



# Boat-based Visual Surveys for Bottlenose Dolphins in the West Connacht Coast SAC in 2025



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## Executive Summary

The West Connacht Coast SAC (Site Code 002998) was designated in 2013 with bottlenose dolphins as the sole qualifying interest. An updated abundance estimate of the number of bottlenose dolphins within the West Connacht Coast SAC was required. We used a mark-recapture survey technique on images of individual dolphins recorded within the West Connacht Coast during 2025 to derive this estimate. Dedicated line transects were carried out **over seven days** on fixed, pre-determined routes in the SAC between June and September 2025. The survey area was divided into two discrete areas consistent with the boundaries of the SAC; namely the Northern Component and the Southern Component. Both Northern and Southern Components of the SAC were surveyed simultaneously on the same day with two different teams. The survey design involved travelling along the coast and inside the islands at both sites and was consistent with a similar survey carried out in 2021.

A total of 355 nmls (657km) of survey effort was carried out in the Northern Component and 560 nmls (1037km) in the Southern Component, making a total of 915 nmls (1,694km). Surveys were largely carried out in good sea conditions, with 95% of survey effort carried out in  $\leq$  sea state 2. Bottlenose dolphins were encountered in both the Northern and Southern Components, with two sightings in the North and five in the South. On only one survey day were no dolphins encountered in either Component (Survey 2). Bottlenose dolphins were encountered on five of the seven surveys (71%) in the Southern Component and two (40%) in the Northern Component, thus bottlenose dolphins were encountered on six out of the seven (86%) survey days. Sightings in the Southern Component were mainly in the mouth of Killary Harbour with one sighting off Louisburg to the north of the site and one small group off Aughrusbeg to the south. In the Northern Component one sighting was made off Belderra Bay and a large group off Aughadoon moving north towards Erris Head

From mean group size estimates, a total number of 113 individuals were encountered but 118 dolphins were recognised from photographs. From these images a total of 80 individual dolphins were identified using fin Severity Grades 1-3. A total of 11 mother-calf pairs were recorded, including four first season calves and five third to fourth season calves, who were close to being fully weaned. All first season calves were categorised as Grade 3 fins and therefore were not included in the final mark-recapture modelling. Discovery curves of the number of new dolphins recorded as the total number of individually recognisable dolphins photographed increased showed some evidence that although the curves were starting to plateau out, not all dolphins in the West Connacht Coast SAC were captured during the survey.

The 2025 West Connacht Bottlenose Dolphin (BDWC25) was compared to images collected during a similar survey on behalf of the NPWS in 2021. Of the 36 fin Severity Grade 1 images collected in 2025 9 individual dolphins (25%) were photographed during the two surveys and 15 (41.6%) were probable matches. When comparing images from 2025 to a catalogue curated by UCC of images acquired over a wider time period from 2001 and 2014 (13 years), this resulted in four definite matched and seven potential matches which is a matching rate 2-3.5%. As the time between capturing images increases the matching rate declines as marks are more likely to change making matching very challenging. This high site fidelity within the West Connacht Coast SAC has been reported before. Although site fidelity is high bottlenose dolphins are also highly mobile and dolphins recorded in the West Connacht Coast SAC during 2025 have also been recorded within the Lower River Shannon SAC and as far south as Kerry. This connectivity between SACs and other sites has been also demonstrated previously.

A total of 75 individual dolphins presented with Grade 1 or Grade 2 fin mark severity and were used in the models to estimate abundance. Of these 36 (48%) were of Severity Grade 1 and photographed from both sides of the dorsal fin, with the remaining 39 presenting with Grade 2 fin mark severity. A total of nine dolphins with Grade 1 fins were only photographed from the left or right side and 16 with Grade 2 fins. Although using only images with Severity Grade 1 fins minimises violations of the assumption

that all marks were correctly recorded and animals did not lose marks between surveys, the number of capture histories (36) was small and combining capture histories of dolphins with Severity Fin marks 1 and 2 provided a larger dataset of 75 individual capture histories which greatly improved the abundance estimate.

Estimates of  $N_{hat}$ , which is the estimated total number of marked individuals in the population, was 161 for Severity Grade 1 fins. When using both Severity Grade 1 and 2 fins in the models this increased the abundance estimate from 168 to 179 (left/right) and 221 for both sides combined. The estimated abundance of marked individuals is increased according to the estimated proportion of marked individuals in the population. The proportion of dolphins with Severity Grade 1 identifiable marks was 0.63 for both sides of the fin and 0.98 for Grade 1+2 identifiable marks.

Population estimates varied from  $167 \pm 42$ ,  $CV = 0.25$  (95% CI = 85 to 250) for both sides and right only, to  $224 \pm 57$ ,  $CV = 0.25$  (95% CI = 113 to 335) for both sides and left only, and  $225 \pm 45$ ,  $CV = 0.20$  (95% CI = 137 to 314) for both sides left and right.

The data from Severity Grade 1 and Severity Grades 1+2, specifically the left-side and right-side measurements were combined using an inverse-variance weighted average. These two values were combined to give a final estimate for Severity Grade 1 images of  $218 \pm 58$ ,  $CV = 0.27$  (95% CI = 104 to 332) and Severity Grades 1+2 images combined of  $201 \pm 27$ ,  $CV = 0.13$  (95% CI = 148 to 254). The data from Grade 1 and Grades 1+2, specifically the left-side and right-side measurements, were combined using an inverse-variance weighted average to provide the best estimate. Using the lower CV, we suggest  **$201 \pm 27$  (95% CI 148-254)** with a CV of **0.13** is the most robust abundance estimate for bottlenose dolphins within the West Connacht Coast SAC during the summer 2025.

The abundance estimate from this survey was very similar to that estimated in 2021 ( $197 \pm 24$ ,  $CV=0.12$ ) using the same methodology and all estimates since 2009 are within 95% Confidence Intervals of each other. These data suggest that the number of bottlenose dolphins using the West Connacht Coast SAC, since the first abundance estimate in 2009, is stable although their distribution during 2025 was more widespread compared to 2021. Since 2024 harbour porpoise was included as a qualifying interest in the West Connacht Coast SAC. During this survey there were six sightings of this species in the Northern Component and four in the Southern Component, confirming their presence within the SAC.

The results from this survey suggest the methodology developed in 2021 for long-term monitoring of bottlenose dolphins within the West Connacht Coast SAC provides consistent results and can be repeated across years. However, this assumes bottlenose dolphins can be regularly encountered within the West Connacht Coast. We provide some recommendations on how to increase the encounter rate on future surveys. Sufficient images of individual bottlenose dolphins were captured using photo-id for mark-recapture abundance estimates during this survey to derive a robust abundance estimate to meet NPWS reporting obligations.

## 1 Introduction

Bottlenose dolphins are widespread in Irish waters, occurring both inshore and offshore and in estuaries and bays (Wall *et al.*, 2013; Rogan *et al.*, 2018; Giralte Paradel *et al.*, 2024). Giralte Paradel *et al.* (2024) estimated an abundance of 11,328 bottlenose dolphins using design-based models from aerial survey data occurred within the Irish EEZ during summer 2021 (95% CIs 8,385- 15,302), which increased to 37,489 in summer 2022 (95% CIs 30,611-45,913) and a winter 2022 abundance estimate of 23,778 bottlenose dolphins (95% CI's 19,156 – 29,516).

Genetic studies have shown that there are three discrete genetic populations in Ireland (Mirimin *et al.*, 2011; Louis *et al.*, 2014; Nykänen *et al.*, 2018). A small population is largely confined to the Shannon Estuary and adjacent waters; a coastal population (often referred to the Connemara-Mayo population) which ranges all around the Irish coast and an offshore population which ranges from at least Scotland to the Azores. Coastal and estuarine populations are thought to have diverged from pelagic populations associated with retreating glaciers exposing suitable habitats (Nykänen *et al.*, 2019; Louis *et al.*, 2021). The last glacial maxima facilitated divergence of coastal populations in the Northeast Atlantic from the pelagic population around 15,000 years ago which coincided with rising temperatures in the lower latitudes of the North Atlantic Ocean.

### 1.1 Previous studies of bottlenose dolphins in the survey area

Bottlenose dolphins have been associated with the Connemara area of Counties Galway and Mayo for many years. Fairley (1981) described a large school of bottlenose dolphins surrounding a yacht off Connemara and published a photograph, taken in 1975, of a bottlenose dolphin breaching off Ballinakill Bay, Co. Galway.

The first dedicated bottlenose dolphin study in this area was by Ingram *et al.* (2001) who carried out four boat-based surveys between Cleggan and Killary Harbour and two in Broadhaven Bay in north Mayo (Table 1). A total of three groups of bottlenose dolphins were encountered during two of the surveys, one each off Killary Harbour, Ballinakill Bay and Cleggan Head, but no dolphins were recorded in Co. Mayo. The waters off Connemara were then surveyed on three occasions in August and September 2003 by Ingram and Rogan (2003), which resulted in one bottlenose dolphin encounter which occurred south of the entrance to the Killary.

A much more intensive study was carried out between September 2008 and September 2009 by Ingram *et al.* (2009). A total of 21 surveys were carried out, largely covering the same route as that followed during the present study in the Southern Component. A total of 11 encounters with bottlenose dolphins were reported on eight survey days. Group sizes ranged from 2-25 individuals with a median of 15. Encounters were distributed throughout the survey area from Clare Island in the north to Mannin Bay to the south but were concentrated within 1km of the mainland. Most (45%) in the Southern Component were in the mouth of the Killary. A minimum of 86 uniquely marked bottlenose dolphins were recorded and at least 5 calves/juveniles estimated to be at least 1 year old, but no neonates were recorded. Ingram *et al.* (2009) used these data to derive an abundance estimate ( $\pm$ SE) of  $171 \pm 48$  with 95% Confidence Intervals of 100-294 (CV = 0.28). This was the first abundance estimate for this coastal population off Connemara. Of the dolphins recorded during 2009, ten were catalogued previously from Cork to Donegal, with five of them also seen during previous surveys off Connemara. This suggests these dolphins were wide ranging but also showed a degree of site fidelity to waters off Connemara. Ingram *et al.* (2009) suggested that while bottlenose dolphins range widely, the waters off Connemara appears to represent a suitable habitat for the designation as a Special Area of Conservation for this species. No bottlenose dolphins were encountered during four surveys, three in the Southern Component and one in the Northern Component in 2012 by Rogan *et al.* (2013).

**Table 1** Summary of dedicated bottlenose dolphin surveys carried out in the West Connacht Coast SAC (including surveys prior to SAC designation).

| Date                      | Location                            | No. surveys/<br>Encounters   | Reference                     |
|---------------------------|-------------------------------------|------------------------------|-------------------------------|
| July-September 2001       | Northern and<br>Southern Components | 6 surveys/<br>3 encounters   | Ingram <i>et al.</i> (2001)   |
| August and September 2003 | Southern Component                  | 3 surveys/<br>1 encounter    | Ingram & Rogan (2003)         |
| 2008 and 2009             | Southern Component                  | 21 surveys/<br>11 encounters | Ingram <i>et al.</i> (2009)   |
| 2008                      | Northern Component                  | 11 surveys/<br>5 encounters  | Oudejans <i>et al.</i> (2008) |
| 2009                      | Northern and<br>Southern Components | 35 surveys/<br>14 encounters | Oudejans <i>et al.</i> (2010) |
| July to September 2012    | Northern and<br>Southern Components | 4 surveys/<br>0 encounters   | Rogan <i>et al.</i> (2013)    |
| Summers 2013 and 2014     | Northern and<br>Southern Components | 13 surveys/<br>12 encounters | Nykänen <i>et al.</i> (2015)  |
| June and August 2021      | Northern and<br>Southern Components | 14 surveys/<br>19 encounters | Berrow <i>et al.</i> 2021     |

Bottlenose dolphin surveys off northwest Mayo was largely driven by research and monitoring associated with the Corrib Gas Field and landfall in Broadhaven Bay. Between 2001 and 2014, the Coastal and Marine Resources Centre (CMRC) at UCC carried out visual and acoustic monitoring of all marine mammal species in Broadhaven Bay and adjoining coastal waters. This included photo-identification of bottlenose dolphins (O’Cadhla *et al.*, 2003; Englund *et al.*, 2006; Coleman *et al.*, 2008; Visser *et al.*, 2009). The study area was Broadhaven Bay SAC (Site Code 000472) with fieldwork largely conducted outside of the current West Connacht Coast SAC, though some land-based watches were carried out from Erris Head at the northern boundary of the West Connacht Coast SAC.

