# Social structure of Risso's Dolphin (*Grampus griseus*) in waters off Anglesey, Wales

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# Social structure of Risso's Dolphin (*Grampus griseus*) in waters off Anglesey, Wales

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## Abstract

Risso's dolphins (*Grampus griseus*) are a cetacean species sighted frequently in waters off the Isle of Anglesey, Wales. Despite their reliable seasonal occurrence, this population remains rarely studied, and its social dynamics are not well understood. This study is the first attempt at establishing the social structure of this Risso's dolphin population, with the intention of identifying differences from other populations of the species, and informing future conservation measures. Using photo-identification, 308 individual Risso's dolphins were identified, of whom 85 were resighted at least once, a resighting rate of 28%. Associations were generally weak, short-term, and highly varied, with a mean association index value of 0.06, and an estimate of social differentiation of 0.83. Results indicate a fluid, highly mobile society, with individuals frequently moving in and out of the study area. No evidence was found of stable groups or long-term associations. These conclusions stand in contrast to studies of Risso's dolphins in other locations, which have found significant clustering, stable associations, and site fidelity. Such variation is likely the result of differences in environmental factors, particularly availability of food resources, which are driven by the differing structures of the continental shelf between locations.

**KEYWORDS**

photo-identification, Risso's dolphin, social network analysis, social structure

## 1 | INTRODUCTION

Delphinids are known to exhibit a range of social structures (Boran et al., 2001; Connor, 2000). Two of the most common of these labels are fission-fusion societies, in which group composition is fluid and dynamic, with individuals frequently moving between different groups as they react to their environment and conspecifics (Connor et al., 2000; Couzin, 2006); and matrilineal societies, in which groups of related individuals remain in stable, long-term associations based on mother-offspring bonds (Baird, 2000; Bigg et al., 1990; Boran et al., 2001).

In mammalian societies, males and females typically face different selection pressures; female distribution and dispersal is driven by the availability of food resources, whereas male distribution is influenced primarily by the distribution of females (Emlen & Oring, 1977). These pressures are the basic drivers of social structure. As a broad summary across delphinid species, females may display greater philopatry and be more likely to associate with related individuals, while males, who generally form associations to increase their chances of successful reproduction, will disperse, and are no more likely to associate with relatives than with unrelated individuals (Möller, 2012). However, these assumptions rely on resources, particularly food, being consistent and stable; when resources are unreliable, larger mixed groups and long-term associations become advantageous, giving individuals the benefits of foraging cooperatively (Gowans et al., 2007). These are generalisations, and may not apply to all species, but they form a useful basis for understanding how a variety of social structures may occur depending on food availability and reproductive mechanisms.

Risso's dolphins are a widespread, but relatively understudied species of oceanic dolphin, found in equatorial, tropical, and temperate waters between latitudes of 64°N and 46°S, though they may be more common in temperate waters (Jefferson et al., 2014). Most studies of the species' distribution concur that they show a preference for waters over the continental shelf, which is likely due to the availability of prey, which tend to be on or near the seabed (Azzellino et al., 2008; Bearzi et al., 2010; Gaspari, 2004; Gaspari et al., 2007), although Polacheck (1987) describes the population in the eastern tropical Pacific as a nearshore species. It should be noted that in such studies, the continental shelf is very narrow, the seabed dropping to considerable depths close to the shore. This makes it difficult to define the species as having an offshore or nearshore distribution. Risso's dolphins are teuthophagous, feeding primarily on cephalopods; the most common prey species vary between populations in different areas (Bearzi et al., 2010; Bloch et al., 2012; MacLeod et al., 2014; Visser er al., 2021). Temporal and spatial movement of prey species is the most frequently given determinant of movement and distribution changes in Risso's dolphins (Bearzi et al., 2010; Plön et al., 2020; Smultea et al., 2018; Soldevilla et al., 2010). There is evidence that the distribution of Risso's dolphins may be shifting northward, potentially as a result of changing ocean temperatures driven by climate change, or as a response to changing distribution of their cephalopod prey, which itself may also be driven by climate change (Bloch et al., 2012; Chosson et al., 2023; Evans & Waggitt, 2020). These shifts could also see changes in social structure, as the species adapts its behaviour to the changing environment.

A key physical feature of Risso's dolphins is their tendency to retain a variety of scars, scratches, and other marks which may in adults cover a large proportion of the dorsal surface of the body. These can give the dolphin a light, mottled appearance, and are generally caused by intraspecific interactions, although they can also be caused by interspecific interactions, prey interactions, parasites, boat strikes or fishing gear entanglements (Mariani 2016). These marks, along with notches in the dorsal fin, provide ample opportunity for individual Risso's dolphins to be distinguished using photo identification.

The present body of literature on social structure in Risso's dolphins is limited, and there is no consistency in how that social structure is described. Gaspari (2004) considers Risso's dolphins to be a fission-fusion society; Amano and Miyazaki (2004) describe a group of Risso's dolphins having features in common with both fission-fusion and matrilineal societies; and Hartman et al. (2008) propose a distinct type of society for Risso's dolphins, which they term 'stratified social organisation'. This stratified social organisation consists of either pairs or groups of up to 12 adult individuals that form stable, long-term associations. They are generally separated by gender, with groups observed consisting solely of adult males, or solely of adult females with calves. Younger individuals of both sexes may also form less stable groups. In a later study, Hartman et al. (2020) also identify particularly close associations between groups of 2 and 3 individuals, even within a larger stable group of 13, suggesting there may be groups and subgroups, a structure also suggested by Gaspari (2004). Due to the specific geography of the Azores however, this social structure may not always occur in other locations. A significant amount of variation has been observed in the distribution, behaviour, and ecology of Risso's dolphins between different populations, and we must consider that this variation could also extend to the social organisation of the species. As such it may be that the population in the present study has a different social structure to populations in other locations. If models of social structure are to be used effectively to inform conservation and policy, they must be specific to the population at hand.

There has been some suggestion that the distinctive markings of Risso’s dolphins have evolved as a result of the species’ social structure; that the lack of repigmentation in scars has evolved as a way for males to signal quality in order to avoid aggression in an unstable social system (MacLeod 1998), which may indicate that a lack of stability is a fundamental aspect of Risso’s dolphin social structure. However, this theory has not been explored further.

Despite sightings being regular and relatively predictable in time and space, the population of Risso’s dolphins in the waters off the Isle of Anglesey, Wales, is not well understood, with social structure being a key knowledge gap. Photo-ID has been conducted on Risso’s dolphins in the area on an opportunistic basis since 2004. Stevens (2014) and Mandlik (2021) identified 144 and 105 individuals respectively; however, these studies were primarily focussed on environmental determinants of distribution and did not conduct in-depth analysis of social structure. Evans and Waggitt (2023) identified high densities of Risso’s dolphin sightings around Anglesey, but also off the coasts of the Isle of Man, the Llŷn Peninsula, and southeastern Ireland. Significant overlap in the individuals that make up these areas of high density has been found, suggesting a highly mobile population that covers a wide geographical area, which is supported by resightings in the aforementioned photo-ID studies between locations as far afield as Cornwall and the Hebrides (Stevens, 2014; Mandlik, 2021). Studies of Risso’s dolphins around Bardsey Island, Wales, which is within the study area covered by this project, have recorded site fidelity in the population (Eisfeld-Pierantonio & James, 2018). De Boer et al. (2012, 2014) have linked the movement of the population around Bardsey to the tidal cycle, with the suggestion that changes in the distribution of prey species is the cause.

This study is intended to provide the first assessment of social structure in the population of Risso’s dolphins seen around the coast of Anglesey, in the hopes of informing policy and conservation work that could help to protect the species. There are a variety of anthropogenic threats that can affect Risso’s dolphins in the UK, including bycatch, noise pollution, tourism, offshore developments, and loss of prey species driven by climate change (Evans, 2013; JNCC, 2019). Marine vessel traffic could be particularly significant in Anglesey waters; a study in nearby Cardigan Bay found that vessel traffic significantly impacted the community structure of bottlenose dolphins *Tursiops truncatus* (Richardson, 2012), and harbour porpoise

*Phocoena phocoena* have been impacted by recreational craft at Point Lynas, Anglesey, a location also regularly frequented by Risso's dolphins (Grundy, 2021). The potential impact of these threats on Risso's dolphins is not well understood, and improving our knowledge of how the population is organised could inform future conservation measures such as the designation of Marine Protected Areas (MPAs). Ideally, this study will also contribute to the wider understanding of Risso's dolphins, revealing patterns of social structure and their similarities to, or differences from, other populations of the species.

