding habitat occur in the northern Pumicestone Passage to the north of Bell's Creek mouth (see **Figure 3.7** for locations):

- a large tidal flat on the eastern side of the passage along the north-western tip of Bribie Island (SBN1);
- a large tidal flat on the western side of the passage opposite Golden Beach (SBN2);
- a small tidal flat connected to SBN2 opposite Pelican Waters (PEWA);
- several small patches of tidal flat at Bell's Creek (BECK);
- a new tidal flat (SBN3) on the south side of the new opening into Pumicestone Passage where sediment has gradually built up on the outer southern side of the new entrance following the Bribie Island break-through; and
- a new tidal flat (NTBI) that has established across the old entrance to Pumicestone Passage, between the northern tip of Bribie Island and Caloundra, following the Bribie Island break-through.

SBN2 and the area nearby has changed substantially following the creation of a new opening to the sea that broke through the northern tip of Bribie Island in January 2022. A high bank has established between the southern end of the isolated northern tip of Bribie Island and Golden Beach and runs westwards to within about 30m of the Golden Beach shoreline. Birds are using existing and new feeding areas that are still referred to as SBN2, and they can roost here now on most but not all high tides because the top of the bank becomes submerged on only the highest spring tides. Because the high bank is an integral part of this feeding area, it is included within SBN2. Birds were observed feeding on both SBN1 and SBN2 at low tide and readily retreat to the high parts of SBN2 at the peak of the high tide, providing they are not disturbed.

The results of the four summer-season surveys by this study as well as one winter-season survey by SCC staff are summarised in **Table 3.5**. The tidal flat areas of SBN1 and SBN2 (including PEWA) were the most important feeding areas for migratory shorebirds but increasing numbers of migratory shorebirds are starting to use the new SBN3 on the south side of the new ocean entrance. In 2024/25, the combined area of tidal flats supported an average combined total of 159 (maximum 297) migratory shorebirds, and an average of 37 (maximum 68) resident shorebirds during the summer (October-February) season. The most abundant migratory shorebirds included the vulnerable Bar-tailed Godwit, Eurasian Whimbrel, the critically endangered Far Eastern Curlew and Pacific Golden Plover (**Table 3.6**). One other migratory shorebird species was recorded occasionally in smaller numbers, with small numbers of five resident shorebird species. Shorebirds numbers were generally similar to the averages over the previous four years (**Table 3.6**).

Figure 3.8 shows the long-term variation in the annual average total migratory shorebird count at low tide during the summer non-breeding period. The total migratory shorebird counts each year over the period 1992 to 2019 and 2021 were derived by summing the average counts across all the monitored tidal flats at Golden Beach from QWSG data. The total migratory shorebird counts each year over the years 2020 and 2022 to 2024 were derived by summing the average counts across all the monitored tidal flats at Golden Beach from the BAAM surveys. These data suggest that there was a decline in total count of migratory shorebirds foraging on tidal flats at Golden Beach over the period 1992 to around 2010, but no apparent trend since then (**Figure 3.8**).



BAAM ECOLOGICAL CONSULTANTS

Client	Sunshine Coast Council	Project	Sunshine Coast Shorebird Conservation Action Plan Surveys and Assessment
Design	BAAM	23.06.2025	
Drawn	MP	23.06.2025	
Scale	1:25,000	# 0219-028	
Cad File	363 SCC Shorebird C05.dwg	NTP 469	
Title	**Locations of tidal flat shorebird feeding habitat areas at Caloundra**	FIGURE	**3.7**

Table 3.5. Summary of shorebird species recorded during four summer surveys (this study) and one winter survey (SCC staff) at Caloundra in 2024/25 at low tide on each of five tidal flat areas: Sandbank No. 1 to 3 (SBN1, SBN2, SBN3) including Pelican Waters (PEWA); Bells Creek (BECK); and Northern Tip of Bribie Island (NTBI). NS = not surveyed.

Common name	EPBC*	NCA*	Summer				Winter
			05/11/24	19/11/24	14/01/25	13/02/25	24/07/24
SBN1							
Far Eastern Curlew	M, CE	E	7	1	15	6	11
Eurasian Whimbrel	M	S	10	19	63	20	
Bar-tailed Godwit (W Alaskan)	M, E	E	5	8	84	54	
Pacific Golden Plover	M	S				67	
Beach Stone-Curlew		V		2			
Pied Oystercatcher		LC	1		4	4	2
Masked Lapwing		LC				4	5
Pied Stilt		LC				14	4
Total migratory			***22***	***28***	***162***	***147***	***11***
Total resident			***1***	***2***	***4***	***22***	***11***
SBN2+PEWA							
Far Eastern Curlew	M, CE	E	9	9	24	30	
Eurasian Whimbrel	M	S	5	3	14	49	
Bar-tailed Godwit (W Alaskan)	M, E	E			6	33	
Double-banded Plover	M	S					11
Pied Oystercatcher		LC	1	5			
Pied Stilt		LC		5		1	14
Red-capped Plover		LC	4		10	11	
Total migratory			***14***	***12***	***44***	***112***	***11***
Total resident			***5***	***10***	***10***	***12***	***14***
SBN3							
Far Eastern Curlew	M, CE	E	1			4	
Eurasian Whimbrel	M	S	5	3		1	
Bar-tailed Godwit (W Alaskan)	M, E	E	6	6		9	
Pacific Golden Plover	M	S		15			
Pied Oystercatcher		LC		3			
Pied Stilt		LC				10	5
Total migratory			***12***	***24***	***0***	***14***	***0***
Total resident			***0***	***3***	***0***	***10***	***5***
BECK							
Far Eastern Curlew	M, CE	E	1	1		1	
Eurasian Whimbrel	M	S		2		1	3
Bar-tailed Godwit (W Alaskan)	M, E	E	7	7		18	
Red-necked Stint	M	S				3	
Pied Oystercatcher		LC	1	3		1	
Masked Lapwing		LC				7	
Pied Stilt		LC	22	7		14	146
Total migratory			***8***	***10***	***0***	***23***	***3***
Total resident			***23***	***10***	***0***	***22***	***146***
NTBI							
Far Eastern Curlew	M, CE	E	1	1		1	
Eurasian Whimbrel	M	S	1				
Pied Oystercatcher		LC	2	7	2	2	
Pied Stilt		LC		1			
Total migratory			***2***	***1***	***0***	***1***	***NS***
Total resident			***2***	***8***	***2***	***2***	***NS***