Dedicated studies, in what is now the Northern Component of the West Connacht Coast SAC, started in 2008 when Oudejans *et al.* (2008) carried out 11 dedicated and 18 opportunistic vessel-based surveys from the port of Blacksod (Table 1). Five encounters with bottlenose dolphins were recorded during 848km of dedicated effort and seven encounters during 309km of opportunistic effort. They carried out 12 photo-identification sessions resulting in the identification of 113 individual dolphins leading to a catalogue of 90 individual bottlenose dolphins recognised. Six of these individual dolphins were observed on multiple days of which two were reported on 10 and 8 different days respectively as part of a small group of three individuals, suggesting small groups of dolphins remained within the study area from May to July. A total of 11 mother-calf pairs were recorded on three occasions, of which six were neonates (Oudejans *et al.*, 2008). This study was extended into 2009 with 35 additional dedicated vessel-based surveys and 14 opportunistic surveys. Bottlenose dolphins were encountered on 25% of 57 surveys with group sizes ranging from 10 to 75 individuals. This increased the number of individually recognisable bottlenose dolphins off south Mayo to 159 (Oudejans *et al.*, 2010). A discovery curve which is used to determine what proportion of the population has been photographed was still rising indicating not all dolphins using the area were photographed. A total of 19 individuals (11%) were photographed between 2008 and 2009 within Mayo, suggesting some degree of site fidelity but not as strong as that reported off Connemara. These data were combined with photo-id data from Connemara and showed at least 70 of these individuals (41%) were recorded in both study areas (Oudejans *et al.*, 2010). This showed for the first time that bottlenose dolphins off Connemara and Mayo were part of the same social group.

No bottlenose dolphins were observed within the West Connacht Coast SAC during the ObSERVE aerial surveys carried out in 2015 and 2016 by Rogan *et al.* (2018) or in 2021 and 2022 by Giralte Paradel *et al.* (2024).

## 1.1 West Connacht Coast SAC

The West Connacht Coast SAC (Side Code 002998) was designated in 2013 with bottlenose dolphins as the sole qualifying interest. This site consists of a substantial area of marine waters lying off the coasts of Counties Mayo and Galway. Comprising two parts, in its Northern Component the site extends from the coastal waters off Erris Head westwards beyond Eagle Island and the Mullet Peninsula in Co. Mayo. From there it extends southwards immediately off the coast as far as the entrance to Blacksod Bay. In its Southern Component, the site stretches from Clare Island and the outer reaches of Clew Bay at Old Head and continues southwards off the Mayo coast to the Connemara coast near Clifden and Ballyconneely, Co Galway. Predominantly coastal in nature, the site extends westwards into Atlantic continental shelf waters up to approximately 7-11 km from the mainland, although in its Southern Component it remains mostly inshore of the main islands: Clare Island, Inishturk, Inishbofin and Inishshark (NPWS, 2015).

Following its designation, Nykänen (2016) carried out a study of the phylogeography, population structure, abundance and habitat use of the bottlenose dolphins including deriving a more robust abundance estimate. A mark-recapture method was applied to Bayesian inference and hierarchical log-linear likelihood to derive a multi-site abundance estimate of coastal bottlenose dolphins for the wider Connemara-Mayo-Donegal area during 2013 and 2014. The median estimate for the abundance of bottlenose dolphins in the whole study area was 145 (95% HPDI = 111-239) in 2013 and 189 (95% HPDI = 162-232) in 2014. A discovery curve was beginning to level off towards the end of the survey period, suggesting that most of the well-marked individuals may have been photographed. Nykänen (2016) also reported high rates of movement between the different survey areas during the study. From a total of 59 well-marked bottlenose dolphins, fifteen (25%) were recorded in more than one of the study areas, with similar overlap between the Southern and the Northern Components (six dolphins), the Northern Component and Donegal Bay (two dolphins) and the Southern Component and Donegal Bay (four dolphins). Three out of the 59 well-marked dolphins (5%) were seen in all of the study areas.

This demonstrates once again the high mobility and connectivity between the West Connacht Coast SAC and adjacent areas spanning a distance of some 215 km (115 nmls). Nykänen *et al.* (2018) combined photo-id data and genetic methods to explore connectivity between SACs in which bottlenose dolphins are a qualifying interest (QI) within Ireland in greater detail and showed individual bottlenose dolphins were strongly spatially associated with specific SACs. They showed that populations in the Lower River Shannon SAC and West Connacht Coast SAC showed a similar degree of site fidelity to their respective areas and are likely to have nonoverlapping core home ranges, at least during the seasons that photo-identification work was conducted.

Nykänen *et al.* (2015) encountered 25 groups of bottlenose dolphins resulting in photo-id sessions during 13 boat-based surveys during summers 2013 and 2014. Local abundance estimates for northwest Connemara in 2013 was 56 (95% CI = 34-90) and 83 (95% CI = 49-140) in 2014. They combined estimates from three sites (including Donegal Bay) using Bayesian multi-site abundance theory to provide an estimate of 145 (CV = 0.30, 95% CI = 111-239) in 2013 and 189 (CV = 0.11, 95% CI = 162-232) in 2014. They concluded that these estimates are likely to better reflect the true abundance of coastal bottlenose dolphins than local site-based estimates. Of the individual identifications collected in 2013, 25 dolphins had been encountered during surveys before 2013, and 71 identifications of 109 individual dolphins identified in 2014. This demonstrates great site fidelity to these sites, certainly during summer months.

The most recent dedicated survey was carried out by Berrow *et al.* (2021), on behalf of NPWS as part of their obligations to monitor bottlenose dolphins within the West Connacht Coast SAC. They carried out

seven visits to the SAC between June and August 2021, carrying out simultaneous surveys within the Northern and Southern Components on the same days. Bottlenose dolphins were only recorded in the Southern Component and were exclusively observed in the mouth of Killary Harbour, Ballinakill Bay and off Cleggan. A total number of 181 dolphins were encountered and of these 163 individual dolphins could be identified. From mark-recapture modelling the final best abundance estimate was  $197 \pm 24$  (CV = 0.12, CI = 150-243). Images collected were compared across available bottlenose dolphin catalogues from the area and of the 69 grade 1 fins recorded only two dolphins were also in the IWDG Coastal Catalogue (2008-2016) and eight in the AMETS (2009-2021) catalogues (Berrow *et al.* 2021).

The aims of the current survey were:

- i) to undertake a series of seven (7) boat-based surveys of bottlenose dolphin in the West Connacht Coast SAC.
- ii) to derive a robust and precise population estimate for bottlenose dolphins in the SAC using mark-recapture photo-identification based sampling.
- iii) to determine the associated Coefficient of Variation (CV) and 95% Confidence Intervals about the updated estimate and
- iv) to examine site faithfulness for bottlenose dolphins in the West Connacht Coast SAC.

## 2 Methods

### 2.1. Survey Area and Platform

Dedicated line transect surveys were carried out on fixed, pre-determined routes in the West Connacht Coast SAC. The survey was a repeat of a survey during June to August 2021 (Berrow *et al.*, 2021). Vessels travelled between 8-12kts to ensure coverage of the survey sites could be completed within a day. The proposed survey design involved travelling along the coast and inside the islands at both sites (i.e. Northern Component and Southern Component).

The survey area was divided into two discrete areas consistent with the boundaries of the West Connacht Coast SAC: namely the **Northern** and **Southern Components**. Both northern and Southern Components of the SAC were surveyed on the same day with two different teams. Transects were carried out by two trained and experienced persons in each team.

Transects were planned to be carried out in sea-state  $\leq 3$  with good visibility ( $>6\text{km}$ ) and low swell ( $<1\text{m}$ ). It was planned to carry out one survey each month from June to September 2025 inclusive, with provision for three additional surveys across this period (i.e. a total of seven full surveys in both the Northern and Southern Components of the SAC).

#### 2.1.1 Northern Component

The survey route was designed to cover the entire northern section of the SAC. The vessel attempted to remain within 500-1000m from shore throughout the survey. The total distance travelled during each survey was to be around 40-50 nmls (70-90km), depending on the state of the tide but not including any extra distance and time required to obtain photo-id images when bottlenose dolphins are encountered. The design attempted to provide good coverage of the whole northern section, while acknowledging the tendency for dolphins to hug the shore at this location (Oudejens *et al.*, 2015). If dolphins were observed towards the middle (open water), sections of the SAC, or information on dolphin presence outside the standard route was obtained, the vessel would break the track-line to investigate and return if possible within the time-frame of the survey, to this location once photo-id images have been obtained.

The survey vessel used was Kea Josh operated by Belmullet Boat Charters out of Blacksod, Co Mayo (<https://belmulletboatcharters.wordpress.com>). Keah Josh is a 12m catamaran built by South Boats and primarily used for carrying passengers to the islands. She has a P5 passenger boat licence allowing her to carry 12 passengers and 2 crew up to 30 miles offshore. She has a large aft deck area, a large wheelhouse and an elevated front deck. The aft deck is ideal for taking low level photos of dorsal fins.



The front deck provides an eye height of 1.0m above sea-level and the top of the wheelhouse a platform height of 2.5m for surveying. The skipper has considerable experience of the area and in carrying out marine mammal surveys. One surveyor was located on the bow, and one on top of the wheelhouse with the skipper inside the wheelhouse. All surveys started from Blacksod at the tip of the Mullet peninsular and the route was surveyed anti-clockwise

throughout. Survey effort was started as soon as the vessel cleared the harbour as Blacksod is within the eastern boundary of the Northern Component of the SAC.

### 2.1.2 Southern Component

The survey route covered the entire southern section of the SAC. The boat departed Cleggan and travelled anti-clockwise. The vessel remained within 500-1000m from shore throughout the survey. The distance during each survey was a minimum of 85 nmls (153 km), not including the extra distance required to obtain photo-id images when bottlenose dolphins were encountered. The design attempted to provide good coverage of the whole southern section while acknowledging the tendency for dolphins to hug the shore at this location. The route is easily repeatable within and across years. If dolphins were observed towards the middle (open water), sections of the SAC, or information on dolphin presence outside the standard route was obtained, the vessel would break the track-line to investigate and return if possible, to this location once photo-id images have been obtained. If the time period when survey effort was off the pre-determined track-line was long, it was not always possible to rejoin the track-line at the point it was left and some areas could not be surveyed.

The survey vessel used was Blue Water operated by Blue Water Fishing (<https://seafishingireland.net>). Bluewater is a 40-foot twin engine utility vessel primarily used for angling. She has a P5 passenger boat licence allowing her to carry 12 passengers and 2 crew up to 30 miles offshore. She has a large aft deck area clear of obstructions, a wheelhouse with seating for 5 plus the skipper and an elevated front deck. Bluewater has two 280HP engines, which gives her a top speed of 25 knots. The aft deck is ideal for taking low level photos of dorsal fins. The front deck provides an eye height of 1.5m above sea-level and the top of the wheelhouse a platform height of 2.5m for surveying.



Bluewater has two 280HP engines, which gives her a top speed of 25 knots. The aft deck is ideal for taking low level photos of dorsal fins. The front deck provides an eye height of 1.5m above sea-level and the top of the wheelhouse a platform height of 2.5m for surveying.

The boat is owned and operated by a very experienced skipper who has documenting the presence of cetaceans in the area for decades. One surveyor was located on the bow, and one on top of the wheelhouse with the skipper inside the wheelhouse. Effort was started as soon as the vessel cleared the harbour as the bay at Cleggan is included within the Southern Component of the SAC.

The routes of each survey vessel and positions of dolphin schools encountered in both areas were stored on Garmin handheld GPS as well as waypoints indicating any changes to environmental conditions. Map files from each survey are downloaded using Garmin MyGeodata® software and saved as shape files. These data were then used to create ArcGIS Pro (Version 3.3.0; 2024) shape files of the survey track and location of all sightings recorded during each survey.

## 2.2 Photo-identification

Images of bottlenose dolphins suitable for photo-identification were collected with Canon DSLR cameras. Each survey team had a Canon D7 Mark ii body, which is still considered one of the best semi-professional cameras available for wildlife photography despite recent upgrades. D7 Mark ii has GPS facility and can location stamp each image with latitude/longitude. Both Canon D7 Mark ii were fitted with a 100-400mm Sigma lenses. Extra lenses including a 100-500mm and a 75-300mm lens were also provided to each team to ensure they can capture images from animals close to, and at a distance from the survey vessel. These cameras can acquire images at 10.10 resolution and images were collected as jpg files. This equipment can collect up to 280 high resolution images (up to 4-5MB per image) on a 1.6GB card. Images were downloaded and sorted and those images to be processed were renamed using Advanced Renamer software (<https://www.advancedrenamer.com>).

All dolphin schools, defined as all dolphins within 100m radius of each other (Irvine *et al.*, 1981), encountered were approached slowly and their position at the start and end of each encounter recorded using a hand-held GPS. Group size, behaviour (using Baker *et al.*, 2017a) and the presence and numbers of calves were recorded. An attempt was made to photograph all dolphins in each school encountered and to obtain images of both the left and right sides of each dorsal fin. However, this was not always possible if dolphins are travelling fast or avoidance behaviour occurs, and photo-identification was only continued while there was no prolonged negative reaction to attempts to obtain photo-identification images.

## 2.3 Matching

We followed a standard protocol for sorting and matching images (Baker, 2015). All images were reviewed and all those badly out of focus, missing dolphins etc. were deleted. Sorting and matching were consistent with the previous NPWS funded survey of the West Connacht Coast SAC (Berrow *et al.*, 2021) and recent IWDG surveys in the Shannon Estuary (Baker *et al.*, 2017b; 2018). All dolphin images were sorted and graded from 1 to 3 following published criteria (Ingram 2000; Englund *et al.*, 2007; 2008; Berrow *et al.*, 2012; 2021; Baker *et al.*, 2017b, 2018).