## 2 | METHODS

This study was carried out in two phases; photo-identification (photo-ID) and social network analysis. Images were taken from 55 Risso's dolphin encounters that occurred between 2004 and 2023. Encounters were logged during at-sea surveys, organised landwatches, or as incidental sightings from either land or vessels at sea. The study area comprises the coastal waters of Wales and the Isle of Man (Fig. 1). Risso's dolphins were rarely the target species of surveys, which were undertaken mainly either as part of a monitoring programme for bottlenose dolphins involving systematic transects across the region (Cardigan & Caernarfon Bays), or generalised regular surveys along the north and north-west coasts of Anglesey. On occasions, however, photo-ID surveys were undertaken targeting Risso's dolphin following reports of the species in the area. This means that survey effort was not evenly distributed, and some areas received more attention than others; 43 of the 55 encounters occurred at locations along the north coast of the Isle of Anglesey. Images were sourced from various photographers and collated by Prof. Peter Evans.

### 2.1 | Photo-ID

Photo-ID makes use of notches, scratches, scars, and other marks on the body and dorsal fin of Risso's dolphins which allow the researcher to identify individual animals across multiple sightings. In this instance marks on the dorsal fin were used primarily, with body marks used to support identification on occasion. Any visible mark could be used in the photo-ID process, based on the findings of Mariani (2016) that changes in marks in Risso's dolphins are low enough over time for all mark types to be used in photo-identification. Some consideration was given to using the specific mark types defined in Mariani (2016) to categorise images, However, this was deemed unnecessary for the purposes of the project.

Photo-ID work was conducted by three researchers working independently, identifying a year's worth of images each at a time, which were subsequently checked by the other two.

The first step in the photo-ID process was to remove superfluous images, those that were too low quality or too poorly lit to distinguish marks, or so similar to another image that retaining both was unnecessary. Following that, images were separated into folders by encounter and renamed with the date on which they were taken and a consecutive image number, so that each image had a unique identifying code. Images were then cropped to include only the dorsal fin and body of the animal. Images with more than one animal were replicated before being cropped so that each individual had its own image, except for in the case of mothers and calves, which were always cropped together. The images in each encounter were then compared against each other to determine how many individuals were photographed, and each individual was given a temporary two-digit code within that encounter. Each individual was then compared against those already identified in previous encounters, each new individual being given a permanent three-digit ID code, running consecutively from the first individual identified in the first encounter chronologically. Once all images were identified in this manner, each individual was compared against the rest of the catalogue twice more to check for missed matches and incorrect matches. As well as physical changes to the animal, differences in angle, lighting, and image quality can make resighted individuals difficult to identify (Fig. 2).

Identified individuals were only given limited designation of gender and age. A female was designated if seen in close association with a calf; all other adults were not assigned a gender. A calf was designated as an unmarked or lightly marked individual no more than 75% the length of the adult with which it was photographed surfacing; no other age categories were assigned. Although Hartman (2016) presents a system for identifying age and sex in Risso's dolphins using size, colour, and marking extent, it was felt that it would not be reliable in this instance because it was based on a different population of the species, and because in this study, the quality, angle, and lighting of the images were extremely variable and could cause misidentifications.

### 2.2 | Social Network Analysis

For analysis of social structure, associations must be defined; in this instance, individuals were considered associated if they appeared in the same group during an encounter. These associations are binary and symmetric; for each sampling period any given pair is assigned an association value of 1 if they are both identified, 0 if they are not. Analyses were carried out with a sampling period of one day, and a group defined as individuals seen in the same location on the same day. As such, the definition of a group was essentially the same as the definition of the sampling period, and therefore tests for preferred associations could not be carried out (Whitehead, 2019). Groups were defined in this manner to account for the possibility of autocorrelation, that two groups initially considered separate may in fact be the same group if sighted in the same area.

A discovery curve was plotted intending to display the rate at which individuals enter the data set (Whitehead 2019); however, due to a far greater number of images being available in certain years compared to others this was considered misleading and is not presented here.

The next step was the analysis of association indices. The 'simple ratio' association index was chosen, as recommended for data of this type (Ginsberg & Young, 1992). This index is essentially an estimate of the proportion of time any two individuals are associated, given as a value between 0 and 1 (Whitehead, 2019). Data were not standardised for gregariousness, as the number of resightings was too low to reasonably assume the level of gregariousness of any individual. Network analysis measures were then calculated using the matrix of association indices. These measures include *strength*, which is the sum of an individual's association indices, i.e. how strongly they are associated with the rest of the population; *eigenvector centrality*, *clustering coefficient*, and *affinity*, which are various measures of how well the associates of an individual are themselves associated with others; and *reach*, which is a measure of indirect connectedness. These measures are explained in greater detail in Whitehead (2019). This was followed by assessments of community division by modularity and association complexity. Community division by modularity attempts to split the population into clusters, where association indices are high between individuals in the same cluster, and low between individuals in different clusters. Association complexity groups association indices into 'mixtures', or relationship types, using the mixture model approach described by Weiss et al. (2019). A network diagram was created using the principal coordinates arrangement, with all association index values over 0.1 displayed. Finally, analyses were conducted of the lagged and null association rates. The lagged association rate is an estimate of the probability that two individuals that are associated at one point in time will still be associated a certain period of time later; the null association rate is the expected value of the lagged association rate if there was no preferred association between the individuals (Whitehead, 2019).

Only Risso's dolphins that were resighted at least once were included in the social network analysis. A higher threshold for inclusion would have been preferable; however, resightings were limited, and tests at a threshold of two and three resightings yielded inconsistent results. Analyses were carried out using SOCPROG 2.9 (compiled version) (Whitehead, 2019).

## 3 | RESULTS

From the 55 encounters, a total of 1027 images were used in the study. 359 individual Risso's dolphins were initially identified; this was reduced to 308 after final accuracy checks. Of the 308 individuals, 22 were confirmed female as they had been photographed in close association with a calf. A total of 24 calves were recorded, making up 7.8% of the identified population; adult individuals 131 and 181 were each observed with two different calves in separate encounters, in different years. Mother-calf pairs were more frequently than not seen in groups with other mother-calf pairs, 83% of calf sightings occurring in the same group as another. None of the calves were subsequently resighted after the encounter in which they were initially recorded. Group size ranged from 1 to 24 individuals, with a mean group size of 8.3 and a median group size of 7, although this may not represent true group size, as not all encounters will have resulted in every individual present being photographed and identified. Separate sightings data were available with the intention of comparing estimated group size with photographed group size, however in the majority of cases the photographed encounters could not be reliably matched to a reported sighting with the same date and location.

Of the 308 individuals identified, 85 were resighted at least once, a resighting rate of 28%. The remaining 223 individuals were only sighted in one encounter across the study period. Of the 85, 53 were resighted once, 18 resighted twice, 10 three times, 2 four times and 2 five times (Fig. 3).

In the distribution of associations (Table 1), the mean association index values for each individual range between 0.01 and 0.14, with a total mean of 0.06. These values are fairly low, given that two individuals that are always sighted together would have an association index value of 1 and two never sighted together a value of 0. The sum of association index values for each individual varies between 1.63 and 13, with a mean of 6.59. The estimate of social differentiation for the population as a whole is 0.830, indicating a well differentiated society, although it should be noted that the estimate of correlation between the true and estimated association indices is 0.306, which indicates that the power of the estimate of social differentiation to detect the true social system is low.

Network analysis measures reveal high mean values across the population for eigenvector centrality, reach, clustering coefficient and affinity (Table 2), suggesting a high level of secondary and indirect connectedness. However, standard deviations for all measures are also very high, and such high variation around the mean may indicate that the value is not truly representative of the population as a whole.

Analysis of community division by modularity was able to separate the identified population into six clusters (Table 3), with a modularity of 0.632, which should be sufficient to demonstrate useful division of the population (Whitehead 2019). The network diagram (Fig. 4) displays these clusters to some extent, but also shows that they are not discrete, and that there are many associations between individuals from different clusters. Analysis of association complexity was unable to identify more than one 'mixture', or relationship type, within the population, indicating low association complexity, i.e. the manner in which individuals associate shows little variation.

Analysis of lagged and null association rates (Fig. 5) shows a short, sharp peak in lagged association rate at a time lag of 50 days, followed by an equally sharp decline to close to the null association rate by 100 days. This suggests that the Risso's dolphins identified associate preferentially in the short term. However, over periods of over 100 days they are close to or the same as they would be if there was no preferred association in the population.

## 4 | DISCUSSION

Both the total number of individuals identified, and the resighting rate were higher than in the two previous photo-ID studies of this population, which should allow us to develop insights into the structure of the population with greater confidence. However, the resighting rate is still lower than would be ideal for social network analysis, and this has been considered when interpreting results.

The assumption based on surveys and previous work that the population would be highly mobile is largely confirmed here. It is likely that Risso's dolphins sighted off the Welsh and Manx coasts are part of a larger population that covers a wide geographical range, with some individuals moving between locations despite the site fidelity observed in others. The high number of individuals seen once in this study but not resighted suggests frequent movement in and out of the study area, a possibility backed up by previous photo-ID studies, which have identified resightings of individuals from the Anglesey population as far north as the Hebrides, and as far south as Cornwall (Stevens, 2014; Mandlik, 2021).