* Status under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) or Queensland *Nature Conservation Act 1992* (NCA): CE = critically endangered; E = endangered; LC = least concern; M = migratory; S = special least concern (migratory); V = vulnerable.

Table 3.6. Comparison of the average, standard deviation (SD, a measure of variability) and maximum counts of migratory and resident shorebirds foraging at low tide at Caloundra between the summer of 2024/25 (4 surveys) and 2020/21 to 2022/23 (12 surveys).

Season			2024/25			2020/21 to 2023/24		
Date	**EPBC***	**NCA***	**Average**	**SD**	**Maximum**	**Average**	**SD**	**Maximum**
Bar-tailed Godwit	M, E	E	60.8	48.6	114	68.8	21.2	123
Common Sandpiper	M	S	0	0	0	0.4	1.4	5
Curlew Sandpiper	M, CE	CE	0	0	0	1.2	3.5	12
Eurasian Whimbrel	M	S	49.0	29.1	77	52.5	19.9	91
Far Eastern Curlew	M, CE	CE	28.0	14.8	42	29.3	9.2	41
Greater Sand Plover	M, V	V	0	0	0	0.2	0.6	2
Grey-tailed Tattler	M	S	0	0	0	1.4	4.3	15
Pacific Golden Plover	M	S	20.5	31.8	67	37.1	25.6	70
Red Knot	M, V	V	0	0	0	0.1	0.3	1
Red-necked Stint	M	S	0.8	1.5	3	0.8	1.7	5
Masked Lapwing		LC	2.8	5.5	11	2.5	3.2	9
Pied Oystercatcher		LC	9.0	6.1	18	3.9	3.6	14
Pied Stilt		LC	18.5	16.4	39	5.2	12.1	42
Red-capped Plover		LC	6.3	5.2	11	1.6	1.7	4
Beach Stone-curlew		V	0.5	1.0	2	0.2	0.6	2
Total migratory			***159.0***	***113.3***	***297***	***192.0***	***34.6***	***241***
Total resident			***37.0***	***22.0***	***68***	***13.3***	***12.7***	***51***

* Status under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) or Queensland *Nature Conservation Act 1992* (NCA): CE = critically endangered; E = endangered; LC = least concern; M = migratory; S = special least concern (migratory); V = vulnerable.