Photo Quality Grade 1: Well-lit and focused shots taken perpendicular to the dorsal fin at close range;

Photo Quality Grade 2: More distant, less well-lit or slightly angled shots of dorsal fins

Photo Quality Grade 3: Poorly lit or out of focus shots taken at acute angles to the dorsal fin

Dorsal fins will be recorded as “left-side”, “right-side” and “both sides” for each encounter. A unique catalogue of dorsal fins was established for this survey and individual dolphins were classified according to the extent of their natural marks, following Ingram (2000):

Severity Grade 1: Marks consisting of significant fin damage or deep scarring that can be considered permanent.

Severity Grade 2: Marks consisting of deep tooth rakes and lesions and minor cuts.

Severity Grade 3: Marks consisting of very superficial lesions or complete absence of them.

Photo-id matching was carried out by MD, with second checking by SL for quality assurance. Capture histories for Severity Grade 1: Left, Right and Both sides and Severity Grade 1+2 Left, Right and Both sides were created to derive mark-recapture abundance estimates.



Severity Grade 1 fin "left" side and "right" side (BDWC25-055)



Severity Grade 2 fin "left" side and "right" (BDWC25-045)



Severity Grade 3 fin "left" (BDWC25-073) with mother (BDWC25-072, aka "Half-Fin")

## 2.4 Mark-Recapture Modelling

Mark-recapture modelling was carried out using the software programs MARK and CAPTURE (Version 6.2, Build 9200) by JO'B. All datasets were prepared and input into a closed model incorporating heterogeneity in capture probability (Chao M(th)) (Chao *et al.*, 1992). Multiple sample capture-recapture abundance estimates were generated based on the following assumptions of closed populations following Ingram (2000);

- i. the population is closed during sampling period
- ii. animals do not lose their identifying marks during sampling period

- iii. all marks are correctly recorded in each capture
- iv. each animal has an equal and constant probability of being captured.

The Akaike Information Criterion (AIC) values were calculated in the program MARK for each model to assess best fit (Akaike, 1974). The key parameters of the models are S (probability of survival), gamma'' (probability of emigration), gamma' (probability of an emigrated animal staying outside the study area), and N (population size within the study area). Together, these were used to obtain overall population estimates, using a biased corrected estimate, the delta method recommended by Wilson *et al.* (1999) after taking account of the (weighted) mean proportion of well-marked animals and some measure of survival/migration obtained from the model.

The program CAPTURE derives confidence intervals under the assumption that the number of individuals not captured in the population is log normally distributed, resulting in the upper estimate being larger than if assumed to be normally distributed. The estimates of the marked population varied depending on which set of dorsal fin images were used. Estimates of abundance were calculated using left side, right side, and both side identifications. Bottlenose dolphins with Severity Grade 1 and 2 marks were used and not those with Severity Grade 3. Model results showed the CAPTURE model M(th) for a closed population incorporating capture probability heterogeneity (Chao *et al.*, 1992) provided the best fit (i.e., lowest AIC value). The estimated total number of marked individuals in the population (Nhat) was calculated by the model. We calculated estimates using dolphins re-captured from the left side of the dorsal fin (Left), dolphins recaptured from the right side of the dorsal fin (Right), and dolphins recaptured from both sides of the dorsal fin (Both). We calculated all estimates using Photo Quality Grades 1 and 2 only.

### 3 Results

#### 3.1 Survey Effort and Sightings

A total of seven surveys were completed at both sites simultaneously between June and September 2025 (Table 2). A total of 358 nmls (663km) of survey effort was carried out in the Northern Component and 596 nmls (1104km) in the Southern Component, making a total of 955 nmls (1,767km). Surveys were carried out in good sea conditions. Bottlenose dolphins were located on six of the seven survey days with two encounters in the Northern Component and five in the Southern Component (Table 2).

All survey effort on Surveys 4-7 in the Northern Component, and all survey effort except Surveys 3 and 4 in the Southern Component, were carried out in sea-state  $\leq 2$  (Table 2). On three surveys in the Northern Component (Survey 1-3) sea state was 3 for 10-18% typically occurring to the north of the site off Erris Head which is consistently rougher due to its exposed nature and strong currents. In the Southern Component sea state 3 was recorded for 5.4% and 14.9% of survey effort on Surveys 3 and 4 (Table 2).

If during the survey recent reliable sightings of bottlenose dolphins were reported to the team or skippers, the boat went in search of these dolphins. This meant that some of the outer track line to the western boundary were not surveyed. This was the case in the Southern Component when on surveys 3, 6 and 7 the western boundary of the SAC was not surveyed. However, this led to a group of 8 bottlenose dolphins being located on survey 6 and 13 bottlenose dolphins on survey 7, despite not being located earlier in the survey at the same locations.

Bottlenose dolphin sightings were made in both Northern and Southern Components (Fig 1). In the Northern Component one sighting was made off Belderra Bay and a large group off Aughadoon moving north towards Erris Head (Fig. 2a). This group of around 40 dolphins on Survey 1 was followed to the northwest outside the boundary of the SAC in an attempt to collect as many images as possible.

Sightings in the Southern Component were mainly in the mouth of Killary Harbour with one sighting off Louisburg to the north of the site and one small group off Aughrusbeg at the southern end of the SAC (Fig. 2b).

**Table 2** Survey effort and sighting data for bottlenose dolphin surveys in the West Connacht Coast SAC during 2025.

| Survey       | Date         | Total effort (nmls) |       | Total effort (%) in sea-state $\leq 2$ |       | Number of BND sightings and (best estimate of group size) |        |
|--------------|--------------|---------------------|-------|----------------------------------------|-------|-----------------------------------------------------------|--------|
|              |              | North               | South | North                                  | South | North                                                     | South  |
| 1            | 19 June      | 49.5                | 84.4  | 85.4                                   | 100.0 | 1 (40)                                                    | 1 (4)  |
| 2            | 1 July       | 47.4                | 81.8  | 89.6                                   | 100.0 |                                                           |        |
| 3            | 16 July      | 53.3                | 80.6  | 81.2                                   | 94.6  | 1 (15)                                                    |        |
| 4            | 24 July      | 49.8                | 85.2  | 100.0                                  | 85.1  |                                                           | 1 (8)  |
| 5            | 12 August    | 51.6                | 77.5  | 100.0                                  | 100.0 |                                                           | 1 (25) |
| 6            | 13 August    | 52.3                | 72.4  | 100.0                                  | 100.0 |                                                           | 1 (8)  |
| 7            | 22 September | 51.1                | 78.7  | 100.0                                  | 100.0 |                                                           | 1 (13) |
| <b>Total</b> |              | 355.0               | 560.6 |                                        |       |                                                           |        |

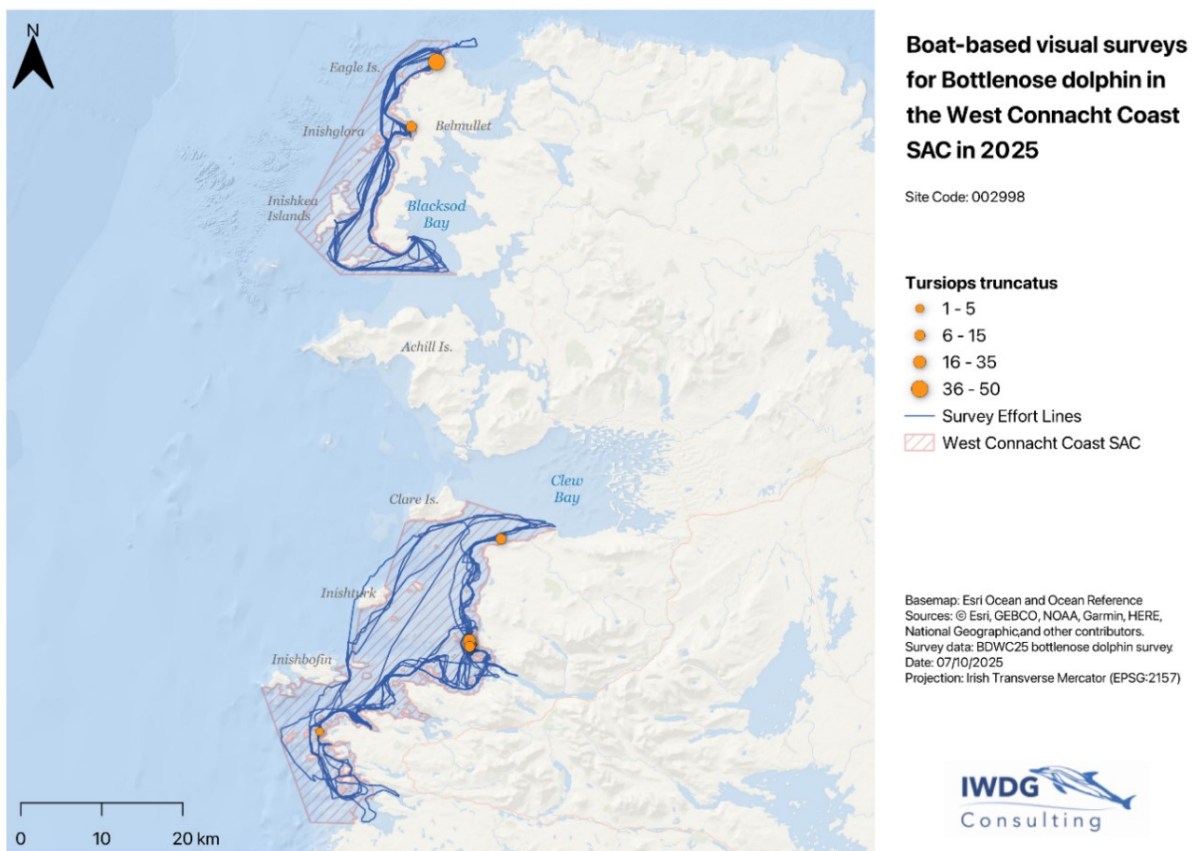


**Figure 1** Map of survey track-lines and on effort sightings of bottlenose dolphins during surveys of the West Connacht Coast SAC during 2025.

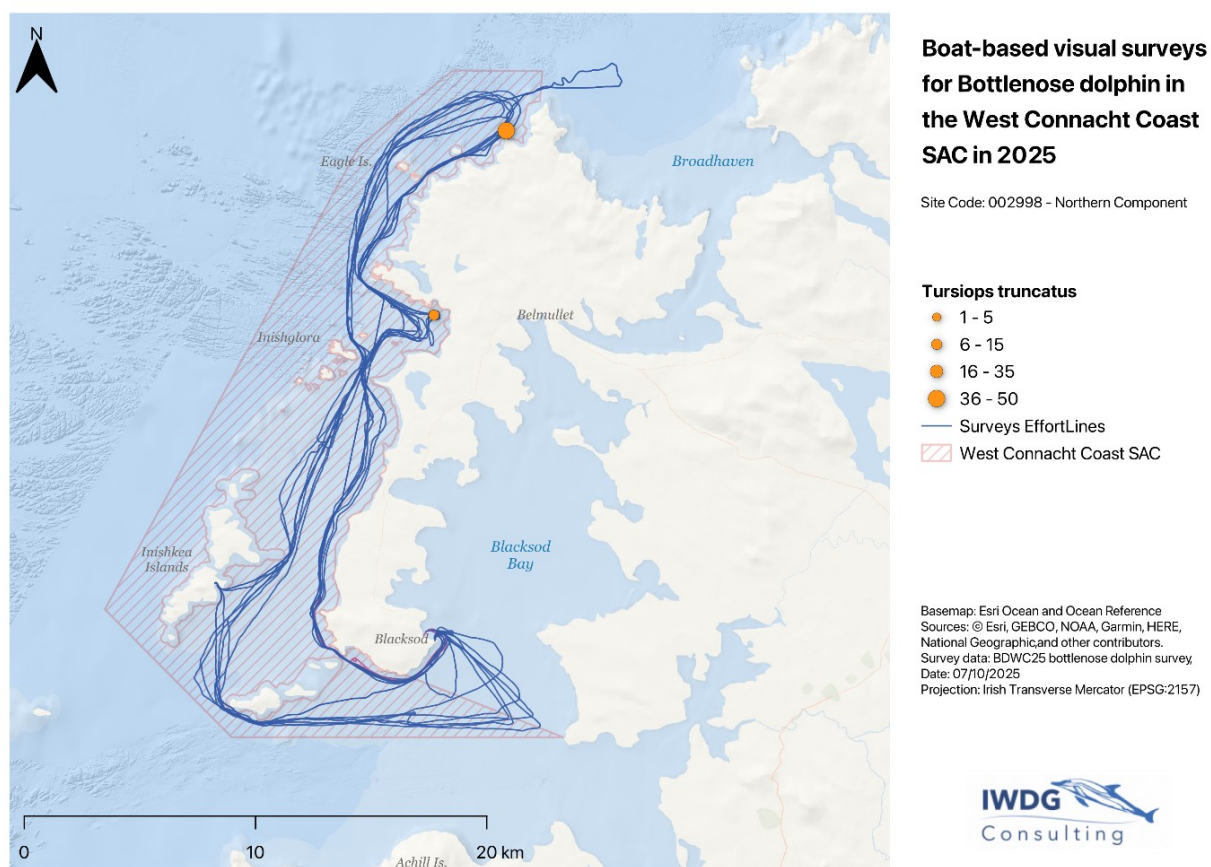


**Figure 2a** Map of survey track-lines and sightings of bottlenose dolphins in the Northern Component of the West Connacht Coast SAC during 2025

