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Short Note

Use of Citizen Science, Social Media, and AI to Track White Whales in the Kingdom of Tonga and Australian Waters

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Observations of all white humpback whales (*Megaptera novaeangliae*) are becoming more widely documented as they are easily identifiable and popular with the general public (Table 1). In August through October 2024, two separate all white, female humpback whale calves were observed in the Kingdom of Tonga. These are the first known white calves documented in this region. Whale swim tourism operators and guests made underwater observations in the Vava'u and Ha'apai island groups. Observers sighted the two white calves on several occasions, initially within 9 km of each other, across 5 d. Sightings occurred in several different locations between 12 August to 2 October 2024. The individual whales (calves and accompanying mothers) were identified using distinguishing features on their rostrum, pectoral fins, dorsal fins, and tails. Operators and passengers contributed photographic information to Happywhale.com and via the Tongan Fluke Database initiative. These humpback whales were given Tongan names: “Siale” and “Mahina.”

Siale (Happywhale ID: HW-MN1200961)

On 12 August 2024, around 1300 h, a whale swim tour observed a white humpback calf near Vaka Eitu island in the Vava'u group (-18.722722, -174.105667; Figure 1). Whale swim operators saw the calf again on 18 and 19 August in a similar location (southwest of Vava'u island group) and then several other times in the Ha'apai island group between 22 August and 14 September (Figure 2). The calf was identified as a female via photos of her hemispherical lobe in her genital region. In some images, a red eye was visible indicating that this calf is most likely albino.

Mahina (Happywhale ID: HW-MN1200962)

On 17 August 2024, around 1000 h, the vessel *Kalo* observed a white humpback calf southwest of Vava'u (approximate coordinates -18.78279, -174.16003; Figure 1). The vessel was under permit to provide swim-with-humpback whales activities and documented the individual both above and below the surface. Based on the flukes and other identifying features of the white calf, this whale was determined to be a female and a different individual from the other white whale (Siale) previously sighted during that time period (Figure 1). Further collection of images showed the mother of each calf to also be unique. This calf's eyes remained mostly closed (we were unable to determine eye colour), and she was interactive with swimmers (e.g., she repeatedly approached people in the water). Another tour boat, *No Bananas*, resighted the same whale later that day and took fluke identification photos of both the mother and calf (Table 2). The calf was not sighted again until 2 October when co-author AF, onboard *Opa Jean*, documented the same mother and white calf close to Fatumanga Island (-18.77039, -174.12329).

Resighting of Siale in Australian Waters in 2025

On 5 November 2025, a citizen scientist recorded an all-white humpback whale at around 0700 h at South Durras, near Batemans Bay, New South Wales, on the east coast of Australia. The same whale was spotted later that day, around 50 km north of this location via drone video captured from Warden's Head, New South Wales. The individual was identified as Siale—one of the two white whales first seen in 2024 in Tonga (Figure 3)—using images from social media along with algorithms from Happywhale. The individual was sighted again, further north, on 7 November 2025 by members of

Table 1. Global sightings of partially white to all-white humpback whale (*Megaptera novaeangliae*) phenotypes. Predominantly white whales are unique and are becoming more widely documented by scientists and the general public via social media platforms.

Year first sighted	Location	Colouration	Happywhale reference	Reference
1991	East Australia	Albino (confirmed)	“Migaloo” UID-0005	Forestell et al., 2001; Polanowski et al., 2012; Pirodda et al., 2023
2002	Ecuador	Leucistic (70% white)		Castro et al., 2007
2008	East Australia	Leucistic		Koper et al., 2017
2011	East Australia	Albino (presumed)		Koper et al., 2017
2012	Norway	Leucistic	“Qipqoqq Akistog” HW-MN0102168	Lydersen et al., 2013
2012	East Australia	Leucistic		Koper et al., 2017
2014	South Africa	Piebald		Koper et al., 2017
2016	South Africa	Leucistic (white body, dark extremities)		Koper et al., 2017
2019	French Polynesia	Leucistic (grey/white)	HW-MN1200772	De Weerd, 2023
2022	Costa Rica, Peru, Antarctica	Leucistic	“Suru” HW-MN1305222	Mora et al., 2022; Cortez-Casamayor et al., 2024
2023	West Australia	Leucistic	Encounter 614470	Brooke Pyke, Instagram: @brookepykephotography
2024	Tonga	Albino	“Siale” HW-MN1200961	This short note
2024	Tonga	Unknown	“Mahina” HW-MN1200962	This short note
2025	Colombia	Leucistic (partially)		Estupiñán-Montañón & Baron, 2025
2025	Australia	Albino	“Siale” HW-MN1200961	This short note