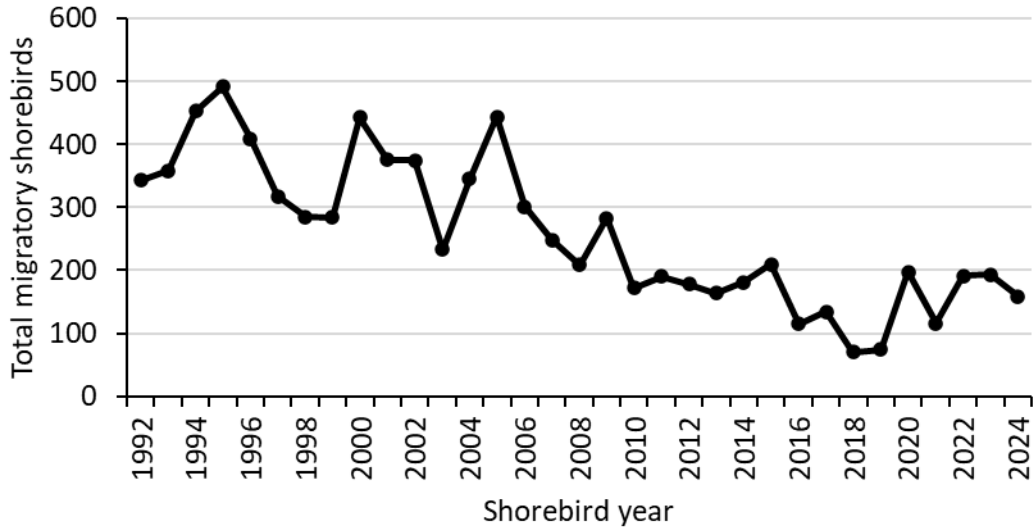
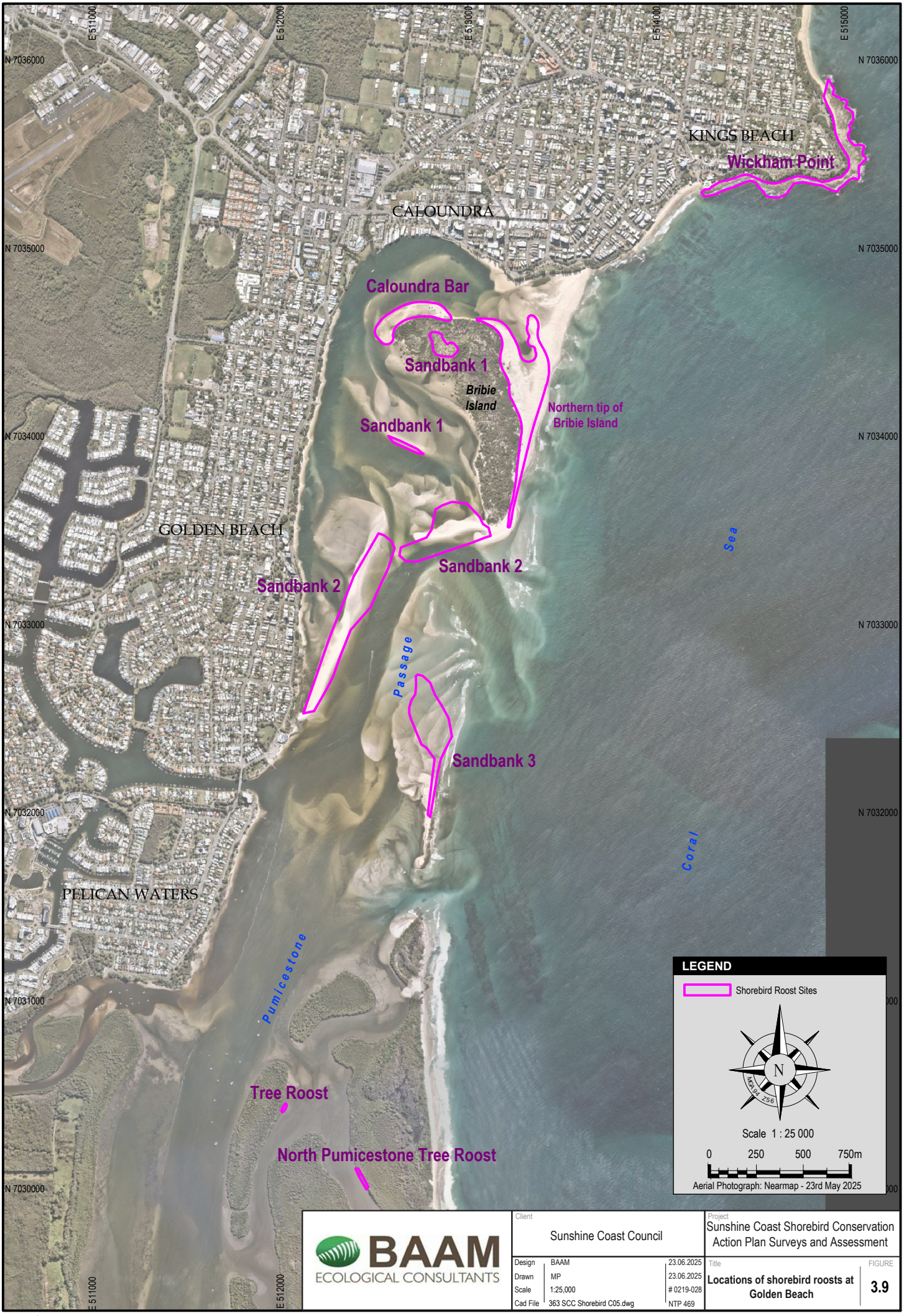


Figure 3.8. Average annual total migratory shorebird counts at Golden Beach at low tide during the summer non-breeding period over the years 1992/93 to 2024/25.

3.3.2 High tide surveys

Eight shorebird roost sites are currently recognised at Caloundra (see **Figure 3.9**):

- Caloundra bar (CBAR), a sand bank at the Pumicestone Passage entrance;
- Northern tip of Bribie Island (NTBI, part of Bribie Island National Park), along the beach between the old and new entrances to Pumicestone Passage (prior to the 2021/22 season, the northern portion of this site was included in CBAR);



BAAM ECOLOGICAL CONSULTANTS

Client	Sunshine Coast Council	Project	Sunshine Coast Shorebird Conservation Action Plan Surveys and Assessment
Design	BAAM	23.06.2025	
Drawn	MP	23.06.2025	
Scale	1:25,000	# 0219-028	
Cad File	363 SCC Shorebird C05.dwg	NTP 469	
Title	Locations of shorebird roosts at Golden Beach	FIGURE	3.9

- Sandbank 1 (SBN1), including a sandbank in the passage (used on the rising tide and neap high tides), a sandbank on the north-western shoreline of Bribie Island and an adjoining area of saltmarsh on the shoreline of Bribie Island;
- Sandbank 2 (SBN2), two raised portions of sandbank on the northern side of the new entrance to Pumicestone Passage;
- Sandbank 3 (SBN3), a new sandbank on the southern side of the new entrance to Pumicestone Passage that was first seen used by shorebirds for roosting in February 2023;
- A mangrove tree roost (BCTR) on the opposite side of Pumicestone Passage from Bell's Creek;
- North Pumicestone mangrove tree roost (NPTR) in a blind ending channel on the western side of Bribie Island, south of BCTR, identified for the first time in 2024; and
- Wickham Point (WICK), a rock platform on the mainland coastline north of the Pumicestone Passage entrance, where small numbers of shorebirds regularly roost.