There is also a great deal of fluidity in the population. Although some pairs were only sighted together and thus have an association index value of 1, no individual had a mean association index higher than 0.14. This could be interpreted as an indicator of discrete groups that don't interact with the wider population. However, based on the basic data, it is more likely that this is caused by the high mobility of the population. Although social network analysis is able to delineate clusters within the population, they are not sighted together over any significant length of time; these clusters stand out within the data set because the number of individuals resighted more than once is proportionally very low. Essentially, new individuals enter the area studied on a regular basis, and form short-term associations before moving to a different area, resulting in some pairs having association index values of 1 despite there being no evidence that they remained associated in the long term. In support of this, the two individuals with the highest number of resightings, 137 and 178, both have relatively low average association index values of 0.05 and 0.07 and maximum association index values of 0.67 and 0.60 respectively. The Risso's dolphins that did remain in the study area did not form stable long-term associations. The network diagram (Fig. 4) also provides an effective visual demonstration of the fact that the clusters identified are not discrete, and that across the whole study period there is sufficient change among groups to depict a society with a wide spread of short-term connections. This combination of limited resightings in the data and a system with high mobility and short-term associations would also explain the high values found in network analysis measures, which at face value might suggest a society with strong long-term associations, but in this case, are probably a result of groups of Risso's dolphins being sighted together 1-3 times in the short term, then not sighted again at all subsequently.

The trend in lagged association rate points to a lack of long-term group stability in the population. It shows that there is a very sharp decrease in the likelihood of two individuals remaining associated 50 days after they were first sighted, and at time lags beyond 100 days, that likelihood is close to the assumed rate if there was no preferred association at all. This is the most conclusive indication in the study that stable long-term associations are not a fundamental aspect of the social structure of this Risso's dolphin population as they may be in others. Changes in group composition appear to occur frequently, individuals frequently being sighted with different companions in encounters that occurred within a week of each other. On the two occasions that two separate encounters were photographed on the same day, group composition changed between the encounters, with some individuals observed in both encounters, and some individuals observed in only one. The idea of a mobile and changeable society is further supported by the fact that no calves in these encounters were subsequently resighted as adults, despite several being well marked. This may indicate that young adult Risso's dolphins disperse over a wide geographical range when they become independent from their mothers.

Not much can be said about the aspects of social structure concerned with segregation by sex and age, as only adult females with calves were identified. However, what can be seen is that mother-calf pairs tend to associate with other mother-calf pairs. Although there is no evidence for stable maternal groups, this does indicate that adult females with calves may prefer to stick together, a preference that has been observed previously in Risso's dolphins and some other delphinid species (Hartman et al., 2008).

The results found here have noticeable differences with previous studies of social structure in Risso's dolphins, such as those in the Azores (Hartman et al., 2008) and the Mediterranean (Gaspari, 2004). No evidence was found of matrilineal groups, and comparatively little evidence for stable dyads or clusters of individuals in the long term. These differences indicate that the social structure of this population may be different to that of populations in other locations. The cause of this could be differences in the ecological circumstances that influence social structure: the Azores, being an oceanic archipelago, has a continental shelf with an entirely different structure to the British Isles, as does the Ligurian Sea coast studied by Gaspari (2004). In both locations the narrower continental shelf creates a narrower area of favourable foraging for Risso's dolphins, concentrating individuals in a smaller area with stronger site fidelity, more conducive to a stable, resident population. The much wider continental shelf of the British Isles allows individuals to range over greater distances and remain in favourable foraging areas, resulting in a more dispersed and mobile population. The suggestion by Möller (2012) that rates of philopatry and dispersal are different between species living in inshore, coastal, and pelagic waters, based on resource availability and reliability, may also provide a basis for these differing social structures. It should be noted, however, when discussing theory based on multiple delphinid species, that Risso's dolphins are less likely than other species to benefit from cooperative feeding, as hunting of cephalopods generally occurs individually (Arranz et al., 2018). Additionally, both Gaspari

(2004) and Hartman et al. (2014) concluded that in Risso's dolphins, groups formed of adult females with calves are more likely to be found close to the coast in shallower water, probably because they need to leave their calves for less time when diving to feed. Further investigation of the impact of tides and other environmental variables on Risso's dolphin distribution would be beneficial in testing this theory. It is important to consider that these differences to previous studies may also be caused partially by differences in procedure; challenges in identifying the sex of the animals recorded made matrilineality difficult to distinguish.

Overall, the population appears to have a social structure that is unique by comparison to other studies of Risso's dolphins. It has aspects in common with fission-fusion societies, with individuals frequently moving between groups, and associations remaining fluid in the long term. However, without further investigation of the sex and age composition of groups, it is not possible to definitively term this population a fission-fusion society.

Although the limited number of resightings makes it difficult to estimate the total population size in the region, the frequent introduction of newly sighted individuals into the observed portion of the population indicates the total population size may be large. Human error in the photo-ID process may contribute to a higher number of new individuals than expected, through missed resightings. However, the use of three observers working independently and then checking each other's work will have mitigated this. Despite their distinctive markings, Risso's dolphins are a challenging species on which to conduct photo identification, particularly in the UK. Compared to more visible species such as bottlenose dolphins, they are less frequently encountered, less likely to surface visibly, and less likely to tolerate the presence of a research vessel. Although we can infer information about the social structure of the Risso's dolphin population through these results, the low resighting rate, limited geographical range of the study, and variable periods when images are available restrict the certainty with which those inferences can be made, and the extent to which they can be applied to the species as a whole.

A highly mobile, well differentiated society in which site fidelity occurs in some but not all of the population represents a challenge for conservation and mitigation measures aimed at Risso's dolphins in the UK. When designating areas of the ocean as MPAs, fisheries, or offshore development zones, consideration should be given to the fact that even if they are not seen in high densities during surveys, Risso's dolphins may transit through on a regular basis, and such areas may still be crucial to maintaining the connectivity of the population as a whole.

There is more work to be done to fully understand what may be a single interconnected population of Risso's dolphins across the Irish and Celtic seas, up to the west coast of Scotland. An extended photo-ID study combining this project with further images of Risso's dolphins from Cornwall, the Hebrides, and the east coast of Ireland could provide a more complete picture of the population, and reveal how frequently individual animals move between those locations, as well as providing a greater sample size on which to conduct more extensive social network analysis. Such a project may also benefit from incorporating citizen science by allowing members of the public to submit photographs they have taken, which could help to fill spatial and temporal gaps not covered by surveys or existing catalogues. Some of the images used in this study came from submissions made by interested members of the public. As ever, cooperation and collaboration will be essential in conducting effective research on what remains an enigmatic and understudied species.