the Organisation for the Rescue and Research of Cetaceans in Australia, whale watch tour operators, and co-author VP (Figure 4). Observers sighted Siale displaying a number of behaviours, including pectoral slapping, breaching, and swimming in various directions. A day later, Siale was spotted north of this location from Catherine Hill Bay, north of Sydney, New South Wales (Figure 5). This was the last known sighting of Siale in Australian waters in 2025.

Future Conservation of White Whales

The unique phenotypes of these white whales means there is likely to be increased interest by the general public to photograph them. In Australia, authorities have implemented dedicated legislation to protect another known white humpback whale, “Migaloo” (albino humpback whale; part of the Australian east coast population), and other predominantly

white whales, with increased vessel approach distances of 500 m (Forestell et al., 2001; Pirodda et al., 2023). Currently, there are no specific legislation or guidelines in place for white whales in other locations of the South Pacific, such as the Kingdom of Tonga, as the calves reported on in this short note are the first documented in this region. This short note highlights potential consideration for their protection in the Kingdom of Tonga, along with enforcement, which has been an ongoing challenge with whale swimming tourism in the Kingdom of Tonga (Kessler et al., 2013; Fiori et al., 2019). For example, Siale demonstrates that humpback whales move between islands (Vava’u to Ha’apai) as Siale and her mother covered ~128 km over 2 d, with in-water interactions operations occurring in both locations. Given the popularity of white whales and their potential future occurrence in waters of the Kingdom of Tonga, education and protection