A high bank has established between the southern end of the isolated northern tip of Bribie Island and Golden Beach. The bank runs westwards to within about 150m of the Golden Beach shoreline. Birds can roost here now on most high tides because the top of the bank does not usually become submerged. This high bank is now treated as an extension of SBN2. All roost sites except Wickham Point were surveyed by BAAM during the 2024/25 season (**Table 3.7**), but Wickham Point was surveyed by SCC as part of surveys of rocky headlands (**Table 3.10**).

Table 3.7. Summary of shorebird species recorded in each of the four summer high tide surveys at Caloundra in 2023/24 at each of five roost sites: Sandbank No. 1 to 3 (SBN1, SBN2, SBN3); Bells Creek Tree Roost (BETR); and Northern Tip of Bribie Island (NTBI).

Common name	EPBC*	NCA*	05/11/24	19/11/24	14/01/25	13/02/25
SBN1						
Pied Oystercatcher		LC			3	
Pied Stilt		LC				11
Masked Lapwing		LC				2
Total migratory			***0***	***0***	***0***	***0***
Total resident			***0***	***0***	***3***	***13***
SBN2						
Far Eastern Curlew	M, CE	CE	0	33	47	37
Eurasian Whimbrel	M	S	0	39	45	57
Bar-tailed Godwit (W Alaskan)	M, E	E	0	22	76	94
Pied Oystercatcher		LC	1	2	2	
Red-capped Plover		LC			16	11
Total migratory			***0***	***94***	***168***	***188***
Total resident			***1***	***2***	***18***	***11***
SBN3						
Far Eastern Curlew	M, CE	CE	45	7	1	
Eurasian Whimbrel	M	S	58	24	2	
Bar-tailed Godwit (W Alaskan)	M, E	E	41	33	2	
Beach Stone-Curlew		V		1		
Pied Oystercatcher		LC			2	
Pied Stilt		LC	48	38	21	42
Total migratory			***144***	***64***	***5***	***0***
Total resident			***48***	***39***	***23***	***42***
NTBI						
Pied Oystercatcher		LC			2	2
Total migratory			***0***	***0***	***0***	***0***
Total resident			***0***	***0***	***2***	***2***
BCTR						
Eurasian Whimbrel	M	S	18		34	
Total migratory			***18***	***0***	***34***	***0***

Common name	EPBC*	NCA*	05/11/24	19/11/24	14/01/25	13/02/25
NPTR						
Grey-tailed Tattler					36	
Total migratory			***NS***	***NS***	***36***	***0***

* Status under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) or Queensland *Nature Conservation Act 1992* (NCA): CE = critically endangered; E = endangered; LC = least concern; M = migratory; S = special least concern (migratory); V = vulnerable.

An average of 188 (range 158 to 243) migratory shorebirds used roost sites at Caloundra during the four high tide surveys in 2024/25, including up to 48 critically endangered Far Eastern Curlew, 94 vulnerable Bar-tailed Godwit, 81 Eurasian Whimbrel and 36 Grey-tailed Tattler (**Table 3.8**). The average numbers of shorebirds recorded roosting during summer (October-February) in 2024/25 were generally similar to the averages over the previous four years (**Table 3.8**). The formation of the new entrance to Pumicestone Passage increased the availability of suitable alternative roost sites, with suitable roosting habitat now present on a broad sandy beach at SBN3 and the area of roosting habitat on SBN2 having increased following the increased deposition of sand at this location. However, there is now increased accessibility by people to these roosting areas, which increases the risk and frequency of disturbance. Due to the silting up of the old entrance channel, the NTBI roost has become particularly accessible to people walking across the old channel entrance from Caloundra on all tides. Consequently, there is now usually high disturbance pressure from walkers and dogs at the NTBI roost and few shorebirds use this roost now. Nonetheless, the birds have a variety of alternative roost sites in proximity, with evidence that they move between adjoining sites in response to disturbance, particularly between SBN2 and SBN3, the two currently preferred roosting areas.

Table 3.8. Comparison of the average, standard deviation (SD, a measure of variability) and maximum counts of migratory and resident shorebirds roosting at Caloundra at high tide between the summer of 2024/25 (n = 4 surveys) and 2020/21 to 2023/24 (n = 16 surveys).