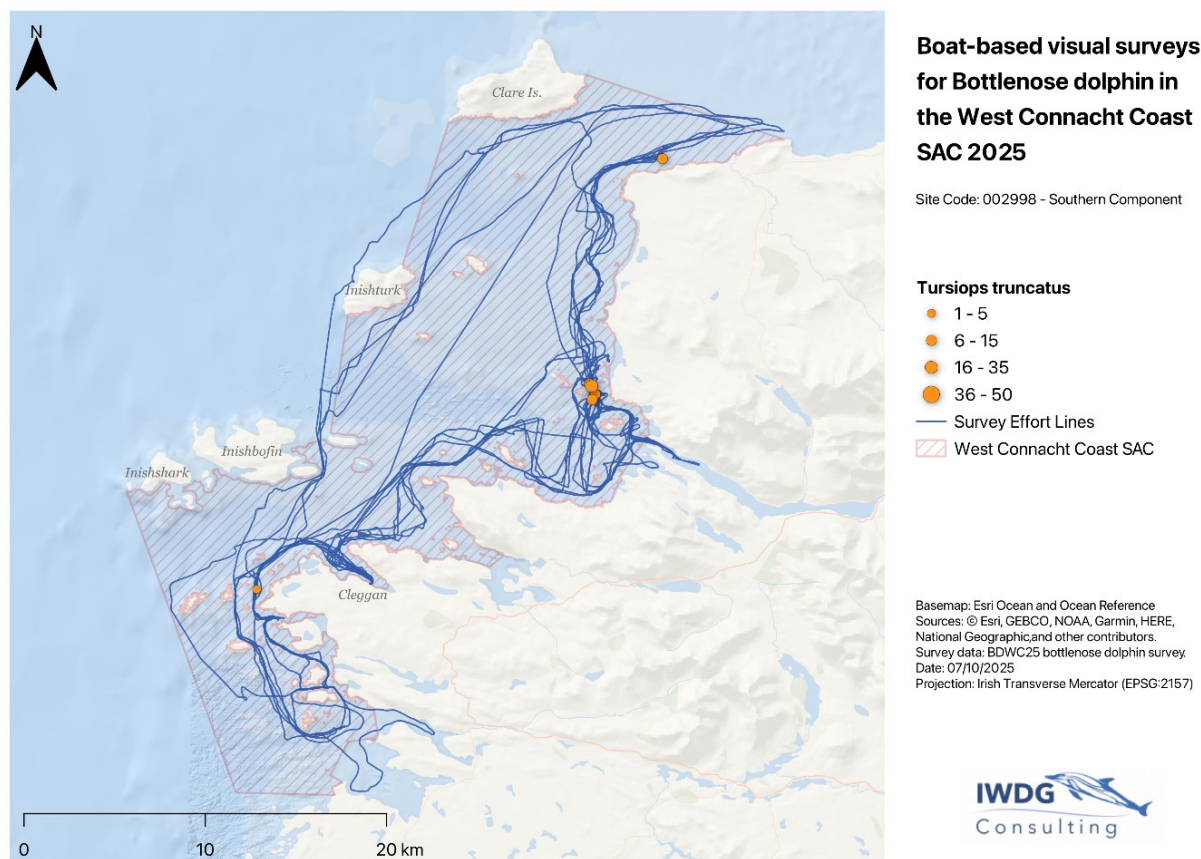


**Figure 2b** Map of survey track-lines and sightings of bottlenose dolphins in the Southern Component of the West Connacht Coast SAC during 2025

### 3.2 Images obtained for photo-identification

The primary objective for locating bottlenose dolphins was to obtain images suitable for photo-identification for use in mark-recapture modelling. Once an individual or group was encountered, we attempted to obtain good images both sides of the dorsal fin from all dolphins present. The majority of a group of approximately 40 bottlenose dolphins observed within the Northern Component on Survey 1 in heavy seas (see Fig 2a), showed avoidance behaviour which meant capturing good images suitable for photo-id was a challenge and not all individuals in the group were photographed. In order to avoid excessive disturbance we try and implement the Marine Notice 15 of 2005 which limits the total time on dolphins to 30 minutes per group. If groups are large or difficult to photograph this time limit is exceeded but if excessive avoidance behaviour is recorded, such as deep diving when boat approaches or excessive tail slapping, then the group is not followed even if the surveyors consider that not all dolphins in the group were photographed.

On five occasions (four within the Southern Component) the number of individuals captured from images was greater than the estimated group size (Table 3). On two occasions (Surveys 5 and 7) the number of individuals photographed was quite a bit higher (14 and 9). This can occur if dolphins are spread out and hard to approach but this underestimate has implications for raising Nhat (the abundance of marked individuals) to the total population, and an accurate estimate of group size is important. We suggest the use of a UAV should be considered to improve estimates of group size, especially if dolphins are spread out or dispersed. For mark-recapture analysis images from both components were combined to generate capture histories.

**Table 3** Number of dolphins identified in each survey and cumulative total of individually recognisable dolphins (Grade 1+2+3) within West Connacht Coast SAC during 2025.

| Survey Day   | Southern Component        |                                          |                                          | Northern Component        |                                          |                                          |
|--------------|---------------------------|------------------------------------------|------------------------------------------|---------------------------|------------------------------------------|------------------------------------------|
|              | Estimated mean group size | Number of individual dolphins identified | Cumulative number of dolphins identified | Estimated mean group size | Number of individual dolphins identified | Cumulative number of dolphins identified |
| 1            | 4                         | 4                                        | 4                                        | 40                        | 17                                       | 17                                       |
| 2            | 0                         | 0                                        | 4                                        | 0                         | 0                                        | 17                                       |
| 3            | 0                         | 0                                        | 4                                        | 15                        | 16                                       | 33                                       |
| 4            | 8                         | 9                                        | 13                                       | 0                         | 0                                        | 33                                       |
| 5            | 25                        | 39                                       | 52                                       | 0                         | 0                                        | 33                                       |
| 6            | 8                         | 9                                        | 61                                       | 0                         | 0                                        | 33                                       |
| 7            | 13                        | 24                                       | 85                                       | 0                         | 0                                        | 33                                       |
| <b>Total</b> | <b>58</b>                 | <b>85</b>                                | <b>85</b>                                | <b>55</b>                 | <b>33</b>                                | <b>33</b>                                |

During the survey individual dolphins were identified during the seven surveys on 118 occasions with 33 in the Northern Component and 85 in the Southern Component (Table 3). Five of these individual dolphins were identified in both the Northern and Southern Components. This resulted in a total of 80 individually recognisable individuals photographed of all fin grades during the seven dolphin encounters over the course of the survey. These images were used to build the photo-id catalogue and individual capture histories (see Appendix I). In addition, 11 dependent calves were observed, including five presenting with Grade 3 fins.

**Table 4** Number of dolphins identified during each survey and the cumulative total of individual dolphins photographed in each Fin Severity Grade (1-3) within the West Connacht Coast SAC (combined Components) during 2025.

| Survey Number | Number of new dolphins identified | Cumulative number of dolphins identified | Number of new dolphins identified | Cumulative number of dolphins identified | Number of new dolphins identified | Cumulative number of dolphins identified |
|---------------|-----------------------------------|------------------------------------------|-----------------------------------|------------------------------------------|-----------------------------------|------------------------------------------|
|               | Severity Grade 1 fin              |                                          | Severity Grade 1+2 fin            |                                          | Severity Grade 1+2+3 fin          |                                          |
| 1             | 14                                | 14                                       | 21                                | 21                                       | 21                                | 21                                       |
| 2             | 0                                 | 14                                       | 0                                 | 21                                       | 0                                 | 21                                       |
| 3             | 6                                 | 20                                       | 16                                | 37                                       | 16                                | 37                                       |
| 4             | 1                                 | 21                                       | 9                                 | 46                                       | 9                                 | 46                                       |
| 5             | 13                                | 34                                       | 25                                | 71                                       | 30                                | 76                                       |
| 6             | 0                                 | 34                                       | 0                                 | 71                                       | 0                                 | 76                                       |
| 7             | 2                                 | 36                                       | 4                                 | 75                                       | 4                                 | 80                                       |

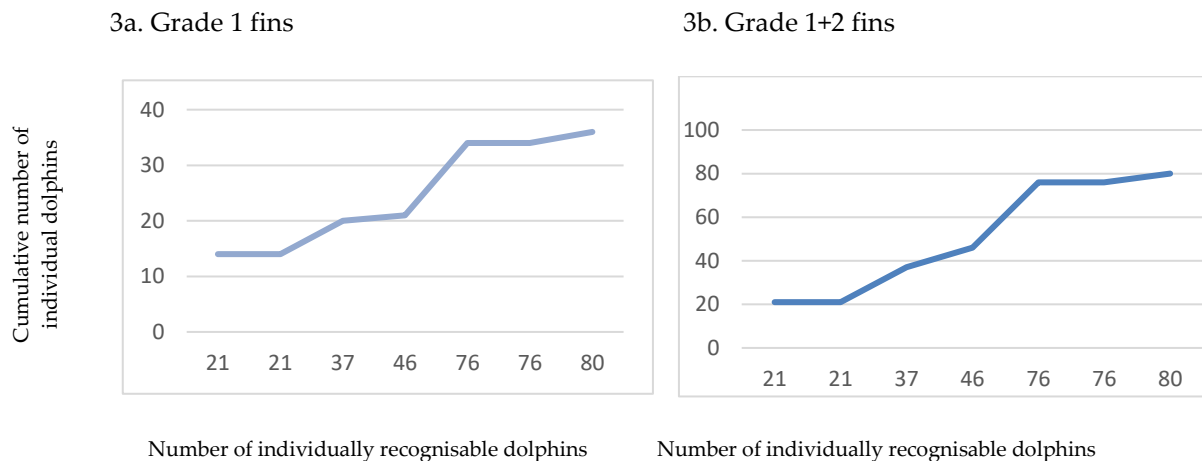


**Figure 3a-b** Discovery curves of individually recognisable bottlenose dolphins (Grade 1 + 2 fins) in the West Connacht Coast SAC during 2025.

As the number of individual dolphins photographed increased throughout the survey the number of new dolphins identified decreases as an increasing proportion of the population in the survey area is photographed. We can plot the total number of dolphins photographed after each survey (cumulative number of dolphins, see Table 4) against the number of unique individual dolphins recorded. This is known as a Discovery Curve and gives an insight into how much of the identifiable (marked) population has been photographed. If all dolphins with marked fins are photographed (captured) then it doesn't matter how many more surveys are carried out as no more new individuals will be photographed. At this point the curve will have plateaued out. Data for fin Severity Grade 1 to 3 are presented in Table 4.

Discovery curves of the number of new dolphins recorded as the total number of individually recognisable dolphins increased are shown in Figure 3a for Severity Grade 1 fins only and Figure 3b for Severity Grades 1-2. Although these discovery curves are starting to plateau out, it's likely that new dolphins would have been photographed with more surveys within the survey period. Additional images would increase the precision of the estimate (lower the CV) and confidence intervals.

### 3.3 Bottlenose dolphin abundance estimates

Mark-recapture modelling was conducted using the programs MARK and CAPTURE (Version 6.2, Build 9200). All datasets were formatted and analysed under a closed population model incorporating heterogeneity in capture probability (Chao M(th); Chao *et al.*, 1992). Multiple-sample capture-recapture abundance estimates were generated based on the assumptions of population closure, which include the following:

1. the population is closed during the entire sampling period
2. animals do not lose their identifying marks during the sampling period
3. all marks are correctly recorded in each capture
4. each animal has an equal and constant probability of being captured.

The Akaike Information Criterion (AIC) was computed in programme MARK for each candidate model to evaluate relative model fit (Akaike, 1974). The principal model parameters included S (apparent survival probability),  $\gamma''$  (probability of emigration),  $\gamma'$  (probability that an emigrated individual remains outside the study area), and N (population size within the study area). Estimates of overall population size, together with bias-corrected values derived using the delta method recommended by Wilson *et al.* (1999), were obtained after accounting for the weighted mean proportion of well-marked individuals and the model-derived estimates of survival and movement.

Estimates of abundance of the marked population were derived using left side, right side, and combined (both sides) identifications (Nhat). In order to provide robust estimates, only bottlenose dolphins presenting with Severity Grade 1 or 2 marks were included in the analysis. Model selection indicated that the CAPTURE model M(th), a closed population model incorporating capture probability heterogeneity (Chao *et al.*, 1992) provided the best fit to the data, as determined by the lowest AIC value. The M(th) allows for both temporal variation and individual heterogeneity in capture probability and is one of the most flexible and realistic models for many wildlife datasets. The estimated total number of marked individuals in the population (Nhat) was obtained from this model. Separate estimates were calculated based on dolphins resighted from the left side of the dorsal fin (Left), the right side (Right), and both sides (Both). In addition, abundance estimates were computed using photographs of Photo quality Grade 1 and Grades 1+2 to evaluate the influence of photo quality on the resulting estimates and increase the number of individual dolphins included in the analysis (Table 5).