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# TABLES

**Table 1.** Distribution of associations of all resighted Risso's dolphin (*Grampus griseus*) individuals.

| ID | Mean association | Sum of associations | Maximum association |
|---|---|---|---|
| 37 | 0.02 | 2.50 | 0.33 |
| 43 | 0.04 | 4.44 | 0.25 |
| 45 | 0.07 | 7.17 | 0.50 |
| 68 | 0.01 | 2.25 | 0.33 |
| 78 | 0.05 | 5.49 | 0.33 |
| 80 | 0.03 | 3.92 | 0.33 |
| 88 | 0.03 | 3.33 | 0.33 |
| 90 | 0.06 | 5.83 | 1.00 |
| 96 | 0.06 | 5.83 | 1.00 |
| 101 | 0.06 | 5.83 | 1.00 |
| 102 | 0.06 | 5.83 | 1.00 |
| 103 | 0.06 | 5.83 | 1.00 |
| 104 | 0.03 | 3.50 | 0.50 |
| 127 | 0.05 | 5.30 | 0.40 |
| 131 | 0.11 | 10.39 | 0.67 |
| 132 | 0.05 | 5.57 | 0.50 |
| 134 | 0.05 | 4.92 | 0.67 |
| 137 | 0.05 | 5.47 | 0.67 |
| 138 | 0.04 | 4.68 | 0.67 |
| 144 | 0.06 | 6.18 | 0.67 |
| 147 | 0.01 | 1.63 | 0.25 |
| 148 | 0.04 | 4.68 | 0.33 |
| 150 | 0.06 | 5.89 | 0.50 |
| 151 | 0.04 | 4.54 | 0.50 |
| 154 | 0.04 | 4.41 | 0.67 |
| 155 | 0.04 | 4.66 | 0.67 |
| 156 | 0.04 | 4.66 | 0.67 |
| 170 | 0.05 | 4.91 | 0.33 |
| 171 | 0.06 | 6.13 | 0.50 |
| 178 | 0.07 | 7.36 | 0.60 |
| 181 | 0.04 | 4.63 | 0.67 |
| 186 | 0.03 | 3.68 | 0.33 |
| 187 | 0.10 | 9.75 | 0.60 |
| 189 | 0.10 | 9.61 | 0.50 |
| 191 | 0.07 | 7.10 | 0.67 |
| 192 | 0.08 | 8.11 | 0.75 |
| 193 | 0.09 | 9.08 | 0.67 |
| 194 | 0.08 | 7.83 | 1.00 |
| 195 | 0.10 | 9.18 | 1.00 |
| 197 | 0.08 | 7.83 | 1.00 |
| 198 | 0.10 | 9.18 | 1.00 |
| 199 | 0.08 | 7.83 | 1.00 |
| 200 | 0.08 | 7.83 | 1.00 |
| 202 | 0.04 | 4.33 | 0.50 |
| 208 | 0.06 | 6.23 | 0.29 |
| 209 | 0.08 | 7.68 | 0.67 |
| 211 | 0.08 | 7.85 | 1.00 |
| 212 | 0.07 | 7.26 | 0.60 |
| 213 | 0.05 | 5.57 | 0.50 |
| 214 | 0.07 | 7.22 | 0.60 |
| 216 | 0.08 | 7.85 | 1.00 |
| 217 | 0.07 | 7.20 | 1.00 |
| 218 | 0.07 | 7.20 | 1.00 |
| 221 | 0.06 | 5.74 | 0.50 |
| 226 | 0.06 | 5.75 | 0.67 |
| 229 | 0.04 | 4.80 | 0.67 |
| 232 | 0.04 | 4.45 | 0.50 |
| 235 | 0.05 | 5.68 | 0.33 |
| 236 | 0.03 | 3.70 | 0.33 |
| 237 | 0.04 | 4.42 | 0.67 |
| 239 | 0.07 | 7.33 | 0.33 |
| 244 | 0.03 | 3.99 | 1.00 |
| 246 | 0.03 | 3.99 | 1.00 |
| 251 | 0.04 | 4.49 | 0.33 |
| 259 | 0.01 | 2.15 | 0.50 |
| 274 | 0.02 | 2.65 | 0.33 |

| | | | |
|---|---|---|---|
| 286 | 0.02 | 3.03 | 0.33 |
| 288 | 0.01 | 1.73 | 0.33 |
| 291 | 0.03 | 3.75 | 1.00 |
| 295 | 0.03 | 3.75 | 1.00 |
| 303 | 0.02 | 3.03 | 0.33 |
| 312 | 0.10 | 9.78 | 0.67 |
| 314 | 0.05 | 5.25 | 0.67 |
| 315 | 0.11 | 10.50 | 1.00 |
| 316 | 0.14 | 13.00 | 1.00 |
| 317 | 0.11 | 10.50 | 1.00 |
| 318 | 0.14 | 13.00 | 1.00 |
| 319 | 0.11 | 10.50 | 1.00 |
| 320 | 0.14 | 13.00 | 1.00 |
| 321 | 0.11 | 10.50 | 1.00 |
| 322 | 0.14 | 13.00 | 1.00 |
| 323 | 0.14 | 13.00 | 1.00 |
| 324 | 0.11 | 10.50 | 1.00 |
| 325 | 0.13 | 12.50 | 1.00 |
| 326 | 0.13 | 12.50 | 1.00 |
| 329 | 0.12 | 11.67 | 1.00 |
| **Overall** | 0.06 (0.04) | 6.59 (3.01) | 0.68 (0.28) |

**Table 2.** Mean values and standard deviations for five network analysis measures of the resighted population of Risso's dolphins (*Grampus griseus*).

| Measure: | Strength | Eigenvector centrality | Reach | Clustering coefficient | Affinity |
|---|---|---|---|---|---|
| **Overall mean** | 5.53 (3.01) | 0.05 (0.10) | 39.50 (35.32) | 0.38 (0.21) | 6.08 (2.38) |

**Table 3.** Resighted Risso's dolphins (*Grampus griseus*) divided into clusters as a result of analysis of community division by modularity. Eigenvector values near zero indicate uncertainty in the assignment of that individual to that particular cluster.

| ID | Eigenvector | Cluster |
|---|---|---|
| 131 | -0.1665 | 1 |
| 181 | -0.0605 | 1 |
| 239 | -0.0699 | 1 |
| 312 | -0.1695 | 1 |
| 314 | -0.0816 | 1 |
| 315 | -0.1875 | 1 |
| 316 | -0.2435 | 1 |
| 317 | -0.1875 | 1 |
| 318 | -0.2435 | 1 |
| 319 | -0.1875 | 1 |
| 320 | -0.2435 | 1 |
| 321 | -0.1875 | 1 |
| 322 | -0.2435 | 1 |
| 323 | -0.2435 | 1 |
| 324 | -0.1875 | 1 |
| 325 | -0.2337 | 1 |
| 326 | -0.2337 | 1 |
| 329 | -0.2174 | 1 |

| | | |
|---|---|---|
| 45 | -0.1176 | 1 |
| 101 | -0.3573 | 2 |
| 102 | -0.3573 | 2 |
| 103 | -0.3573 | 2 |
| 104 | -0.3110 | 2 |
| 37 | -0.0225 | 2 |
| 68 | -0.0280 | 2 |
| 80 | -0.1995 | 2 |
| 90 | -0.3573 | 2 |
| 96 | -0.3573 | 2 |
| 178 | -0.1861 | 3 |
| 186 | -0.1356 | 3 |
| 191 | -0.1948 | 3 |
| 192 | -0.2142 | 3 |
| 193 | -0.0812 | 3 |
| 194 | -0.2281 | 3 |
| 195 | -0.2208 | 3 |
| 197 | -0.2281 | 3 |
| 198 | -0.2208 | 3 |
| 199 | -0.2281 | 3 |
| 200 | -0.2281 | 3 |
| 202 | -0.1531 | 3 |
| 235 | -0.1189 | 3 |
| 43 | -0.1477 | 3 |
| 127 | -0.1478 | 4 |
| 132 | -0.1134 | 4 |
| 137 | -0.1148 | 4 |
| 144 | -0.1118 | 4 |
| 147 | -0.0943 | 4 |
| 148 | -0.1662 | 4 |
| 150 | -0.2015 | 4 |
| 151 | -0.1761 | 4 |
| 154 | -0.1758 | 4 |
| 155 | -0.1749 | 4 |
| 156 | -0.1749 | 4 |
| 170 | -0.1631 | 4 |
| 171 | -0.1557 | 4 |
| 244 | -0.0976 | 4 |
| 246 | -0.0976 | 4 |
| 78 | -0.1825 | 4 |
| 187 | 0.0100 | 5 |
| 189 | 0.0103 | 5 |
| 208 | 0.0412 | 5 |
| 209 | 0.2102 | 5 |
| 211 | 0.2065 | 5 |
| 212 | 0.2006 | 5 |
| 213 | 0.1875 | 5 |
| 214 | 0.1967 | 5 |
| 216 | 0.2065 | 5 |
| 217 | 0.2222 | 5 |
| 218 | 0.2222 | 5 |
| 221 | 0.1896 | 5 |
| 226 | 0.1941 | 5 |
| 229 | 0.1897 | 5 |
| 232 | 0.1313 | 5 |
| 259 | 0.0265 | 5 |
| 274 | 0.1403 | 5 |
| 134 | 0.2580 | 6 |
| 138 | 0.2382 | 6 |
| 236 | 0.3694 | 6 |
| 237 | 0.3302 | 6 |
| 251 | 0.0540 | 6 |
| 286 | 0.1164 | 6 |
| 288 | 0.0163 | 6 |
| 291 | 0.2217 | 6 |
| 295 | 0.2217 | 6 |
| 303 | 0.1718 | 6 |
| 88 | 0.3503 | 6 |

## FIGURES

043

07/09/07 Unspecified location | 27/09/20 Cemaes Bay, Anglesey

045

07/09/07 Unspecified location | 08/08/23 Holyhead, Anglesey

088

10/07/08 Isle of Man | 29/09/20 Point Lynas, Anglesey

131

04/10/15 Cemlyn Bay, Anglesey | 10/08/23 Bull Bay, Anglesey

170

26/09/17 Cemaes Bay, Anglesey | 14/08/21 Amlwch, Anglesey

**Figure 1.** Dorsal fin images of five individual Risso's dolphins (*Grampus griseus)* identified over the course of the study, demonstrating changes in marks over multi-year gaps between encounters, as well as the variations in quality, angle, and lighting of images that pose challenges to the photo-ID process.