Date	EPBC*	NCA*	2024/25			2020/21 to 2023/24		
			Average	SD	Maximum	Average	SD	Maximum
Bar-tailed Godwit	M, V	V	67.0	23.6	94	63.7	42.2	135
Curlew Sandpiper	M, CE	CE	0	0	0	0.7	2.3	9
Eurasian Whimbrel	M	S	69.3	11.1	81	61.9	39.1	132
Far Eastern Curlew	M, CE	CE	42.5	4.9	48	36.2	16.6	68
Pacific Golden Plover	M	S	0	0	0	14.8	21.6	66
Red Knot	M, V	V	0	0	0	0.2	0.8	3
Red-necked Stint	M	S	0	0	0	0.1	0.5	2
Grey-tailed Tattler	M	S	9.0	18.0	36	0	0	0
Beach Stone-Curlew		V	0.3	0.5	1	0	0	0
Masked Lapwing		LC	0.5	1.0	2	1.4	1.8	5
Pied Oystercatcher		LC	3.5	3.7	9	5.5	2.4	11
Pied Stilt		LC	40.0	14.1	53	13.1	31.8	110
Red-capped Plover		LC	6.8	8.1	16	2.4	3.5	9
Total migratory			***187.8***	***39.2***	***243***	***177.5***	***91.7***	***324***
Total resident			***51.0***	***11.8***	***68***	***22.4***	***33.3***	***123***

* Status under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) or Queensland *Nature Conservation Act 1992* (NCA): CE = critically endangered; E = endangered; LC = least concern; M = migratory; S = special least concern (migratory); V = vulnerable.

The observations of shorebirds moving between roost sites in response to changing tide conditions and disturbance confirm the importance for shorebirds to have access to a local network of available roost sites so that they can move to an alternative nearby site if they are disturbed or otherwise forced off the preferred site.

3.3.3 Disturbance

Shorebird roost sites and tidal flat feeding habitat areas at Caloundra are subject to multiple sources of disturbance to roosting or feeding shorebirds, including people using the area for recreation, dogs being walked on and off-leash and various watercraft. The intensity of potential sources of disturbance and observations of actual disturbances recorded during the surveys is summarized in **Table 3.9**, with additional information collected by SCC staff for rocky headlands between Coolum and Caloundra summarised in **Table 3.10**.

Table 3.9. Summary of the numbers of people, dogs and watercraft observed in the vicinity of roosts at high tide and tidal flats at low tide during the surveys at Caloundra.

Date	Tide	People	Dogs	Boats/kayaks/boards	Jetskis	Observations
05/11/24	HT	33	4	3		
05/11/24	LT	4				
19/11/24	HT					
19/11/24	LT	13		1		1 person walking along the back of SBN1 near mangroves; on SBN2, 1 person walking across & 2 fishers; 1 canoeist put ashore on SBN3.
14/01/25	HT					Many people on NTBI
14/01/25	LT					A lot of disturbance at NTBI: 5 people and 1 dog around the lagoon itself; towards Wickham Point another 100 people scattered under umbrellas in the sand.
13/02/25	HT					Stormy conditions.
13/02/25	LT					

The changes to the Pumicestone Passage entrance since the Bribie Island break-through in January 2022 created a new entrance to the sea have changed patterns of disturbance to shorebirds. Whereas the CBAR, SBN1 and NTBI roost sites previously experienced low to moderate levels of disturbance (BAAM 2023), the risk of disturbance has increased over the past two years. This has largely been due to the silting up of the old entrance channel that allows people to access the northern tip of Bribie Island from Caloundra on most tides. Similarly, the risk of disturbance to shorebirds feeding and roosting on SBN2 has increased. Changes in sediment deposition after the sea broke through the northern end of Bribie Island to create the new entrance has formed a high bank between the southern end of the isolated northern tip of Bribie Island and Golden Beach. The bank, which forms the reconfigured SBN2 roost site runs westwards to within about 30 m of the Golden Beach shoreline and at low tide and most high tides people, including with dogs, can cross a shallow channel here and walk along this bank near feeding and roosting birds. A further widening of the break-through during heavy seas associated with Cyclone Alfred in March 2025 is likely to cause further changes to the formation and locations of both roost sites and tidal flats opposite Golden Beach.

Table 3.10. Summary of observations by SCC staff conducting surveys of rocky headlands between Coolum and Caloundra.

Site	Date	Tide	Total migratory shorebirds	Total resident shorebirds	Total other waterbirds	Dogs on leash	Dogs off leash	People	Float plane	Observations
Caloundra Headland	24/10/24	Low	1	0	10	0	1	4	0	
Caloundra Headland	8/01/25	Low	4	3	5	0	3	9	0	
Caloundra Headland	25/02/25	Low	2	1	4	0	0	2	0	
Coolum	21/08/24	Low	0	2	0	0	0	2	0	
Coolum	5/02/25	Low	0	0	2	0	0	3	0	
Coolum - Yaroomba	17/04/24	Low	0	2	0	1	2	14	0	Sooty Oystercatchers on rocks between 2nd and 3rd bay
Coolum - Yaroomba	30/05/24	Low	0	2	62	1	2	6	0	Crested Terns on Coolum Beach adjacent to SLSC – Pied Oystercatchers on Pt Perry rocks
Moffat Headland	12/04/24	Low	1	0	4	0	0	0	0	
Moffat Headland	24/10/24	Low	1	0	0	0	1	1	0	
Moffat Headland	29/11/24	Low	0	0	14	0	0	5	0	
Moffat Headland	8/01/25	Low	1	0	1	0	0	2	0	2 fishermen disturbed Tattler
Mudjimba Island	31/08/24	High	0	2	0	0	0	0	0	2 Sooty Oystercatcher observed flying from island
Pt Cartwright	11/06/24	High	0	3	4	6	17	26	0	
Pt Cartwright	3/07/24	High	0	0	10	1	0	21	0	
Pt Cartwright	22/08/24	Low	0	0	60	0	0	3	0	
Pt Cartwright	5/12/24	Low	0	0	3	2	0	19	0	
Pt Cartwright	7/01/25	Low	0	1	5	9	9	54	0	Tagged SOOY - ANA. 5 off-leash dogs past sign.
Pt Cartwright - Beach	17/09/24	Low	0	2	1	3	1	23	0	
Pt Cartwright - Headland	17/09/24	Low	0	0	9	0	1	13	1	
Pt Cartwright - River	17/09/24	Low	0	0	3	0	0	17	0	
Wickham Point	12/04/24	Low	0	4	8	0	0	0	0	
Wickham Point	29/11/24	Low	0	3	16	1	0	11	0	
Alexandra Headland	25/07/23	High	0	0	5	0	0	0	0	
Alexandra Headland	16/11/23	High	0	0	0	1	2	13	0	
Coolum - Yaroomba	21/11/23	High	0	0	3	0	0	0	0	
Moffat Headland	7/11/23	High	0	0	0	0	0	3	0	
Moffat Headland	3/04/24	High	1	0	2	0	1	9	1 para-glider	School holidays
Pt Cartwright	5/12/24	High	0	0	12	2	1	26	0	One off leash dog on the headland rocks. Busy on the river, quiet on the front.
Wickham Point	7/11/23	High	0	0	6	0	1	7	0	
Wickham Point	3/04/24	High	0	0	17	2	0	18	0	School holidays