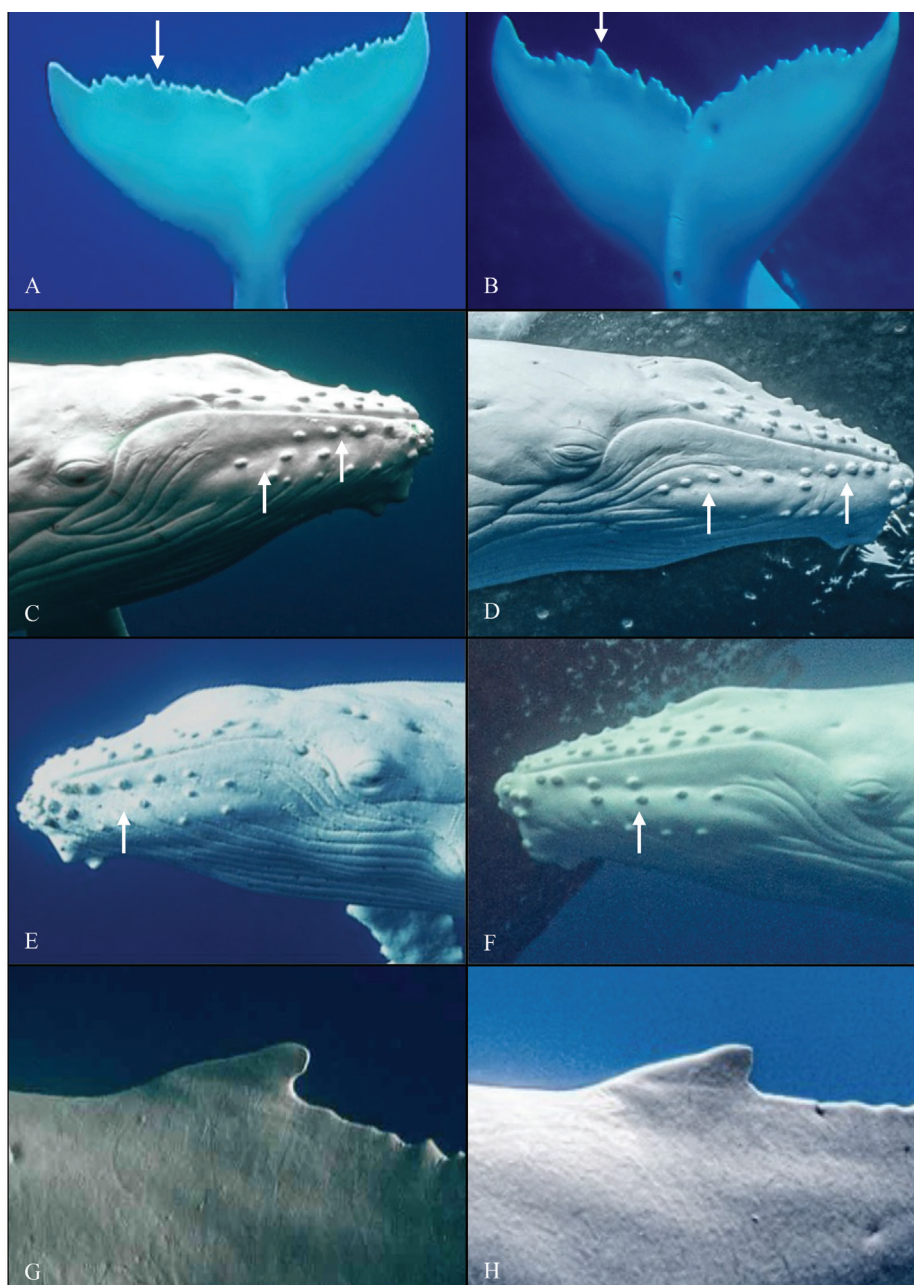


Figure 1. First sightings of the white humpback (*Megaptera novaeangliae*) calves, Mahina (left) and Siale (right), in Tonga in 2024 showing notable areas for identification: (A) Mahina tail fluke (ventral side) from Vava'u, Kingdom of Tonga, 17 August 2024 (Photo credit: Ashlee Jones, Happywhale); (B) Siale tail fluke (ventral side) from Vava'u, Kingdom of Tonga, 19 August 2024 (Photo credit: Robyn Malcolm, Happywhale); (C) Mahina jaw (right hand side) from Vava'u, Kingdom of Tonga, 2 October 2024 (Photo credit: co-author AF); (D) Siale jaw (right hand side) from Vava'u, Kingdom of Tonga, 12 August 2024 (Photo credit: Simon Lorenz); (E) Mahina jaw (left hand side) from Vava'u, Kingdom of Tonga, 30 August 2024 (Photo credit: Kian Bates); (F) Siale jaw (left hand side) from Ha'apai, Kingdom of Tonga, 4 September 2024 (Photo credit: Tris Sheen via Happywhale); (G) Mahina dorsal fin (left hand side) from Vava'u, Kingdom of Tonga, 2 October 2024 (Photo credit: co-author AF); and (H) Siale dorsal fin (left hand side) from Vava'u, Kingdom of Tonga, 2 October 2024 (Photo credit: Jintingliu via Happywhale).