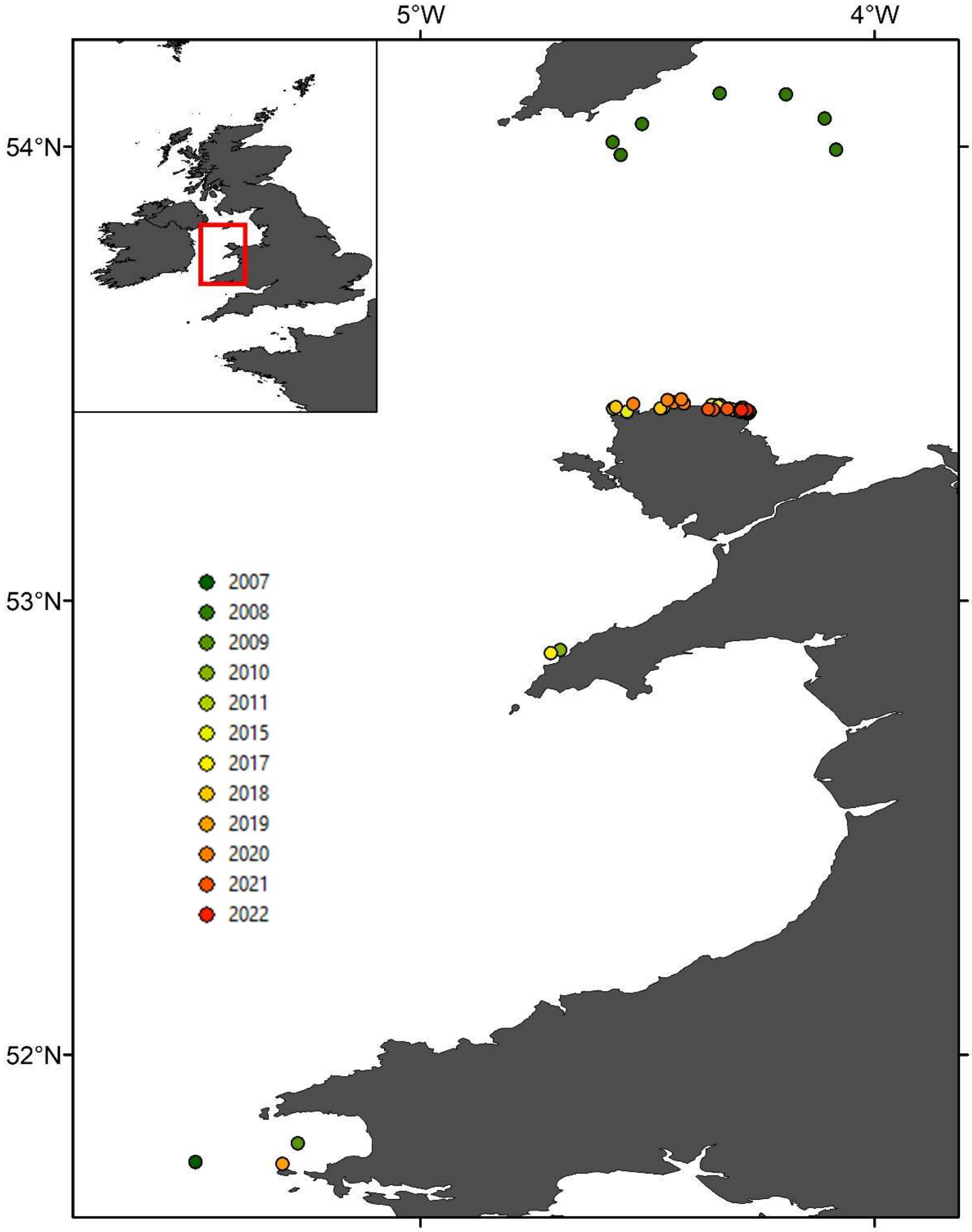


**Figure 2.** A map of the study area with the locations of each encounter marked and coloured by the year in which they occurred. Encounters in 2004, 2005, 2007, and 2023 were photographed without coordinates being recorded, but occurred within the area presented here. No encounters were photographed in 2006.

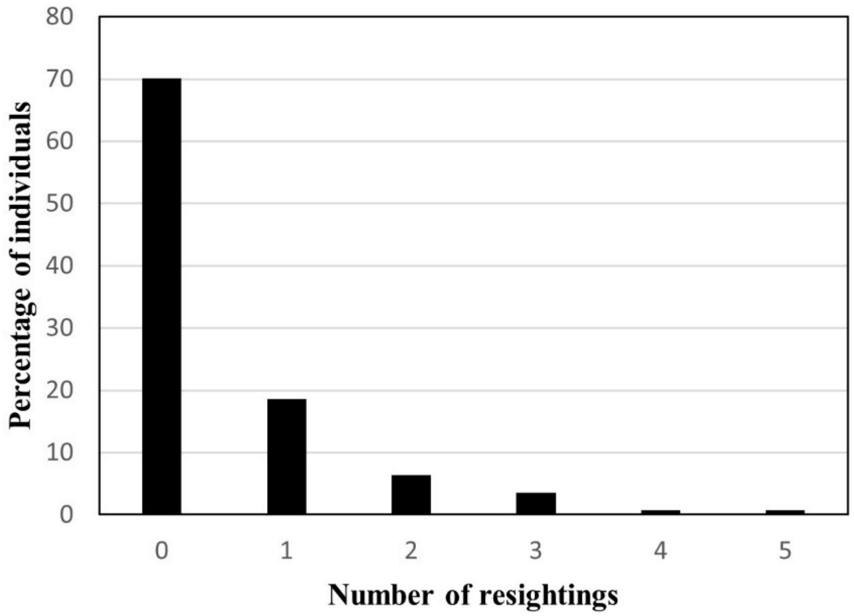


**Figure 3.** Frequency distribution of resightings of Risso's dolphins (*Grampus griseus*).

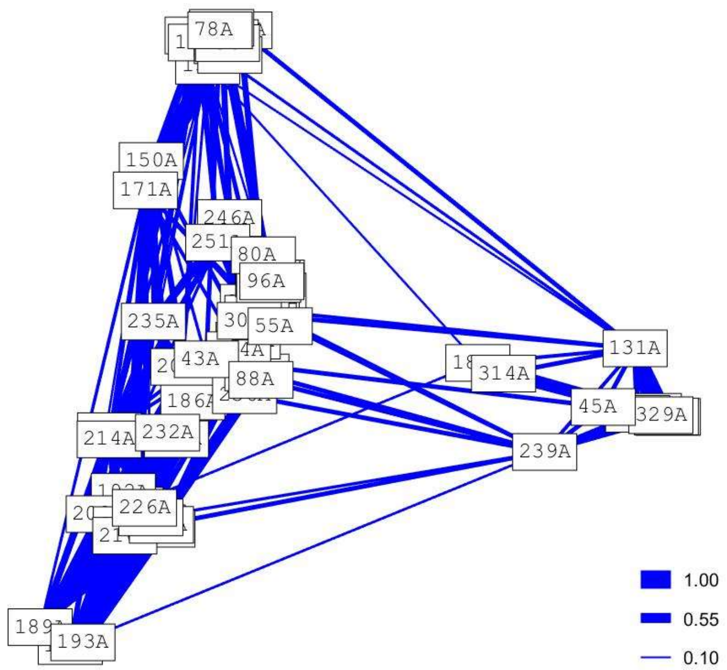


**Figure 4.** Network diagram of the matrix of association indices in principal coordinates arrangement. Thickness of lines between nodes corresponds to the value of association index between the two individuals.

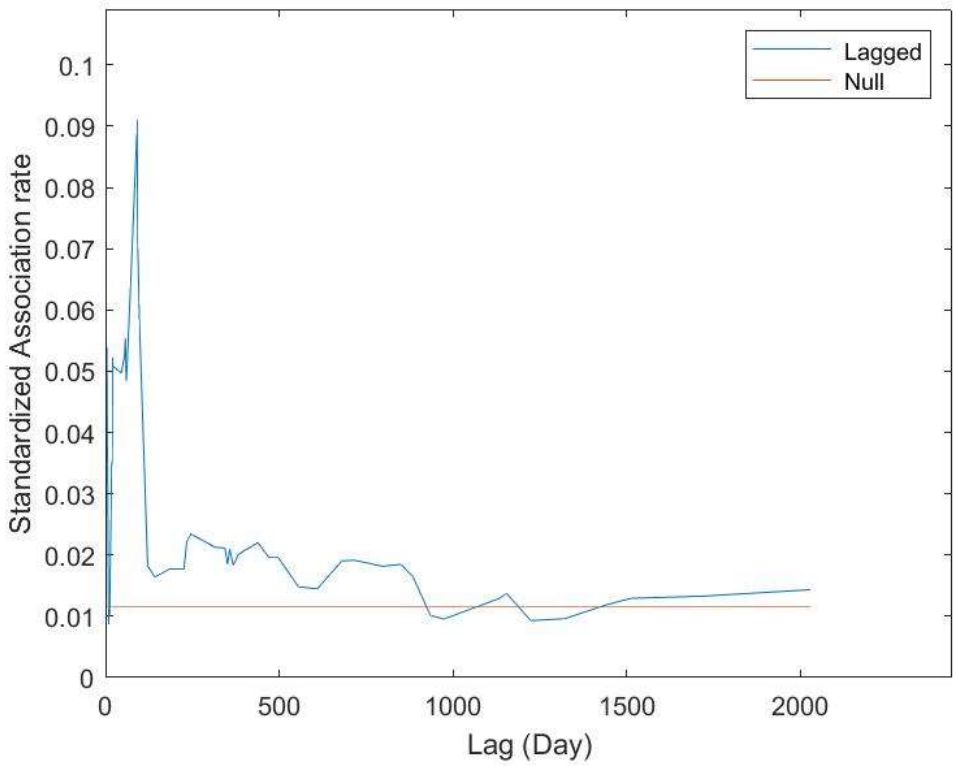


**Figure 5.** Lagged association rate and null association rate of the population of Risso's dolphin (*Grampus griseus*) over a total time lag of 2000 days.