3.3.4 Sunshine Coast Council Surveys

The results of additional surveys of rocky headlands between Coolum and Caloundra north of the old Pumicestone Passage entrance are presented in **Table 3.10**. A Pied Oystercatcher tagged with a green leg flag 'ABN' on its right leg laid eggs in a nest at the edge of a newly built parking lot at Outrigger Island (**Figure 3.9**); unfortunately, the chick was killed by a dog relatively soon after hatching, illustrating the risk that off-leash dogs pose to breeding shorebirds. Another pair of Pied Oystercatchers was observed with two flightless young chicks (approximately 15-20 days old) on the northern tip of Bribie Island (NTBI) on 18 September 2024 (**Figure 3.8**), confirming successful breeding at that location. Two immature birds were observed at the same location during the later surveys from early November, suggesting that the chicks survived to fledging.

Figure 3.10. Pied Oystercatcher at nest with eggs next to a new parking lot on Outrigger Island (left) and another with a flightless chick on the northern tip of Bribie Island (right).

3.4 Shorebird Tracking

Two Sooty Oystercatchers were caught by the QWSG on 13-14 April 2024. Each bird was fitted with a metal band provided by the Australian Bird and Bat Banding Scheme together with an engraved green plastic leg flag, which can be read in the field without recapturing the bird. In addition, platform terminal transmitters (PTTs) were fitted using a leg harness. The transmitters weigh less than 2% of the bird's lean body mass and provide regular position updates (with variable precision) via a satellite network.

The transmitter on an adult fitted with green leg flag 'ANA' provided location fixes from 13 April to 9 September 2024, after which the transmitter stopped working. These showed that the bird moved regularly between Point Cartwright and Mudjimba Island, which are 7.5 km apart (**Figure 3.10**). Occasional sightings of the bird have since been reported at Point Cartwright.

The transmitter on a juvenile fitted with green leg flag 'ANB' provided location fixes from 14 to 25 April 2024, after which the transmitter stopped working. These showed that the bird moved between Moffat Headland, Wickham Point and the northern tip of Bribie Island (**Figure 3.10**). A sighting of the bird has since been reported at Iluka on the NSW north coast on 28 August 2024, around 300 km to the south.