**Table 5** Model data used to estimate abundance of marked dolphins from CAPTURE model for West Connacht Coast SAC during 2025 (n= number of animals captured for estimate)

| Photo quality | Dorsal fin        | AIC    | n   | Nhat  | Standard Error | 95% Confidence Intervals |
|---------------|-------------------|--------|-----|-------|----------------|--------------------------|
| Grade 1       | All               | 7.6    | 33  | 160.6 | 75.6           | 58-399                   |
| Grade 1+2     | Both + Left only  | -116.7 | 102 | 179   | 36.4           | 113-262                  |
|               | Both + Right only | -94.9  | 92  | 167.9 | 38.5           | 104-263                  |
|               | All               | -6.35  | 198 | 220.9 | 44.2           | 138-318                  |

The programme CAPTURE estimates confidence intervals under the assumption that the number of uncaptured individuals in the population follows a log normal distribution, which results in higher upper confidence limits than would be obtained under a normal distribution. Estimates of the marked population size varied depending on which set of dorsal fin images was used (Table 5).

Sample sizes of identified individuals were relatively small; consequently, models incorporating both Grade 1 and Grade 2 images consistently yielded the lowest AIC values, likely reflecting the benefit of increasing the dataset when both image grades were combined. Although images of fins with Severity Grade 1 marks are typically used in abundance estimation to ensure a robust dataset and to minimise potential violations of model assumptions, specifically, that all marks are correctly recorded and remain permanent (reducing the effects of false negatives (that the animal was present but not recognised)), the most precise estimates in this study were obtained from using both Grade 1 and Grade 2 images in the abundance estimation as the sample size in the model increased from 36 to 75 individual capture histories (see Table 4).

The proportion of dolphins with Severity Grade 1 and Grade 1+2 identifiable marks are shown in Table 6. This ranged from 0.8 to 1.0 depending on which side of the dorsal fin was used. The variance of each estimate was calculated using the delta method recommended by Wilson *et al.* (1999) where:

$$\text{Var } N = N^2 (\text{var} \hat{N} / \hat{N}^2 + 1 - \theta / n\theta)$$

$N$  = estimated total population size

$\hat{N}$  = estimate of the subset of marked individuals

$\theta$  = estimated proportion of animals with Severity Grade marks in the population

$\text{var} = \text{SE}^2$

**Table 6** The proportion of dolphins with identifiable marks (Mark Severity Grade 1 and Mark Severity Grades 1+2).

| Side                                | Nhat | Proportion of animals with marks ( $\theta$ ) | Abundance estimate | SE   | Coefficient of variation | 95% Confidence Interval |
|-------------------------------------|------|-----------------------------------------------|--------------------|------|--------------------------|-------------------------|
| <b>Mark Severity Grade 1</b>        |      |                                               |                    |      |                          |                         |
| Both                                | 161  | 0.63                                          | 255.8              | 145  | 0.57                     | 28-539                  |
| <b>Mark Severity Grades 1 and 2</b> |      |                                               |                    |      |                          |                         |
| Both+Left only                      | 179  | 0.80                                          | 224                | 56.5 | 0.25                     | 113-335                 |
| Both+Right only                     | 167  | 1.00                                          | 167                | 42.1 | 0.25                     | 85-250                  |
| Both                                | 221  | 0.98                                          | 225                | 45.3 | 0.20                     | 137-314                 |

The estimated abundance of marked individuals is increased according to the estimated proportion of marked individuals in the population (Table 6). Population estimates varied from  $167 \pm 42$ , CV = 0.25 (95% CI = 85 to 250) for both sides and right only, to  $224 \pm 57$ , CV = 0.25 (95% CI = 113 to 335) for both sides and left only, and  $221 \pm 45$ , CV = 0.20 (95% CI = 137 to 314) for both sides left and right.

The data from Severity Grade 1 and Severity Grades 1+2, specifically the left-side and right-side measurements were combined using an inverse-variance weighted average, assuming independence as recommended by Wilson *et al.* (1999). In the combined average (right, left, and both), the right and left data are each used twice in the weighting process, once individually and once again as part of the 'both' category. These two values were combined to give a final estimate for Severity Grade 1 and Severity Grades 1+2 images:

Severity Grade 1:  $218 \pm 58$ , CV = 0.27 (95% CI = 104 to 332).  
**Severity Grades 1+2:  $201 \pm 27$ , CV = 0.13 (95% CI = 148 to 254)**

The estimate using Severity Grades 1+2 is considered the most robust estimate as the CV is 0.13 compared to 0.27 for Severity Grade 1 alone. This resulted in a lower Standard Error (SE) and tighter Confidence Intervals (CI).

### 3.4 Sex and Determination and Maturity of Identified Individuals

The sex of an individual dolphin was determined for 29% of the animals recorded (n=23). This was from a combination of genital shots, heavy scarring and close mother-calf associations (Table 7). A total of 11 individuals were determined to be female due to the presence of their nutritionally dependent calves (Table 7). Eight were determined to be males using photo sequences that included images that features from the mid body to the urogenital region (genital shot). The animals with genital shots make up 57% (4 out of the 8) of the animals with the highest capture histories, which were the group west of Killary. A further four individuals were also determined to be male due to the level of damage to the dorsal fin, scarring and size relative to other individuals surfacing in proximity (Table 7).

**Table 7** Evidence used to determine the sex of individual dolphins during the West Connacht Coast SAC during 2025

| Sex    | Evidence                  | No. individuals | ID number                                                                            |
|--------|---------------------------|-----------------|--------------------------------------------------------------------------------------|
| Male   | Genital shot              | 8               | BDWC033/BDWC039/BDWC040/<br>BDWC041/BDWC46/BDWC47/BDWC51/<br>BDWC58                  |
| Female | Heavy scarring on body    | 4               | BDWC50/BDWC52/BDWC53/BDWC57                                                          |
|        | Calf in close association | 11              | BDWC11/BDWC70/BDWC72/BDWC74/<br>BDWC76/BDWC78/BDWC80/<br>BDWC82/BDWC84/BDWC86/BDWC88 |

**Table 8** Bottlenose dolphin Photo-id Catalogues obtained from within West Connacht Coast SAC and available to explore site fidelity.

| Adult (mother) | Calf   | Estimated Calf Age Class |
|----------------|--------|--------------------------|
| BDWC10         | BDWC11 | 3rd - 4th Season         |
| BDWC70         | BDWC71 | 3rd - 4th Season         |
| BDWC72         | BDWC73 | 1st Season               |
| BDWC74         | BDWC75 | 2nd Season               |
| BDWC76         | BDWC77 | 3rd - 4th Season         |
| BDWC78         | BDWC79 | 1st Season               |
| BDWC80         | BDWC81 | 1st Season               |
| BDWC82         | BDWC83 | 3rd - 4th Season         |
| BDWC84         | BDWC85 | 2nd - 3rd Season         |
| BDWC86         | BDWC87 | 1st Season               |
| BDWC88         | BDWC89 | 3rd - 4th Season         |

Maturity was estimated from neonate to nearly dependent calf following Baker *et al.*, 2018. Calves were identified based on their length, colouration and fin grade as well as behaviour. For example, older calves close to weaning would frequently bow ride the survey vessel while adults with younger calves would more strongly associate with older males (as determined by their Severity Grade 1 fins and heavy

scarring on their body and dorsal fin). Of the 11 calves recorded four were determined to be less than 1 year old while five were around 3-4 years of age and close to weaning (Table 8).

### 3.5 Site fidelity and Connectivity

Bottlenose dolphins in West Connacht Coast SAC have been shown to demonstrate high levels of site fidelity especially over short summer field seasons. During the present study most of the dolphins (70%) photographed were only recorded once during the survey period (Table 9) while 24 were recorded on more than one occasion, with seven individual dolphins recorded on four different surveys. All dolphins presenting with Grade 3 fin severity were calves.

**Table 9** Number of times individual dolphins with different severity grade fins were photographed in the West Connacht Coast SAC during 2025.

| Number of times an individual dolphin was photographed | Grade 1 fin | Grade 2 fin | Grade 3 fin | Total |
|--------------------------------------------------------|-------------|-------------|-------------|-------|
| 1                                                      | 30          | 24          | 2           | 56    |
| 2                                                      | 5           | 7           | 3           | 15    |
| 3                                                      | 0           | 2           | 0           | 2     |
| 4                                                      | 1           | 6           | 0           | 7     |

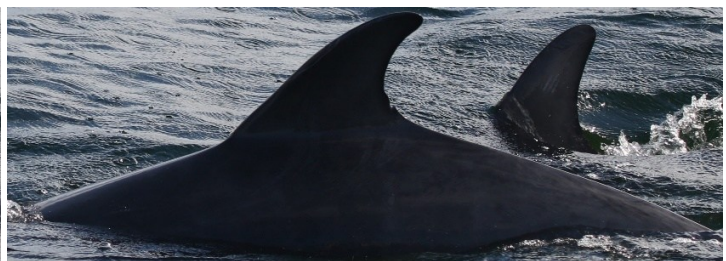
The mean re-capture rate was 1.5 for Severity Grade 1 and 2 fins and 1.4 for Severity Grade 3 fins. The re-sighting rate using the formula in Nykänen *et al.* (2015) was 0.07 for Severity Grade 1 and 2 fins and 0.09 for Severity Grade 3 fins. The animals with the highest capture histories (4) were all in a group of older juveniles, subadults and young adults observed off Killary in July and August 2025.

Five individuals (BDWC02/BDWC04/BDWC27/BDWC29/BDWC33) were photographed in both the Northern and Southern Components during the present survey. Re-sightings of BDWC02 and BDWC04 were 27 days apart having been recorded on the first survey on 19 June in the Southern Component and then in the Northern Component on the third survey on 16 July. The three other individuals were reported in the Northern Component on 16 July then 68 days later in the Southern Component on 22 September. This demonstrates the strong connectivity between the Northern and Southern Components and the wide range of this highly mobile population.

One of these dolphins (BDWC29) presented with a Severity Grade 2 fin at the beginning of the survey on 16 July 2025 (Survey 3) (Plate 1a) in the Northern Component and with Grade 1 fin severity during a second sighting on 22 September 2025 in the Southern Component (Plate 1b). This demonstrates that assumptions such i) animals do not lose their identifying marks during sampling period and ii) all marks are correctly recorded in each capture can be violated but with thorough matching these changes can be identified and accounted for.



Plate 1a. BDWC29 on 16 July 2025



1b. BDWC29 on 22 September 2025

In order to explore site fidelity between years we compared images collected during the current survey with some of those collected in some previous years from the West Connacht Coast SAC (Table 10). For this matching we only used fin Grade Severity 1 were matched as this minimises both false positives (an individual is thought to be present but was mis-identified) and negatives (the individual is present but was not recognised).

**Table 10** Comparison between the BDWC25 photo-id catalogue and BDWC21 catalogue and images obtained from within West Connacht Coast SAC by University College, Cork (UCC).

| Data Holder | Duration of study | Number of individual dolphins | Reference                   | No. of definite matches (%) | No. of probable/possible matches (%) |
|-------------|-------------------|-------------------------------|-----------------------------|-----------------------------|--------------------------------------|
| BDWC21      | 2021              | 80                            | Berrow <i>et al.</i> (2021) | 9 (25%)                     | 6 (41.6%)                            |
| UCC         | 2001-2014         | c.200                         | Rogan (unpubl.)             | 4 (2%)                      | 7 (3.5%)                             |

The 2025 West Connacht Bottlenose Dolphin (BDWC25) was compared to images collected during a similar survey on behalf of the NPWS in 2021 (Berrow *et al.* 2021). Of the 80 individuals photographed in 2021, 69 were of fin Severity Grade 1 and photographed from both sides of the dorsal fin. Of these a total of 9 individual dolphins (25%) were photographed during the two surveys (Table 10). If we include probable matches this increases to 41.6% (Table 10 and Appendix II). In addition we checked two additional females with a dependent calf and Grade 2 fin severity and one also matched to the 2021 catalogue. Thus 26.3% (10/38) individual dolphins photographed in 2025 were also recorded in 2021 in the West Connacht Coast SAC



**Plate 2a** BDWC25-073, also known as "Half-fin" photographed on 18 June 2021 (WCB21-018) (from Berrow *et al.* 2021)



**Plate 2b** Half-fin (BDWC25-073 with BDWC25-072) taken on 12 August 2025 by Simon Berrow/IWDG (this report)

During the matching between 2021 and 2025 one individual which was considered to be two different dolphins in 2025 (BDWC88 and BDWC90) was confirmed as the same individual which matched to the 2021 catalogue. This individual was included as the same individual in the mark-recapture but the matching between catalogues helped confirm its identity. One individual that was resighted between 2021 and 2025 was an adult female known as “half fin” (BDWC25-072 in the 2025 Catalogue and BDWC21-076 in the 2021 Catalogue) (Plate 2a and 2b). In 2025 she had a first season calf with her, as she did in 2021, which indicates an interbirth interval of approximately 4 years. This is consistent with a mean inter-birth interval in the Shannon Estuary of between  $2.7 \pm 0.6$  and  $3.5 \pm 1.3$  years (Baker *et al.* 2018).