## REFERENCES


Amano, M., & Miyazaki, N. (2004). Composition of a school of Risso's dolphins, *Grampus griseus*. *Marine Mammal Science*, 20(1), 152-160.

Arranz, P., Benoit-Bird, K. J., Southall, B. L., Calambokidis, J., Friedlaender, A. S., & Tyack, P. L. (2018). Risso's dolphins plan foraging dives. *Journal of Experimental Biology*, 221(4).

Azzellino, A., Gaspari, S., Airoldi, S., & Nani, B. (2008). Habitat use and preferences of cetaceans along the continental slope and the adjacent pelagic waters in the western Ligurian Sea. *Deep-Sea Research Part I: Oceanographic Research Papers*, 55(3), 296–323. https://doi.org/10.1016/j.dsr.2007.11.006

Baird, R.W. (2000) *The Killer Whale: Foraging specializations and group hunting*.. In J. Mann, R.C. Connor, P.L. Tyack, & H. Whitehead (Eds.), Cetacean Societies. Field studies of whales and dolphins (pp.127-153). University of Chicago Press.

Bearzi, G., Reeves, R. R., Remonato, E., Pierantonio, N., & Airoldi, S. (2011). Risso's dolphin *Grampus griseus* in the Mediterranean Sea. *Mammalian Biology* 76(4), 385–400. https://doi.org/10.1016/j.mambio.2010.06.003

Bigg, M. A., Olesiuk, P. F., Ellis, G. M., Ford, J. K. B., & Balcomb, K. C. (1990). Social organization and genealogy of resident killer whales (*Orcinus orca*) in the coastal waters of British Columbia and Washington State. *Report of the International Whaling Commission*, 12, 383-405.

Bloch, D., Desportes, G., Harvey, P., Lockyer, C., & Mikkelsen, B. (2012). Life history of Risso's dolphin (*Grampus griseus*)(G. Cuvier, 1812) in the Faroe Islands. *Aquatic Mammals*, 38(3), 250. DOI: 10.1578/AM.38.3.2012.250

Boran, J.R., Evans, P.G.H. & Rosen, M. (2001). *Behavioural Ecology of Cetaceans*. In P.G.H. Evans & J.A. Raga (Eds.), Marine Mammals: Biology and Conservation (pp. 191-236). Kluwer Academic/Plenum Press.

Chosson, V., Randhawa, H. S., Sigurðsson, G. M., Halldórsson, S. D., Björnsson, Þ. Þ., Svansson, V., Granquist, S. M., Gunnarsson, K., Samarra, F. I. P., & Pampoulie, C. (2023). First record of Risso's dolphin *Grampus griseus* (Cuvier, 1812) in Icelandic waters. *Ecology and Evolution*, 13, e10477. https://doi.org/10.1002/ece3.10477

Connor, R.C. (2000). *Group living in whales and dolphins*. In J. Mann, R.C. Connor, P.L. Tyack, & H. Whitehead (Eds.), Cetacean Societies. Field studies of whales and dolphins (pp. 199-218). University of Chicago Press.

Connor, R.C., Wells, R.S. Mann, J., & Read, A.J. (2000). *The Bottlenose Dolphin: Social relationships in a fission-fusion society*. In J. Mann, R.C. Connor, P.L. Tyack, & H. Whitehead (Eds.), Cetacean Societies. Field studies of whales and dolphins (pp.91-126). University of Chicago Press.

Couzin, I. D. (2006). Behavioral ecology: social organization in fission–fusion societies. *Current Biology*, 16(5), 169-171.

De Boer, M. N., Eisfeld, S., & Simmonds, M. P. (2012, March 25). *The Fine-Scale Habitat Use of Risso's Dolphins off Bardsey Island, Cardigan Bay (UK)*. Proceedings of the first European Cetacean Society workshop on Risso's dolphin, Galway, Ireland.

De Boer, M. N., Simmonds, M. P., Reijnders, P. J. H., & Aarts, G. (2014). The influence of topographic and dynamic cyclic variables on the distribution of small cetaceans in a shallow coastal system. *PLoS ONE*, 9(1). https://doi.org/10.1371/journal.pone.0086331

Eisfeld-Pierantonio, S., James, V. (2018). *Risso's dolphins of Ynys Enlli / Bardsey Island: Photo-ID catalogue* (NRW Evidence Report No: 261). Natural Resources Wales.

Emlen, S. T., & Oring, L. W. (1977). Ecology, sexual selection, and the evolution of mating systems. *Science*, 197(4300), 215-223.

Evans, P.G.H. (2013). *The Risso's Dolphin in Europe*. In Chen, I., Hartman, K., Simmonds, M., Wittich, A., and Wright, A.J. (Eds.), Grampus griseus 200th Anniversary: Risso's Dolphins in the Contemporary World. Report from the European Cetacean Society Conference Workshop, Galway, Ireland, 25 March 2013 (pp. 10-24). ECS Special Publication Series No: 54.

Evans, P.G.H & Waggitt, J.J. (2020). Impacts of climate change on marine mammals, relevant to the coastal and marine environment around the UK. *MCCIP Science Review 2020*, 421–455. DOI: 10.14465/2020.arc19.mmm

Evans, P.G.H. & Waggitt, J.J. (2023). *Modelled distributions and abundance of cetaceans and seabirds of Wales and surrounding waters* (NRW Evidence Report No. 646.). Natural Resources Wales.

Gaspari, S. (2004). *Social and population structure of Striped and Risso's dolphins in the Mediterranean Sea* [PhD Thesis]. University of Durham.

Gaspari, S., Airoldi, S., & Hoelzel, A. R. (2007). Risso's dolphins (Grampus griseus) in UK waters are differentiated from a population in the Mediterranean Sea and genetically less diverse. *Conservation Genetics*, 8(3), 727–732. https://doi.org/10.1007/s10592-006-9205-y

Ginsberg, J. R., & Young, T. P. (1992). Measuring association between individuals or groups in behavioural studies. *Animal Behaviour*, 44(1), 377-379.

Gowans, S., Würsig, B., & Karczmarski, L. (2007). The social structure and strategies of delphinids: predictions based on an ecological framework. *Advances in marine biology*, 53, 195-294.

Grundy, E.C. (2021). *Harbour porpoise behavioural responses to recreational craft* [Unpublished master's thesis]. Bangor University.

Hartman, K. L., Visser, F., & Hendriks, A. J. E. (2008). Social structure of Risso's dolphins (*Grampus griseus*) at the Azores: A stratified community based on highly associated social units. *Canadian Journal of Zoology*, 86(4), 294–306. https://doi.org/10.1139/Z07-138

Hartman, K., van der Harst, P., & Vilela, R. (2020). Continuous Focal Group Follows Operated by a Drone Enable Analysis of the Relation Between Sociality and Position in a

Group of Male Risso's Dolphins (*Grampus griseus*). *Frontiers in Marine Science*, 7. https://doi.org/10.3389/fmars.2020.00283

Jefferson, T. A., Weir, C. R., Anderson, R. C., Ballance, L. T., Kenney, R. D., & Kiszka, J. J. (2014). Global distribution of Risso's dolphin *Grampus griseus*: a review and critical evaluation. *Mammal Review*, 44(1), 56-68.

Joint Nature Conservation Committee. (2019). Conservation status assessment for the species: S2030 - Risso's dolphin (Grampus griseus). European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC): Fourth Report by the United Kingdom under Article 17.

MacLeod, C. D. (1998). Intraspecific scarring in odontocete cetaceans: an indicator of male 'quality' in aggressive social interactions? *Journal of Zoology*, 244(1), 71–77. https://doi.org/10.1111/j.1469-7998.1998.tb00008.x

MacLeod, C. D., Santos, M. B., Burns, F., Brownlow, A., & Pierce, G. J. (2014). Can habitat modelling for the octopus Eledone cirrhosa help identify key areas for Risso's dolphin in Scottish waters? *Hydrobiologia*, 725, 125-136.