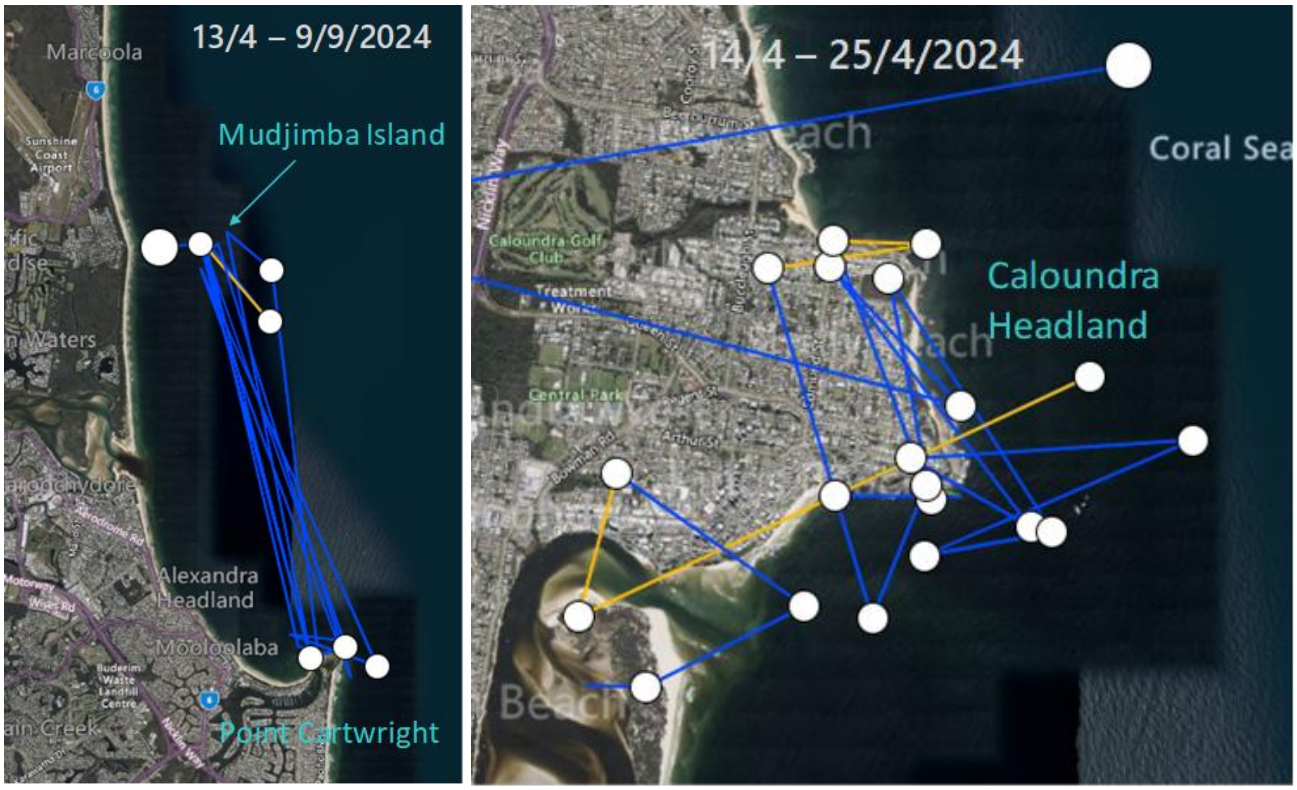


Figure 3.11. Movements of Sooty Oystercatchers fitted with satellite transmitters: an adult fitted with green leg flag 'ANA' (left) and a juvenile fitted with green leg flag 'ANB' (right).

Sooty Oystercatchers are generally sedentary, and dispersal is limited, particularly among breeding adults (Hansen *et al*. 2014). They typically breed on offshore islands and may move to the mainland during the non-breeding season. The breeding season extends from July to December in northern Australia; hence the adult moving between Mudjimba Island and Point Cartwright may have bred on Mudjimba Island. Juveniles are more dispersive, moving to flocking areas after reaching independence. Few long-distance movements have been recorded but these include a bird that moved 500 km from southern Victoria to south-western Tasmania, another that moved 250 km from Roebuck Bay to the Kimberley, and one that moved 100 km from Roebuck Bay to the Lacepede Islands in north-western Australia (Hansen *et al*. 2014). Thus, the movement of the juvenile 300 km from Caloundra to Iluka is the second longest recorded movement of the species.

4.0 Recommendations

Recommendations remain the same as those provided in the 2024 report (BAAM 2024).

4.1 Lower Maroochy River

While it was historically one of the most important roost sites for shorebirds on the lower Maroochy River, the north shore (MRNS) has largely been abandoned as a roost site by shorebirds due to the high levels of disturbance by people using the sandy shoreline for recreation and walking dogs off-leash. Consequently, the sandy shoreline and sand bars on the eastern side of Goat Island (MRGI and MRSB) are currently the most important shorebird roost sites, which enjoy a moderate level of protection from disturbance by being accessible at high tide only by watercraft. Nonetheless, boaters with pets on board do regularly come ashore at Goat Island and walk their dogs, often off-leash, despite it being a Conservation Park where dogs are not allowed. The tidal flats on the eastern and western edges of Goat Island (MR06, MR04 and MR07) are also the most important feeding areas on the lower Maroochy River. While the MR04 and MR07 tidal flats are seldom visited by people, people regularly access the

MR06 tidal flats via watercraft or wading/swimming across the southern channel at low tide, causing regular disturbance to feeding shorebirds, including by dogs being walked off-leash. The MR05 tidal flat is located close to a well-used sandy beach in a cove on the northern shore of the river. These disturbance pressures are expected to continue to increase as the human population of the region continues to grow. Research has shown that off-leash dogs in particular cause severe disturbance to shorebirds, reducing their use of important habitats (Dhanjal-Adams *et al.* 2016), and are a key threat to migratory shorebirds in Moreton Bay (Fuller *et al.* 2019).

Recommended approaches for reducing disturbance to feeding and roosting shorebirds include a combination of:

- Site-specific information signage to raise awareness of the presence of shorebirds in the area and the importance of the key habitat areas for shorebirds, particularly migratory shorebirds (Dowling and Weston 1999, Antos *et al.* 2006, Williams *et al.* 2009);
- Other approaches to raising public awareness of how the migration and feeding ecology of shorebirds are impacted by disturbances to try to change public awareness of, and attitudes towards disturbing shorebirds, particularly among dog-owners that exercise their dogs along foreshore areas (Dowling and Weston 1999, Antos *et al.* 2006, Williams *et al.* 2009);
- Planning to ensure suitable dog-walking facilities such as dog-off leash areas are situated in locations convenient and attractive to the public but separated from important shorebird foreshore habitats (Stigner *et al.* 2016);
- Planning to limit access to important feeding or roosting areas by people and/or dogs (Weston *et al.* 2012, Stigner *et al.* 2016); and
- Effective enforcement of access restrictions and dog on-leash areas, given that compliance to access restrictions or on-leash laws is strongly dependent on the extent of enforcement (Dowling and Weston 1999, Dhanjal-Adams *et al.* 2016, Stigner *et al.* 2016).