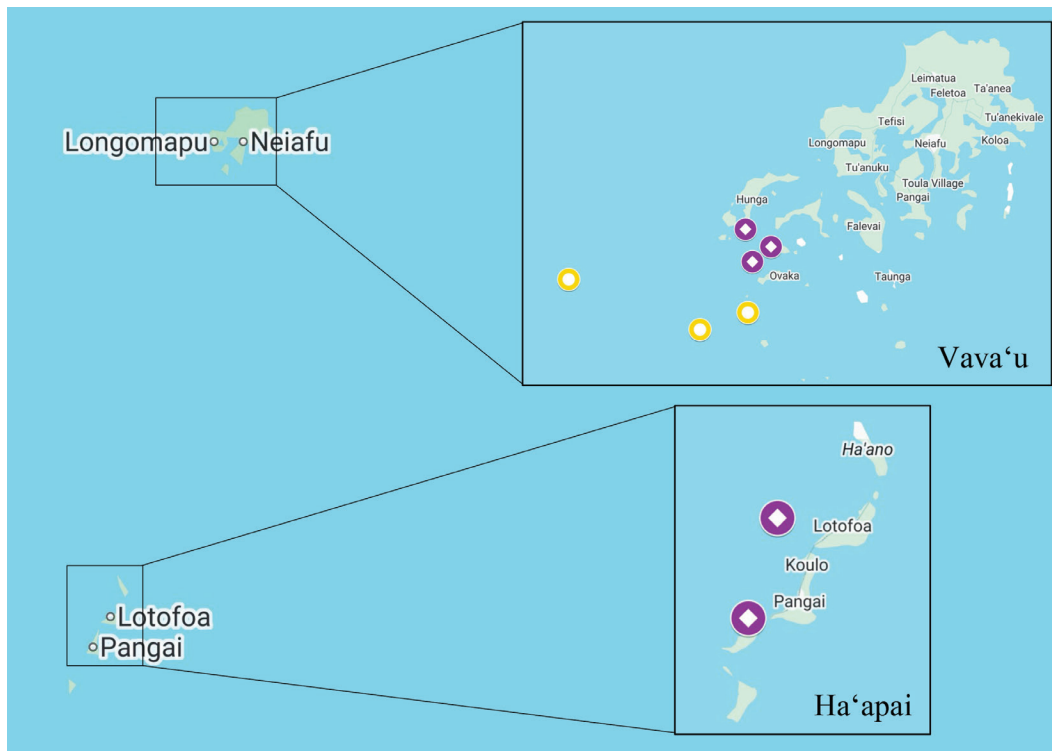


Figure 2. Sighting locations of Mahina and Siale in the Kingdom of Tonga in 2024 from observations by the co-author AF and Happywhale. The purple diamonds indicate Siale, and the yellow circles indicate Mahina.

are important to minimise the potential demand from tourists who might want to swim with them. The recently implemented *Tongan Whale Tourism Project* is an example of the Tongan Government, local community (Vava'u Environment Protection Association), and scientists learning more about ensuring the sustainability and longevity of swim with tourism, with a focus on helping people interpret what they see with a scientific lens. Both Mahina and Siale present a unique opportunity to document whale movements in these waters as their distinctive appearance, and the proximity of their natal grounds to whale tourism operations, make long-term observations a possibility. Additionally, they offer potential to engage the public as well as decisionmakers in implementing and enforcing sustainable practices and conservation.

Citizen science observations were fed into the Happywhale algorithm to help directly inform a better understanding of humpback whale movement between populations. While just one example is reported herein, this might be reflective of wider humpback whale movements in this region that we are yet to understand. The International Whaling Commission (IWC) recognises the Tongan and Australian humpback whale

populations as part of Breeding Stock E but also as distinct subpopulations which are genetically differentiated and have low levels of interchange (Franklin et al., 2023). The Tongan population (E3) is listed as endangered, with a 2011 estimate of a closed population of 2,311 humpbacks; while the eastern Australian population (E1) is one of the fastest recovering globally, with a recently revised estimate of 50,000 individuals in 2025 (Childerhouse et al., 2008; Fleming & Jackson, 2011; Brooks et al., 2025). While some movement between the E1 and E3 populations has been documented, this novel movement of Siale is an important sighting as there is believed to be a low level of interchange between the Oceania population (including Tonga) and the east coast of Australia (Garrigue et al., 2020). Furthermore, the conspicuous nature of these white whales opens up possibilities for future sightings and an increase in knowledge about how humpback whales may move within wider South Pacific waters. These findings support the need to consider movement of humpback whales within the South Pacific and therefore coherent conservation and management of humpback whales in wider Oceania.

Table 2. Citizen science observations of white humpback whales Siale and Mahina in the Kingdom of Tonga (2024) and Australia (2025; Siale only)

Date (d/mo/y)	White whale	Location	Country	Notes
12/8/2024	Siale	Vava'u	Tonga	Sighted by three boats; mother rested with calf in sandy area for about 1.5 h.
17/8/2024	Mahina	Vava'u	Tonga	First sighted further offshore in the morning, and then by several boats closer to Fatumanga in the afternoon. Calf curious and playful; eyes closed.
18/8/2024	Siale	Vava'u	Tonga	
19/8/2024	Siale	Vava'u	Tonga	North of Ovaka
22/8/2024	Siale	Ha'apai	Tonga	Travelled south to Ha'apai (Uoleva Island)
4/9/2024	Siale	Ha'apai	Tonga	Near Pangai Island
4/9/2024	Siale	Ha'apai	Tonga	Uoleva Island; escort present
12/9/2024	Siale	Ha'apai	Tonga	Similar location; no escort present
13/9/2024	Siale	Ha'apai	Tonga	Uoleva Island; escort present
14/9/2024	Siale	Ha'apai	Tonga	Similar location; no escort present
2/10/2024	Mahina	Vava'u	Tonga	Mom, calf, and escort travelling along shallows then stopping to rest a little deeper. Curious calf.
5/11/2025	Siale	Batemans Bay/ Warden's Head	Australia	
7/11/2025	Siale	Cronulla /Gamay/ Botany Bay	Australia	Observed at Cape Solander, travelling 4 kts north. Very active with pec slapping and rolling around just below the surface. She originally had very brief surface time, with only single blows before diving.
8/11/2025	Siale	Catherine Hill Bay	Australia	Whale was peduncle throwing for 2 h as she made her way north.