Two individuals identified in the present survey (BDWC24/BDWC25) were also recorded associating with known individuals from the Shannon population in May and July 2024 off Sleah Head and Brandon Bay, Co Kerry and north of Loop Head, Co Clare (*IWDG unpubl.*)

The 2025 catalogue was also compared to the UCC NW Bottlenose Dolphin catalogue in order to explore site fidelity over a wider time-scale. Again only Severity Grade 1 individuals were compared as marks are likely to have changed considerably over this wide time period (13 years). This resulted in four definite matches (BDWC09/BDWC52/BDWC76/BDWC80) and seven potential matches (see Appendix II) which is 2-3.5% of the BDWC25 Grade 1 catalogue. These potential matches could not be verified due to poor image quality and/or limited visibility of the dolphins body in the images. In addition, as the UCC catalogue contains historical images, some dating back as far as 2001, and the most recent acquired in 2014 which is 11 years prior to the current survey there is a strong possibility that certain individuals were not matched due to significant changes in the appearance of their dorsal fins over time.

One individual from the UCC catalogue (UCC 1450) is a known female member of the Shannon dolphin population and matched to the IWDG Shannon Dolphin Catalogue (ID 247). This individual is an older female whose has one known calf (14) and recorded every year from 2010-2025 except in 2014. Prior to this survey she was last photographed in Dingle Bay/Blasket Sound, Co Kerry on 15 March 2025 by Nick Massett.

### 3.6 Additional sightings

In addition to Bottlenose dolphins, there were sightings of four cetacean and two seal species. Species diversity was consistent between both Northern and Southern Components of the SAC, with at least four extra species at each site, but abundance was higher in the Northern Component (216 individuals; Table 11a) compared to the Southern Component (52 individuals; Table 11b). See Appendix III for maps of their distribution and relative abundance.

**Table 11a** Number of sightings (individuals) of other marine mammal species recorded during surveys in the Northern Component of West Connacht Coast SAC during 2025

| Survey         | Harbour porpoise | Common dolphin  | Grey seal      | Harbour Seal  |
|----------------|------------------|-----------------|----------------|---------------|
| 1              | 1 (2)            | 1 (3)           | 1 (1)          |               |
| 2              |                  |                 | 3 (14)         |               |
| 3              | 1 (2)            |                 | 2 (2)          |               |
| 4              | 3 (4)            | 1 (3)           | 6 (6)          |               |
| 5              | 1 (3)            | 9 (120)         | 6 (6)          | 1 (9)         |
| 6              |                  | 3 (19)          | 12 (12)        | 1 (4)         |
| 7              |                  |                 | 6 (6)          |               |
| <b>Overall</b> | <b>6 (11)</b>    | <b>14 (145)</b> | <b>36 (47)</b> | <b>2 (13)</b> |

The most consistently recorded species was grey seal (*Halichoerus grypus*) present on all seven surveys in both Components. It was more abundant in the Northern Component compared to the Southern (Table 11a and b). Harbour seals (*Phoca vitulina*) were also recorded, but much less frequently, on two surveys in each component, all towards the end of the survey period in August and September.

Both short-beaked common dolphin (*Delphinus delphis*) and harbour porpoise (*Phocoena phocoena*) were recorded at both sites with more sightings of harbour porpoise in the Northern Component and common dolphin in the Southern Component (Tables 11a and 11b). There was one sighting of a single minke whale (*Balaenoptera acutorostrata*) in the Southern Component during survey 7 (Table 11b).

In addition to these marine mammals, there were three sightings of ocean sunfish (*Mola mola*), two in the Southern Component during Survey 5 and one in the Northern Component during Survey 2, two sightings of bluefin tuna (*Thunnus thynnus*) one each in both Northern and Southern Components during survey 7 (September) and a single otter (*Lutra lutra*) in the Northern Component.

**Table 11b** Number of sightings (individuals) of other marine mammal species recorded during surveys in the Southern Component of West Connacht Coast SAC during 2025.

| Survey         | Harbour porpoise | Common dolphin  | Minke whale  | Grey seal      | Harbour Seal |
|----------------|------------------|-----------------|--------------|----------------|--------------|
| 1              |                  |                 |              | 4 (4)          |              |
| 2              |                  | 9 (50)          |              | 2 (2)          |              |
| 3              |                  |                 |              | 2 (2)          |              |
| 4              |                  | 2 (11)          |              | 1 (1)          |              |
| 5              |                  | 6 (31)          |              | 5 (5)          | 1 (1)        |
| 6              |                  | 7 (27)          |              | 1 (1)          |              |
| 7              | 4 (9)            | 1 (10)          | 1 (1)        | 3 (4)          | 3 (3)        |
| <b>Overall</b> | <b>4 (9)</b>     | <b>25 (129)</b> | <b>1 (1)</b> | <b>18 (19)</b> | <b>4 (3)</b> |

Harbour porpoise and common dolphins are widespread along the western seaboard with harbour porpoise typically more abundant closer to the coast with common dolphins occurring more offshore (Kavanagh *et al.*, 2011; Rogan *et al.*, 2018; Berrow *et al.*, 2021; Giralte Paradell *et al.* 2024). Harbour porpoise were included as a qualifying interest in the West Connacht Coast SAC in 2024 and the results from the current survey confirm its presence. Minke whales are also typically offshore but were observed within the islands in the Northern Component on three occasions, once off Blacksod.

A number of SACs with grey seal as qualifying interest lie within, or adjacent to, the West Connacht Coast SAC. These include Duvillaun Islands SAC (Site Code 000495) and Inishkea Islands SAC (Site Code 000507) in the Northern Component and Inishbofin and Inishshark SAC (Site Code 000278) and Slyne Head Islands SAC (Site Code 000328) in the Southern Component. Thus, we might expect regular sightings of this species during the current survey. See Appendix III for maps of additional sightings.

## 4 Discussion

### 4.1 Bottlenose dolphin abundance estimates

During the present survey of bottlenose dolphins in the West Connacht Coast SAC we encountered bottlenose dolphins on four of the seven surveys in the Southern Component and on two of the surveys on the Northern Component. We successfully obtained images of 80 individual dolphins of which 36

presented with fin Severity Grade 1 and 39 with fin Severity Grade 2 which were used in the mark-recapture models. Five individuals presenting with fin Severity Grade 3 were omitted from the analysis as assumptions on the ability to consistently recognise individuals dolphins could be violated. Interestingly one dolphins which presented with fin Severity Grade 2 at the start of the survey had a fin Severity Grade 1 towards the end. This could also violated the assumption that marks are not gained or lost during the survey period however this change was noted and the best abundance estimate was derived from combining fin Severity Grades 1 and 2.

The most robust estimate for bottlenose dolphins within the West Connacht Coast SAC during the summer 2025  $201 \pm 27$  (95% CI 148-254) with a CV of 0.13. This estimates was very similar to that derived in 2021 during the last NPWS funded bottlenose dolphin survey of the West Connacht Coast (Table 12) and also presented a very similar CV (0.13 compared to 0.12). All estimates are within 95% Confidence Intervals of each other (Table 12) which suggests a very stable and consistent number of bottlenose dolphins occur within the West Connacht Coast SAC.

**Table 12** Abundance estimates of bottlenose dolphins in the West Connacht Coast SAC.

| Year              | Estimate      | Coefficient of Variation | 95% Confidence Intervals | Reference                   |
|-------------------|---------------|--------------------------|--------------------------|-----------------------------|
| <b>2025</b>       | <b>201±27</b> | <b>0.13</b>              | <b>148-254</b>           | <b>This study</b>           |
| 2021              | 197±24        | 0.12                     | 150-243                  | Berrow <i>et al.</i> (2021) |
| 2014 <sup>1</sup> | 189           | 0.11                     | 162– 232                 | Nykänen (2016)              |
| 2013 <sup>1</sup> | 145           | 0.30                     | 111–239                  | Nykänen (2016)              |
| 2009 <sup>2</sup> | 171±48        | 0.28                     | 100-294                  | Ingram <i>et al.</i> (2009) |

<sup>1</sup> using a multi-site Bayesian approach including Donegal Bay

<sup>2</sup> data only from the Southern Component of the West Connacht Coast SAC

## 4.2 Encountering bottlenose dolphins within the survey areas

The success in using mark-recapture modelling to estimate abundance depends on the successful capture of photo-id data from individual bottlenose dolphins and building capture histories over the survey period. Encounter rates with bottlenose dolphins within the West Connacht Coast SAC were consistent with previous years with dolphins encountered, and photographed, on six of the seven surveys (86%) two in the Northern Component and five in the Southern Component. On two occasions bottlenose dolphins were encountered in both components on the same survey day. These seven bottlenose dolphin encounters all yielded photo-id data. While the sighting rate reported here is similar to previous surveys on the area (Ingram *et al.*, 2009; Nykänen *et al.*, 2015) more encounters would lead to the acquisition of more images and strengthen the capture histories used in the modelling. This in turn would lead to tighter abundance estimates with a lower CV. It is thus important to increase as much as is possible the encounter rates with bottlenose dolphins during these surveys.

Encountering dolphins in the Northern Component was in contrast to the last survey in 2021 when no bottlenose dolphins were encountered in the Northern Component (Berrow *et al.*, 2021). However photographing dolphins in the Northern Component is more challenging as dolphins frequently occur very close to shore and around reefs which are not easily accessible by the survey boat and sea conditions are often worse than in the Southern Component which is more sheltered. Images are often taken at a greater distance than is ideal and thus the photo quality was poorer and obtaining images of all the dolphins in each group also difficult. These challenges should not be underestimated and increasing the likelihood of encountering bottlenose dolphins to photograph is essential for the success of any long-term monitoring of the bottlenose dolphin population in the West Connacht Coast SAC.

In order to explore the presence of bottlenose dolphins within the study area we interrogated the IWDG Cetacean Sightings database (<https://iwdg.ie/browsers/sightings.php>) and used local knowledge to log additional sightings of bottlenose dolphins during the survey period. There were 32 bottlenose dolphin sightings reported to the IWDG between June and September 2025 in or adjacent to the West Connacht Coast SAC. Of these three occurred on the same day as a survey (24 July and 12 and 13 August) and four one day either side. On survey 4 (24 July) a group of seven bottlenose dolphins were recorded in Kilcummin Harbour which is around 55km east of the study area. On surveys 5 and 6 groups of 5 and 20 individuals were also reported at the same location (Table 13).

On a number of occasions, bottlenose dolphin sightings were reported to the boat skipper during a survey. For example, on Survey 1 on 19 June four bottlenose dolphins were reported off Achillbeg moving north towards Mulranny, north of the SAC Southern Component boundary while on Survey 7 on 22 September, bottlenose dolphins were reported off Rinroe in Broadhaven Bay to the north of the boundary of the Northern Component. One dolphin, which is locally known as “half-fin”, has a very diagnostic wound which resulted in most of its dorsal fin missing (see Fig. 4) was seen in groups of bottlenose dolphins ranging from 10 to 50+ from as far south as Cleggan and north to Donegal between August and October (Table 13).

This demonstrates that bottlenose dolphins were in the vicinity but not within the boundary of the West Connacht Coast SAC and thus not encountered during surveys. This also provides further evidence of the highly mobile nature of bottlenose dolphins which range outside the West Connacht Coast SAC.

**Table 13** Casual sightings of bottlenose dolphins reported to the IWDG within, or adjacent to, the study area. Those in bold are on, or one day either side of the survey day. Sightings in blue indicate sightings with “half-fin” identified in the group.

| Date              | Group size | Location                                         | IWDG Sightings No. |
|-------------------|------------|--------------------------------------------------|--------------------|
| <b>23 July</b>    | <b>4</b>   | <b>Kilcummin Harbour, Killala Bay - Co. Mayo</b> | <b>50773</b>       |
| <b>24 July</b>    | <b>7</b>   | <b>Kilcummin Harbour, Killala Bay - Co. Mayo</b> | <b>50796</b>       |
| <b>25 July</b>    | <b>20</b>  | <b>Kilcummin Harbour, Killala Bay - Co. Mayo</b> | <b>50786</b>       |
| <b>11 August</b>  | <b>7</b>   | <b>Killala Bay - Co. Sligo</b>                   | <b>51034</b>       |
| <b>12 August</b>  | <b>5</b>   | <b>Kilcummin Harbour, Killala Bay - Co. Mayo</b> | <b>51013</b>       |
| <b>13 August</b>  | <b>20</b>  | <b>Kilcummin Harbour, Killala Bay - Co. Mayo</b> | <b>51002</b>       |
| 18 August         | 32         | Glosh, Blacksod, Co. Mayo                        | 51122              |
| 21 August         | 3          | Mweenish Island Carna - Co. Galway               | 51189              |
| <b>23 August</b>  | <b>10</b>  | <b>Fintragh Bay, Co. Donegal</b>                 | <b>51194</b>       |
| <b>12 October</b> | <b>50+</b> | <b>Cleggan, Co. Galway</b>                       | Not reported       |

Consideration should be given to responding to sightings of bottlenose dolphins within or adjacent to the West Connacht Coast SAC by mobilising the survey teams to capture images of these groups. It might also be prudent to survey outside the boundaries of the SAC if sightings of bottlenose dolphins are reported during a survey.