Lloyd *et al.* (2024) outline how, over the past several years, Sunshine Coast Council has worked to increase public awareness of shorebirds through temporary information signage and a variety of other approaches to raising public awareness, including information on Council's website, funding local artists to paint large murals of various shorebird species including interpretive signage on public toilet blocks, and presentations at a variety of community events. Continuation of these activities is encouraged. Given the high dependency of migratory shorebirds on a single roost site in the lower Maroochy River estuary, namely the sandbank on the eastern side of Goat Island, proactive management of disturbance to this location is recommended. Since Goat Island is part of the Maroochy River Conservation Park and managed by the Queensland Parks and Wildlife Service (QPWS), a collaborative approach involving QPWS is recommended.

4.2 Caloundra

The spatial distribution of shorebird habitats, including both tidal flat feeding habitat and roosting habitat has changed substantially since the formation of the entrance to Pumicestone Passage. The changes have increased the availability of alternative roost sites, with suitable roosting habitat now present on SBN3 and the area of roosting habitat on SBN2 having increased. On the other hand, these changes have also changed patterns of disturbance to shorebirds. Whereas the CBAR, SBN1 and NTBI roost sites previously experienced low to moderate levels of disturbance, the risk of disturbance has now increased. This has largely been due to the silting up of the old entrance channel that allows people to access the northern tip of Bribie Island from Caloundra on most tides. Similarly, the risk of disturbance to shorebirds feeding and roosting on SBN2 has increased. Changes in sediment deposition after the sea broke through the northern end of Bribie Island to create the new entrance has formed a high bank between the southern end of the isolated northern tip of Bribie Island and Golden Beach. The bank, which forms the SBN2 roost site runs westwards to within about 150 m of the Golden Beach shoreline and at low tide and most high tides people, including with dogs, can cross a shallow

channel here and walk along this bank near feeding and roosting birds. This recreational disturbance pressure is predicted to continue to increase as the region becomes more developed. Consequently, there is a need for proactive management of disturbance to shorebirds at the important roosting and feeding habitats at Caloundra that are identified above. Approaches for reducing disturbance to feeding and roosting shorebirds are as recommended under **Section 4.1** above. Site-specific signage that clearly indicates the locations of the most frequently used high tide roosting areas to be avoided within the SBN1, SBN2, SBN3 and NTBI roost sites, together with an explanation of why disturbance to flocks of roosting birds should be avoided would be particularly useful in this context.

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APPENDIX 1
Shorebird survey conditions

Table A1.1. Shorebird survey dates and conditions.

Date	Site	LT time	LT ht (m)	HT time	HT ht (m)	Low tide (LT)			High tide (HT)		
						Wind	Cloud	Rain	Wind	Cloud	Rain
23/07/2024	Maroochy River	17:15	0.14								
4/11/2024	Maroochy River	04:37	0.24	10:37	1.76	light	4/8	no	gentle	4/8	no
18/11/2024	Maroochy River	04:47	0.11	10:47	2.02	light	1/8	no	gentle	1/8	no
13/01/2025	Maroochy River	15:02	0.22	9:02	2.04	fresh	8/8	yes	fresh	5/8	no
12/02/2025	Maroochy River	16:42	0.45	9:22	1.99	gentle		no	gentle		no
24/07/2024	Golden Beach										
5/11/2024	Golden Beach	6:38	0.44	10:52	2.28	moderate		no	moderate		no
19/11/2024	Golden Beach	6:48	0.38	11:02	2.5	light	8/8	no	moderate	8/8	no
14/01/2025	Golden Beach	16:49	0.58	09:17	2.6	gentle	1/8	no	gentle	1/8	no
13/02/2025	Golden Beach	16:49	0.58	09:27	2.5	moderate	3/8	no	moderate	8/8	no
3/04/2024	Moffat Headland	10:25	15:21	15:26	1.02	light	no	no	light	no	no
3/04/2024	WICK	10:25	15:21	15:26	1.02	light	no	no	light	no	no
12/04/2024	Moffat Headland	15:00	0.17	9:10	1.76	light	no	no	light	no	no
12/04/2024	WICK	15:00	0.17	9:10	1.76	light	no	no	light	no	no
17/04/2024	Coolum - Yaroomba					light	yes	no			
30/05/2024	Coolum - Yaroomba					light	no	no			
11/06/2024	Pt Cartwright					no	no	no			
3/07/2024	Pt Cartwright					light	yes	no			
21/08/2024	Coolum					light	no	no			
22/08/2024	Pt Cartwright					no	no	no			
31/08/2024	Mudjimba Island					no	no	no			
17/09/2024	Pt Cartwright - River					light	no	no			
17/09/2024	Pt Cartwright - Beach					light	no	no			
17/09/2024	Pt Cartwright - Headland					light	no	no			
24/10/2024	Moffat Headland					light	yes	no			
24/10/2024	Caloundra Headland					light	yes	no			
29/11/2024	Moffat Headland	13:09	0.55	18:43	1.36	light	yes	no			
5/12/2024	Pt Cartwright	3:44	0.3	10:46	1.8	light	no	no			
7/01/2025	Pt Cartwright										
8/01/2025	Moffat Headland										
8/01/2025	Caloundra Headland										
5/02/2025	Coolum										
25/02/2025	Caloundra Headland					Strong	no	no			