Mandlik, D. (2021). *A photo-ID study of the Risso's dolphin (Grampus griseus) in coastal waters of Anglesey, along with the environmental determinants of their spatial and temporal distribution in the Irish Sea* [Unpublished master's thesis]. Bangor University.

Mariani, M., Miragliuolo, A., Mussi, B., Russo, G. F., Ardizzone, G., & Pace, D. S. (2016). Analysis of the natural markings of Risso's dolphins (*Grampus griseus*) in the central Mediterranean Sea. *Journal of Mammalogy*, 97(6), 1512–1524. https://doi.org/10.1093/jmammal/gyw109

Möller, L. M. (2012). Sociogenetic structure, kin associations and bonding in delphinids. *Molecular Ecology*, 21(3), 745–764. https://doi.org/10.1111/j.1365-294X.2011.05405.x

Plön, S., Heyns-Veale, E. R., Smale, M. J., & Froneman, P. W. (2020). Life history parameters and diet of Risso's dolphins, Grampus griseus, from southeastern South Africa. *Marine Mammal Science*, 36(3), 786–801. https://doi.org/10.1111/mms.12675

Polacheck, T. (1987). Relative abundance, distribution and inter-specific relationship of cetacean schools in the eastern tropical Pacific. *Marine Mammal Science*, 3(1), 54-77.

Smultea, M. A., Lomac-MacNair, K., Nations, C. S., McDonald, T., & Würsig, B. (2018). Behavior of Risso's Dolphins (Grampus griseus) in the Southern California Bight: An Aerial Perspective. *Aquatic Mammals*, 44(6).

Soldevilla, M. S., Wiggins, S. M., & Hildebrand, J. A. (2010). Spatial and temporal patterns of Risso's dolphin echolocation in the Southern California Bight. *The Journal of the Acoustical Society of America*, 127(1), 124–132. https://doi.org/10.1121/1.3257586

Stevens, A. (2014). *A photo-ID study of the Risso's dolphin (Grampus griseus) in Welsh coastal waters and the use of Maxent modelling to examine the environmental determinants of spatial and temporal distribution in the Irish Sea* [Unpublished master's thesis]. Bangor University.

Richardson, H. (2012). *The effect of boat disturbance on the bottlenose dolphin (Tursiops truncatus) of Cardigan Bay in Wales* [Unpublished master's thesis]. University College London.

Visser, F., Merten, V.J., Bayer, T., Oudejans, M.G., de Jonge, D.S.W., Puebla, O., Reusch, T.B.H., Fuss, J., and Hoving, H.J.T. (2021). Deep-sea predator niche segregation revealed by combined cetacean biologging and eDNA analysis of cephalopod prey. *Science Advances*, 7.

Weiss, M. N., Franks, D. W., Croft, D. P., & Whitehead, H. (2019). Measuring the complexity of social associations using mixture models. *Behavioral Ecology and Sociobiology*, 73, 1-10.

Whitehead, H. (2019). SOCPROG: Programs for Analyzing Social Structure. http://whitelab.biology.dal.ca/SOCPROG/

## SUPPLEMENTARY INFORMATION

Included here is the complete catalogue of the adult individual Risso's dolphins identified during the study. For each individual, the best available image of each side of the dorsal fin is displayed, although for most only one side was identified. Images may not be consistent in size and ratio, as the original images varied significantly in quality, and the angle at which they were taken. Individuals with a resighting on the same date as their first sighting were seen in two separate encounters on the same day.

| | |
|---|---|
| ID | 001 |
| First sighting | 18/04/2004 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 002 |
| First sighting | 18/04/2004 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 003 |
| First sighting | 18/04/2004 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 004 |
| First sighting | 18/04/2004 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 005 |
| First sighting | 18/04/2004 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 006 |
| First sighting | 18/04/2004 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 007 |
| First sighting | 18/04/2004 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 008 |
| First sighting | 18/04/2004 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 009 |
| First sighting | 09/05/2004 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 010 |
| First sighting | 09/05/2004 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 012 |
| First sighting | 15/06/2004 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 013 |
| First sighting | 15/06/2004 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 014 |
| First sighting | 15/06/2004 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 015 |
| First sighting | 15/06/2004 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 016 |
| First sighting | 15/06/2004 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 017 |
| First sighting | 07/10/2005 |
| Resighting(s) | - |

| ID | 018 |
| --- | --- |
| First sighting | 06/12/2005 |
| Resighting(s) | - |

| ID | 019 |
| --- | --- |
| First sighting | 06/12/2005 |
| Resighting(s) | - |

| ID | 021 |
| --- | --- |
| First sighting | 06/12/2005 |
| Resighting(s) | - |

| ID | 022 |
| --- | --- |
| First sighting | 06/12/2005 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 023 |
| First sighting | 06/12/2005 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 024 |
| First sighting | 06/12/2005 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 025 |
| First sighting | 06/12/2005 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 026 |
| First sighting | 06/12/2005 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 027 |
| First sighting | 06/12/2005 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 030 |
| First sighting | 06/12/2005 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 031 |
| First sighting | 06/12/2005 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 032 |
| First sighting | 06/12/2005 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 033 |
| First sighting | 06/12/2005 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 034 |
| First sighting | 09/12/2005 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 035 |
| First sighting | 05/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 036 |
| First sighting | 05/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 037 |
| First sighting | 05/09/2007 |
| Resighting(s) | 24/03/2008 |

| | |
|---|---|
| ID | 038 |
| First sighting | 05/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 039 |
| First sighting | 05/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 040 |
| First sighting | 05/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 041 |
| First sighting | 07/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 042 |
| First sighting | 07/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 043 |
| First sighting | 07/09/2007 |
| Resighting(s) | 24/03/2008<br>27/09/2020 |

| | |
|---|---|
| ID | 044 |
| First sighting | 07/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 045 |
| First sighting | 07/09/2007 |
| Resighting(s) | 08/08/23 |

| | |
|---|---|
| ID | 047 |
| First sighting | 07/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 048 |
| First sighting | 28/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 049 |
| First sighting | 28/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 050 |
| First sighting | 28/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 051 |
| First sighting | 28/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 052 |
| First sighting | 28/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 053 |
| First sighting | 28/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 054 |
| First sighting | 28/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 055 |
| First sighting | 28/09/2007 |
| Resighting(s) | 31/08/2010 |

| | |
|---|---|
| ID | 056 |
| First sighting | 28/09/2007 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 057 |
| First sighting | 22/03/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 058 |
| First sighting | 22/03/2008 |
| Resighting(s) | - |

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| ID | 059 |
| First sighting | 22/03/2008 |
| Resighting(s) | - |

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| ID | 060 |
| First sighting | 22/03/2008 |
| Resighting(s) | - |

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| ID | 061 |
| First sighting | 22/03/2008 |
| Resighting(s) | - |

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| ID | 062 |
| First sighting | 22/03/2008 |
| Resighting(s) | - |

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| ID | 063 |
| First sighting | 22/03/2008 |
| Resighting(s) | - |

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| ID | 064 |
| First sighting | 22/03/2008 |
| Resighting(s) | - |

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| ID | 065 |
| First sighting | 22/03/2008 |
| Resighting(s) | - |

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| ID | 066 |
| First sighting | 22/03/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 067 |
| First sighting | 22/03/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 068 |
| First sighting | 22/03/2008 |
| Resighting(s) | 24/03/2008 |

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|---|---|
| ID | 069 |
| First sighting | 22/03/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 070 |
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| Resighting(s) | - |

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| ID | 072 |
| First sighting | 22/03/2008 |
| Resighting(s) | - |

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| Resighting(s) | - |

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| ID | 074 |
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| Resighting(s) | - |

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| ID | 075 |
| First sighting | 24/03/2008 |
| Resighting(s) | - |

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| ID | 076 |
| First sighting | 24/03/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 077 |
| First sighting | 24/03/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 078 |
| First sighting | 24/03/2008 |
| Resighting(s) | 26/09/2017 |

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|---|---|
| ID | 079 |
| First sighting | 24/03/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 080 |
| First sighting | 24/03/2008 |
| Resighting(s) | 13/10/2008 |

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|---|---|
| ID | 081 |
| First sighting | 21/04/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 082 |
| First sighting | 08/07/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 083 |
| First sighting | 09/07/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 084 |
| First sighting | 10/07/2008 |
| Resighting(s) | - |

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| ID | 085 |
| First sighting | 10/07/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 086 |
| First sighting | 10/07/2008 |
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|---|---|
| ID | 087 |
| First sighting | 10/07/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 088 |
| First sighting | 10/07/2008 |
| Resighting(s) | 29/09/2020 |