### 4.3 Site fidelity

In the present study we have shown that 25-26.3% of dolphins captured during 2025 were also captured during a similar survey in 2021. A much smaller proportion (2-3.5%) were matched to the UCC Catalogue, the much lower proportion reflecting the aging nature of their catalogue. This high site

fidelity is well known in this area and has been reported before (Ingram *et al.*, 2009; Oudejens *et al.* 2010; Nykänen *et al.* 2015) and supported the designation of this area as an SAC for bottlenose dolphins.

Despite this high site fidelity to the West Connacht Coast SAC these bottlenose dolphins are still highly mobile and connectivity between the West Connacht Coast and other sites has been demonstrated previously (Ingram *et al.*, 2009; Oudejens *et al.* 2010; Nykänen *et al.* 2018). Tracking individual bottlenose dolphins over time requires regularly field surveys as marks can change quite significantly between years. More regular surveys would enable reproductive rates and mortality to be recorded which are important metrics when monitoring a protected species

Bottlenose dolphins were not recorded throughout the SAC but were often encountered in the same locations such as Killary Harbour in the Southern Component. Previous studies have highlighted the importance of Killary Harbour (Ingram *et al.*, 2001; Berrow *et al.*, 2021) which is an important river for migrating Atlantic salmon (*Salmo salar*) and sea trout (*Salmo trutta*). On one occasion during Survey 1 on 19 June during a photo-id session a fish toss was captured (Plate 3). The fish was identified as an Atlantic salmon. On another occasion in the Southern Component on 24 July (Survey 4) fish were observed on the boats sonar hiding under the vessel during bottlenose dolphin foraging activity. The skipper caught a mackerel (*Scomber scombrus*) under the vessel which is likely to be the target of the dolphins feeding behaviour.



**Plate 3.** Bottlenose dolphin fish tossing salmon on 19 June 2025 in the Northern Component (Photo. by Mags Daly/IWDG)

#### 4.4 Recommendations

We were successful in deriving an abundance estimate of bottlenose dolphins in West Connacht Coast SAC with a low CV. However this monitoring method relies on obtaining good quality images of individual bottlenose dolphins to build capture histories. The more encounters with dolphins the more thorough the capture histories leading to more robust estimates. Failure to find dolphins during surveys will greatly compromise the success of these surveys and any ways to increase encounter rates with bottlenose dolphins in the area should be explored. We recommend:

1. Our encounter rate was greatly helped by deviating the cruise plan to respond to local reports. On a number of occasions this meant we did not complete the track line on the western boundary of the Southern Component. This flexibility is an important element of our success and should be continued in future monitoring surveys.
2. We recommend using local knowledge and current sighting networks to identify the presence of bottlenose dolphins during each survey. This could include deploying observers from land to scan key areas (e.g. Killary Harbour) and report any sightings directly to the survey vessel.

This would enable surveyors to put more survey effort into finding dolphins if they know they are in the area

3. Consideration should be given to soliciting images of bottlenose dolphins from local researchers on an *ad hoc* basis during the survey period. This could be through local training by the survey team at the start of the survey and provision of good cameras and lens to key partners such as the chartered boat skippers. This will enable more images to be available for capture histories and improve the abundance estimates as well as increase the data to explore site fidelity.
4. Decoupling simultaneous surveys may release field resources to increase chances of encountering dolphins by surveying those areas where dolphins have been recently sighted
5. We suggest the use of a UAV to improve estimates of group size, especially if dolphins are dispersed in a group.
6. Tracking individual bottlenose dolphins over time requires regularly field surveys as marks can change quite significantly between years. More regular surveys also would enable reproductive rates and mortality to be recorded which are important metrics when monitoring a protected species.
7. A single unified photo-id catalogue for the West Connacht Coast SAC would assist in the long-term monitoring of individual bottlenose dolphins within the SAC and connectivity between sites.

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Appendix I: Capture histories of individual bottlenose dolphins (Severity Grade 1 to 3 are presented but only Grade 1 and 2 were used in abundance estimates)

| NPWS Cat No | Fin Grade | Side Photographed | Photo L | Photo R | Survey 1   | Survey 2   | Survey 3       | Survey 4       | Survey 5       | Survey 6       | Survey 7       | Total Capture Histories by Individual |
|-------------|-----------|-------------------|---------|---------|------------|------------|----------------|----------------|----------------|----------------|----------------|---------------------------------------|
|             |           |                   |         |         | 19/06/2025 | 01/07/2025 | 16/07/2025     | 24/07/2025     | 12/08/2025     | 13/08/2025     | 22/09/2025     |                                       |
|             | (1-3)     | L / R / Both      | (1-3)   | (1-3)   | BND Both   | No BND     | BND North Only | BND South Only | BND South Only | BND South Only | BND South Only |                                       |
| BDWC25-001  | 1         | Both              | 1       | 1       | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |
| BDWC25-002  | 2         | Both              | 1       | 1       | 1          | 0          | 1              | 0              | 0              | 0              | 0              | 2                                     |
| BDWC25-003  | 2         | Both              | 1       | 1       | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |
| BDWC25-004  | 2         | Both              | 1       | 1       | 1          | 0          | 1              | 0              | 0              | 0              | 0              | 2                                     |
| BDWC25-005  | 1         | Both              | 2       | 1       | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |
| BDWC25-006  | 1         | Both              | 2       | 1       | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |
| BDWC25-007  | 1         | Both              | 2       | 1       | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |
| BDWC25-008  | 1         | Both              | 2       | 2       | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |
| BDWC25-009  | 1         | Both              | 2       | 2       | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |
| BDWC25-010  | 1         | Both              | 1       | 1       | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |
| BDWC25-011  | 1         | Right             | NA      | 1       | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |
| BDWC25-012  | 2         | Right             | NA      | 1       | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |
| BDWC25-013  | 1         | Right             | 2       | 1       | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |
| BDWC25-014  | 1         | Left              | 2       | NA      | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |
| BDWC25-015  | 1         | Both              | 2       | 1       | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |
| BDWC25-016  | 1         | Both              | 1       | 1       | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |
| BDWC25-017  | 1         | Both              | 2       | 1       | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |
| BDWC25-019  | 1         | Right             | NA      | 1       | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |
| BDWC25-020  | 2         | Right             | NA      | 1       | 1          | 0          | 0              | 0              | 0              | 0              | 0              | 1                                     |

|            |   |       |    |    |   |   |   |   |   |   |   |   |
|------------|---|-------|----|----|---|---|---|---|---|---|---|---|
| BDWC25-021 | 2 | Both  | 2  | 1  | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| BDWC25-022 | 2 | Both  | 2  | 2  | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| BDWC25-023 | 1 | Both  | 1  | 2  | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| BDWC25-024 | 1 | Both  | 1  | 2  | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| BDWC25-025 | 1 | Both  | 1  | 2  | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| BDWC25-026 | 1 | Both  | 1  | 2  | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| BDWC25-027 | 2 | Both  | 1  | 1  | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 |
| BDWC25-028 | 2 | Both  | 1  | 2  | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| BDWC25-029 | 1 | Both  | b  | 1  | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 |
| BDWC25-030 | 2 | Both  | 1  | 1  | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| BDWC25-031 | 2 | Both  | 1  | 2  | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| BDWC25-032 | 2 | Left  | 1  | NA | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| BDWC25-033 | 2 | Both  | 1  | 1  | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 |
| BDWC25-034 | 2 | Both  | 1  | 1  | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| BDWC25-035 | 1 | Both  | 1  | 2  | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| BDWC25-036 | 2 | Left  | 1  | NA | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| BDWC25-037 | 2 | Right | NA | 1  | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| BDWC25-038 | 2 | Left  | 1  | NA | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| BDWC25-039 | 1 | Both  | 1  | 1  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| BDWC25-040 | 1 | Both  | 1  | 1  | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 4 |
| BDWC25-041 | 2 | Both  | 1  | 1  | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 4 |
| BDWC25-042 | 2 | Both  | 1  | 1  | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 4 |
| BDWC25-043 | 2 | Both  | 1  | 1  | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 4 |
| BDWC25-044 | 2 | Left  | 1  | NA | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| BDWC25-045 | 2 | Both  | 1  | 1  | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 4 |
| BDWC25-046 | 2 | Both  | 1  | 1  | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 4 |
| BDWC25-047 | 2 | Both  | 1  | 1  | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 4 |
| BDWC25-048 | 2 | Both  | 1  | 1  | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 3 |
| BDWC25-049 | 2 | Both  | 1  | 1  | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 3 |
| BDWC25-050 | 1 | Left  | 1  | NA | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |

|            |   |       |    |    |   |   |   |   |   |   |   |   |
|------------|---|-------|----|----|---|---|---|---|---|---|---|---|
| BDWC25-051 | 1 | Both  | 1  | 1  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| BDWC25-052 | 1 | Left  | 1  | NA | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| BDWC25-053 | 1 | Both  | 1  | 2  | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| BDWC25-054 | 1 | Both  | 1  | 2  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| BDWC25-055 | 1 | Both  | 1  | 1  | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| BDWC25-056 | 1 | Left  | 2  | NA | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| BDWC25-057 | 2 | Left  | 1  | NA | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| BDWC25-058 | 2 | Left  | 2  | NA | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| BDWC25-059 | 2 | Both  | 1  | 2  | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| BDWC25-060 | 2 | Left  | 1  | NA | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| BDWC25-061 | 1 | Left  | 2  | NA | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| BDWC25-062 | 2 | Right | NA | 1  | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| BDWC25-070 | 1 | Both  | 1  | 1  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| BDWC25-071 | 2 | Both  | 1  | 1  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| BDWC25-072 | 1 | Both  | 2  | 1  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| BDWC25-073 | 3 | Both  | 1  | 2  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| BDWC25-074 | 1 | Both  | 2  | 1  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| BDWC25-075 | 2 | Both  | 1  | 1  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| BDWC25-076 | 1 | Both  | 1  | 2  | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| BDWC25-077 | 3 | Left  | 2  | NA | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| BDWC25-078 | 2 | Left  | 2  | NA | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| BDWC25-079 | 3 | Left  | 2  | NA | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| BDWC25-080 | 1 | Left  | 1  | NA | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| BDWC25-081 | 3 | Left  | 2  | NA | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| BDWC25-084 | 1 | Both  | 1  | 2  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| BDWC25-085 | 2 | Both  | 2  | 2  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| BDWC25-086 | 1 | Left  | 2  | NA | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| BDWC25-087 | 3 | Left  | 1  | NA | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |

|                   |   |       |    |   |   |   |   |   |   |   |   |   |
|-------------------|---|-------|----|---|---|---|---|---|---|---|---|---|
| <b>BDWC25-088</b> | 2 | Right | NA | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| <b>BDWC25-089</b> | 2 | Right | 2  | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |

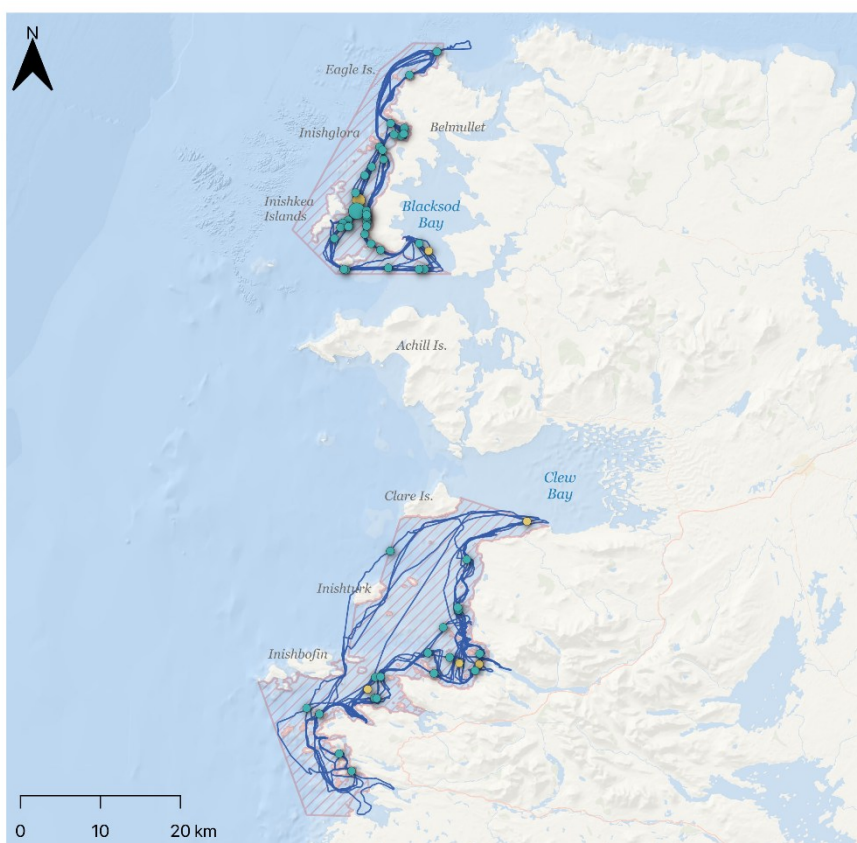
**Appendix II: Comparison between individual bottlenose dolphins photographed during 2025 to some previous ID catalogues.**

|                                  |                    |               |
|----------------------------------|--------------------|---------------|
| <b>Grade 1 fin</b>               | <b>Checked</b>     | Unmatched (X) |
| <b>Grade 2 fin</b>               | <b>Not checked</b> | -             |
| <b>Matched</b>                   | <b>Checked</b>     | ID code       |
| <b>Probable / Possible Match</b> | <b>Checked</b>     | ID code       |