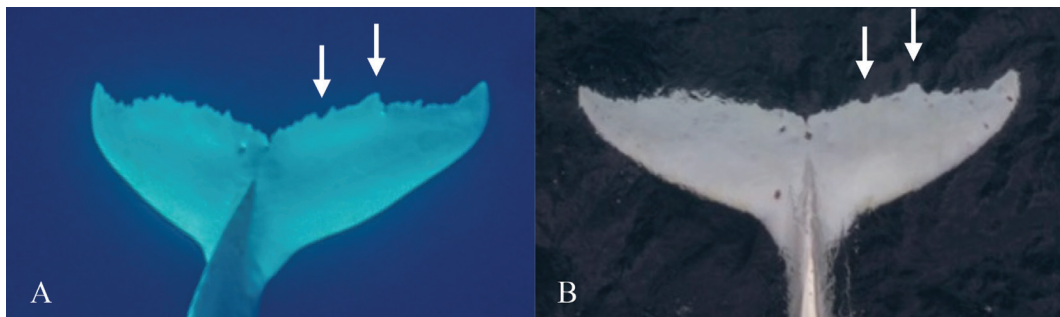
**Figure 3.** A fluke match was first made using Happywhale to identify that the same white whale was seen (A) in Tonga in 2024 (*Photo credit: Tris Sheen*) and (B) in Australia in 2025 (*Photo credit: Scott Robert via Happywhale*).



Figure 4. Siale, the white humpback, off Ha'apai, Tonga, 12 September 2024. Siale was one of two white humpback whales observed in the Kingdom of Tonga in 2024. Using photo identification and the Happywhale platform, Siale was identified several times in two island groups in Tonga, and then a year later in Australian waters. (Photo credit: Tris Sheen/Whale Discoveries).

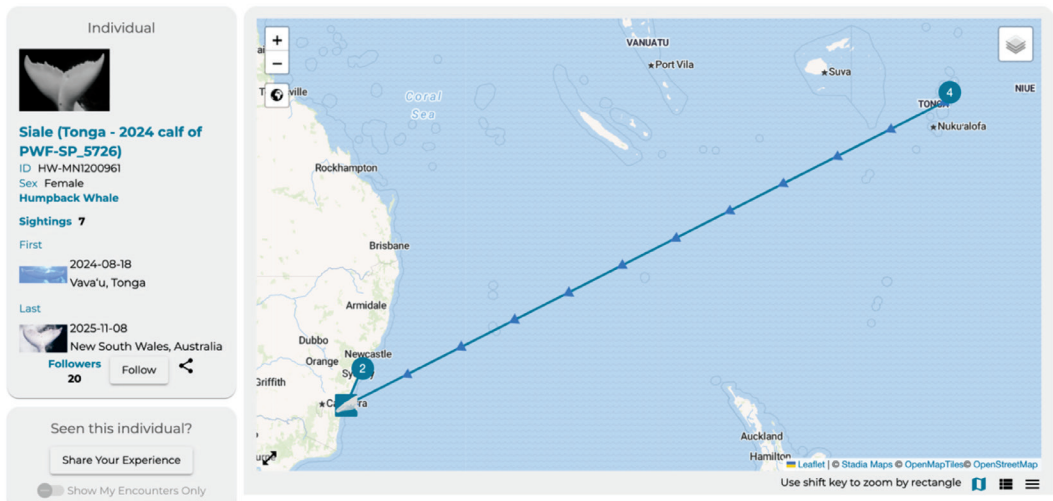


Figure 5. Sighting locations of Siale documented on the Happywhale platform. Observations of Siale's location in the Kingdom of Tonga occurred in 2024 and then a year later, on the New South Wales South coast of Australia, in 2025 from observations by the co-authors and Happywhale.

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Author CRediT Contributions

Conceptualization: AF and TC; *Methodology:* All; *Validation:* AF, VP, and TC; *Data Curation:* AF; *Writing – Original Draft Preparation:* AF, VP, and TC; *Writing – Review & Editing:* AF, VP, and TC; *Visualization:* AF, VP, and TC

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