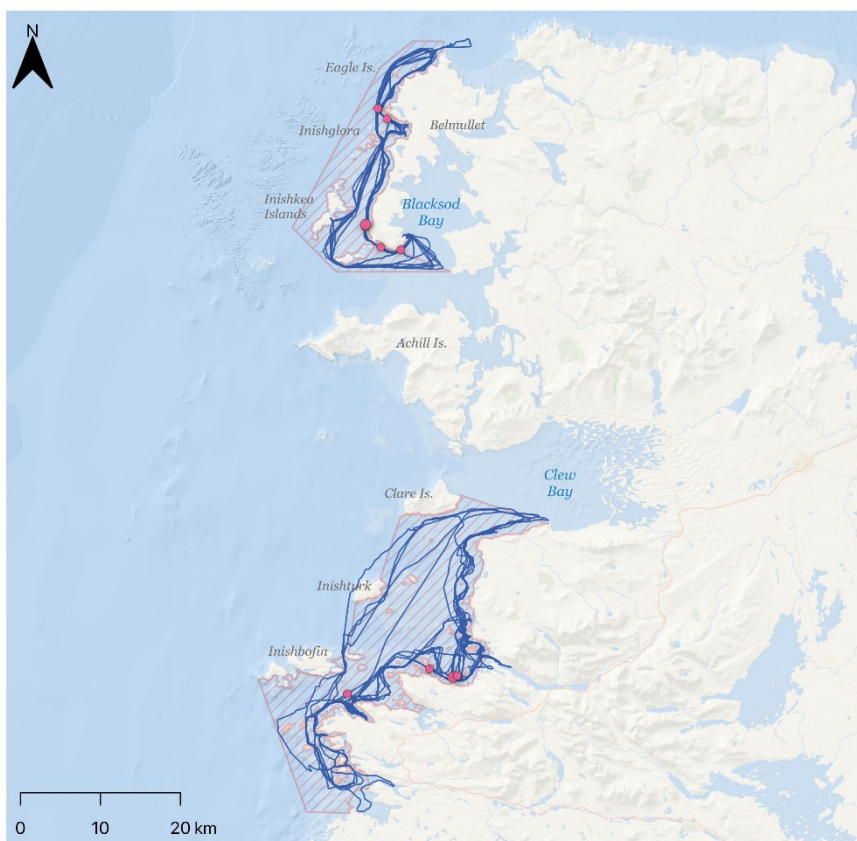
| <b>BDWC25</b> | <b>BDWC21</b> | <b>UCC</b> |
|---------------|---------------|------------|
| BDWC25-01     | X             | 1410?      |
| BDWC25-02     | -             | -          |
| BDWC25-03     | -             | -          |
| BDWC25-04     | -             | -          |
| BDWC25-05     | X             | X          |
| BDWC25-06     | BDWC21-020    | X          |
| BDWC25-07     | X             | X          |
| BDWC25-08     | X             | X          |
| BDWC25-09     | BDWC21-089    | 1015       |
| BDWC25-10     | X             | X          |
| BDWC25-11     | X             | 1047?      |
| BDWC25-12     |               |            |
| BDWC25-13     | X             | X          |
| BDWC25-14     | BDWC21-073    | 402?       |
| BDWC25-15     | X             | X          |
| BDWC25-16     | X             | X          |
| BDWC25-17     | X             | X          |
| BDWC25-19     | X             | X          |
| BDWC25-20     |               |            |
| BDWC25-21     |               |            |
| BDWC25-22     |               |            |
| BDWC25-23     | X             | X          |
| BDWC25-24     | X             | X          |
| BDWC25-25     | BDWC21-083    | X          |
| BDWC25-26     | X             | X          |
| BDWC25-27     |               |            |
| BDWC25-28     |               |            |
| BDWC25-29     | X             |            |
| BDWC25-30     |               |            |
| BDWC25-31     |               |            |
| BDWC25-32     |               |            |
| BDWC25-33     |               |            |
| BDWC25-34     |               |            |
| BDWC25-35     | X             | X          |
| BDWC25-36     |               |            |
| BDWC25-37     |               |            |
| BDWC25-38     |               |            |

|           |            |                         |
|-----------|------------|-------------------------|
| BDWC25-39 | X          | X                       |
| BDWC25-40 | X          | 1264? 1298?             |
| BDWC25-41 |            |                         |
| BDWC25-42 |            |                         |
| BDWC25-43 |            |                         |
| BDWC25-44 |            |                         |
| BDWC25-45 |            |                         |
| BDWC25-46 |            |                         |
| BDWC25-47 |            |                         |
| BDWC25-48 |            |                         |
| BDWC25-49 |            |                         |
| BDWC25-50 | BDWC21-075 | X                       |
| BDWC25-51 | BDWC21-021 | 1289?                   |
| BDWC25-52 | X          | 1004                    |
| BDWC25-53 | BDWC21-092 | 1207?                   |
| BDWC25-54 | BDWC21-053 | X                       |
| BDWC25-55 | BDWC21-052 | X                       |
| BDWC25-56 | BDWC21-072 |                         |
| BDWC25-57 |            |                         |
| BDWC25-58 |            |                         |
| BDWC25-59 |            | X                       |
| BDWC25-60 |            |                         |
| BDWC25-61 | BDWC21-010 | 1007? 1045? 1373? 1043? |
| BDWC25-62 |            |                         |
| BDWC25-70 | BDWC21-013 | X                       |
| BDWC25-71 | X          |                         |
| BDWC25-72 | BDWC21-018 | X                       |
| BDWC25-74 | BDWC21-007 | X                       |
| BDWC25-75 | X          |                         |
| BDWC25-76 | X          | 1347                    |
| BDWC25-78 | X          |                         |
| BDWC25-80 | X          | 1346                    |
| BDWC25-84 | X          | X                       |
| BDWC25-85 | X          |                         |
| BDWC25-86 | X          |                         |
| BDWC25-88 | BDWC21-098 |                         |
| BDWC25-89 | X          |                         |
| BDWC25-90 | BDWC21-098 |                         |
| BDWC25-91 | X          |                         |

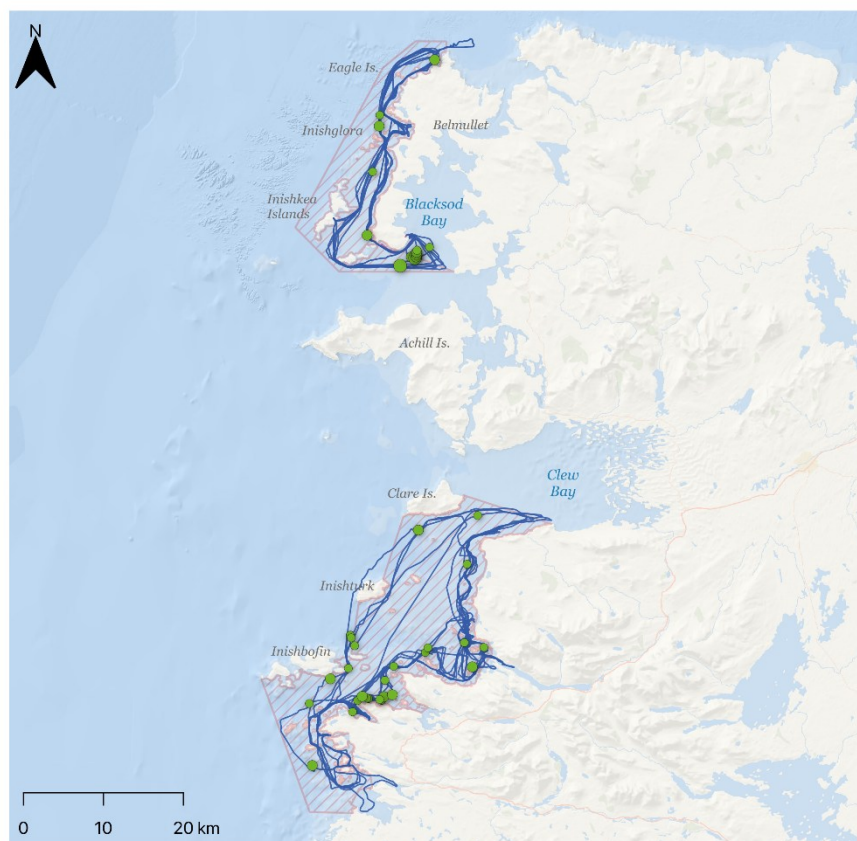
## Appendix III: Maps of additional marine mammal species recorded



Grey and Common (Harbour) seals



Harbour porpoise



## Boat-based visual surveys in the West Connacht Coast SAC in 2025

Site Code: 002998

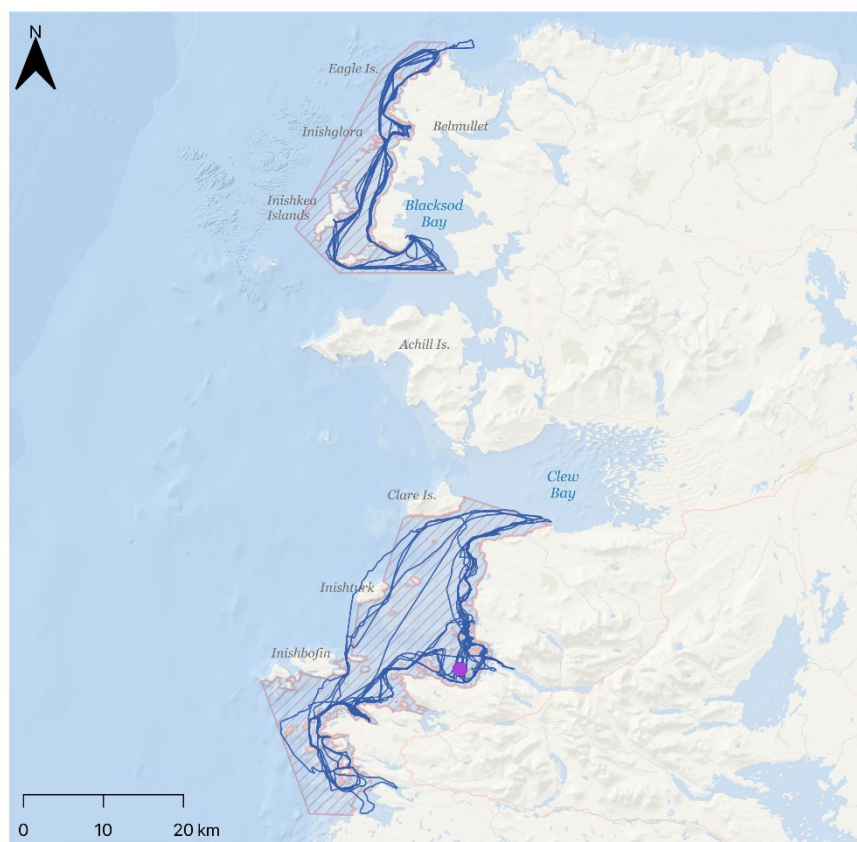
### *Delphinus delphis* (Common dolphins)

- 1 - 5
- 6 - 15
- 16 - 30
- Survey Effort Lines
- ▨ West Connacht Coast SAC

Basemap: Esri Ocean and Ocean Reference  
Sources: © Esri, GEBCO, NOAA, Garmin, HERE,  
National Geographic and other contributors.  
Survey data: BDWC25 bottlenose dolphin survey.  
Date: 07/10/2025  
Projection: Irish Transverse Mercator (EPSG:2157)



Common dolphin



## Boat-based visual surveys in the West Connacht Coast SAC in 2025

Site Code: 002998

- *Balaenoptera acutorostrata*  
(Minke whale)
- Survey Effort Lines
- ▨ West Connacht Coast SAC

Basemap: Esri Ocean and Ocean Reference  
Sources: © Esri, GEBCO, NOAA, Garmin, HERE,  
National Geographic and other contributors.  
Survey data: BDWC25 bottlenose dolphin survey.  
Date: 07/10/2025  
Projection: Irish Transverse Mercator (EPSG:2157)



Minke whale