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|---|---|
| ID | 089 |
| First sighting | 17/07/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 090 |
| First sighting | 11/09/2008 |
| Resighting(s) | 13/10/2008 |

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| ID | 091 |
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|---|---|
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| Resighting(s) | - |

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| ID | 093 |
| First sighting | 11/09/2008 |
| Resighting(s) | - |

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| ID | 094 |
| First sighting | 11/09/2008 |
| Resighting(s) | - |

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| ID | 095 |
| First sighting | 11/09/2008 |
| Resighting(s) | - |

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| ID | 096 |
| First sighting | 11/09/2008 |
| Resighting(s) | 13/10/2008 |

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|---|---|
| ID | 097 |
| First sighting | 11/09/2008 |
| Resighting(s) | - |

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|---|---|
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| First sighting | 11/09/2008 |
| Resighting(s) | - |

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| First sighting | 11/09/2008 |
| Resighting(s) | 13/10/2008 |

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| First sighting | 11/09/2008 |
| Resighting(s) | 13/10/2008 |

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|---|---|
| ID | 103 |
| First sighting | 11/09/2008 |
| Resighting(s) | 13/10/2008 |

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|---|---|
| ID | 104 |
| First sighting | 11/09/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 105 |
| First sighting | 13/10/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 106 |
| First sighting | 13/10/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 107 |
| First sighting | 13/10/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 108 |
| First sighting | 13/10/2008 |
| Resighting(s) | - |

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|---|---|
| ID | 109 |
| First sighting | 27/09/2009 |
| Resighting(s) | - |

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|---|---|
| ID | 116 |
| First sighting | 27/09/2009 |
| Resighting(s) | - |

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|---|---|
| ID | 117 |
| First sighting | 27/09/2009 |
| Resighting(s) | - |

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|---|---|
| ID | 119 |
| First sighting | 27/09/2009 |
| Resighting(s) | - |

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|---|---|
| ID | 120 |
| First sighting | 27/09/2009 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 122 |
| First sighting | 15/09/2011 |
| Resighting(s) | - |

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|---|---|
| ID | 123 |
| First sighting | 15/09/2011 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 124 |
| First sighting | 15/09/2011 |
| Resighting(s) | - |

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|---|---|
| ID | 125 |
| First sighting | 15/09/2011 |
| Resighting(s) | - |

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|---|---|
| ID | 126 |
| First sighting | 15/09/2011 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 127 |
| First sighting | 15/09/2011 |
| Resighting(s) | 26/09/2017<br>20/08/2021 |

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|---|---|
| ID | 129 |
| First sighting | 15/09/2011 |
| Resighting(s) | - |

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|---|---|
| ID | 130 |
| First sighting | 15/09/2011 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 131 |
| First sighting | 04/10/2015 |
| Resighting(s) | 08/08/2023<br>10/08/2023 |

| | |
|---|---|
| ID | 132 |
| First sighting | 04/10/2015 |
| Resighting(s) | 26/09/2017 |

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|---|---|
| ID | 133 |
| First sighting | 04/10/2015 |
| Resighting(s) | - |

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|---|---|
| ID | 134 |
| First sighting | 04/10/2015 |
| Resighting(s) | 29/09/2020<br>02/10/2022 |

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|---|---|
| ID | 135 |
| First sighting | 04/10/2015 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 136 |
| First sighting | 04/10/2015 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 137 |
| First sighting | 04/10/2015 |
| Resighting(s) | 12/09/2017<br>26/09/2017<br>10/05/2018<br>18/08/2020<br>20/08/2021 |


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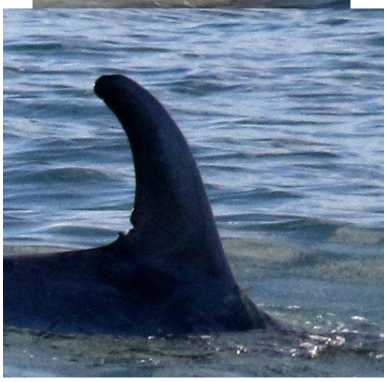
|---|---|
| ID | 138 |
| First sighting | 04/10/2015 |
| Resighting(s) | 29/09/2020 |

| | |
|---|---|
| ID | 139 |
| First sighting | 04/10/2015 |
| Resighting(s) | - |

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|---|---|
| ID | 141 |
| First sighting | 04/10/2015 |
| Resighting(s) | - |

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|---|---|
| ID | 142 |
| First sighting | 04/10/2015 |
| Resighting(s) | - |

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|---|---|
| ID | 143 |
| First sighting | 04/10/2015 |
| Resighting(s) | - |

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|---|---|
| ID | 144 |
| First sighting | 04/10/2015 |
| Resighting(s) | 26/09/2017<br>18/08/2020<br>20/08/2021 |


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|---|---|
| ID | 146 |
| First sighting | 04/10/2015 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 147 |
| First sighting | 05/09/2007 |
| Resighting(s) | 12/05/2017<br>12/09/2017 |


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|---|---|
| ID | 150 |
| First sighting | 20/08/2017 |
| Resighting(s) | 26/09/2017<br>27/09/2020<br>25/09/2021 |


| | |
|---|---|
| ID | 151 |
| First sighting | 20/08/2017 |
| Resighting(s) | 26/09/2017 |

| | |
|---|---|
| ID | 152 |
| First sighting | 08/11/2017 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 153 |
| First sighting | 08/11/2017 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 154 |
| First sighting | 31/08/2017 |
| Resighting(s) | 08/11/2017<br>26/09/2017 |

| | |
|---|---|
| ID | 155 |
| First sighting | 26/09/2017 |
| Resighting(s) | 08/11/2017 |

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|---|---|
| ID | 156 |
| First sighting | 31/08/2017 |
| Resighting(s) | 26/09/2017 |

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|---|---|
| ID | 157 |
| First sighting | 26/09/2017 |
| Resighting(s) | - |

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|---|---|
| ID | 160 |
| First sighting | 26/09/2017 |
| Resighting(s) | - |

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|---|---|
| ID | 162 |
| First sighting | 26/09/2017 |
| Resighting(s) | - |

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|---|---|
| ID | 163 |
| First sighting | 12/05/2017 |
| Resighting(s) | - |

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|---|---|
| ID | 164 |
| First sighting | 12/05/2017 |
| Resighting(s) | - |

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|---|---|
| ID | 165 |
| First sighting | 26/09/2017 |
| Resighting(s) | - |

| ID | 167 |
|---|---|
| First sighting | 26/09/2017 |
| Resighting(s) | - |

| ID | 168 |
|---|---|
| First sighting | 26/09/2017 |
| Resighting(s) | - |


| ID | 169 |
|---|---|
| First sighting | 26/09/2017 |
| Resighting(s) | - |

| ID | 170 |
|---|---|
| First sighting | 26/09/2017 |
| Resighting(s) | 14/08/2021 |

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|---|---|
| ID | 171 |
| First sighting | 26/09/2017 |
| Resighting(s) | 19/09/2020<br>25/08/2022<br>28/09/2022 |

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|---|---|
| ID | 174 |
| First sighting | 26/09/2017 |
| Resighting(s) | - |

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|---|---|
| ID | 175 |
| First sighting | 26/09/2017 |
| Resighting(s) | - |

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|---|---|
| ID | 177 |
| First sighting | 10/05/2018 |
| Resighting(s) | - |

| | |
|---|---|
| ID | 178 |
| First sighting | 10/05/2018 |
| Resighting(s) | 09/08/2020<br>06/09/2020<br>27/09/2020<br>25/09/2021 |

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|---|---|
| ID | 179 |
| First sighting | 10/05/2018 |
| Resighting(s) | - |

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|---|---|
| ID | 180 |
| First sighting | 10/05/2018 |
| Resighting(s) | - |

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|---|---|
| ID | 181 |
| First sighting | 10/05/2018 |
| Resighting(s) | 13/10/2022<br>10/08/2023 |

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|---|---|
| ID | 182 |
| First sighting | 06/08/2018 |
| Resighting(s) | - |

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|---|---|
| ID | 183 |
| First sighting | 06/08/2018 |
| Resighting(s) | - |

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|---|---|
| ID | 184 |
| First sighting | 15/02/2019 |
| Resighting(s) | - |

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|---|---|
| ID | 185 |
| First sighting | 15/02/2019 |
| Resighting(s) | - |

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|---|---|
| ID | 186 |
| First sighting | 09/06/2020 |
| Resighting(s) | 27/09/2020 |

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|---|---|
| ID | 187 |
| First sighting | 09/08/2020 |
| Resighting(s) | 06/09/2020<br>15/09/2020<br>19/09/2020<br>29/09/2020 |

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|---|---|
| ID | 188 |
| First sighting | 09/08/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 189 |
| First sighting | 09/08/2020 |
| Resighting(s) | 15/09/2020<br>19/09/2020<br>27/09/2020 |

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|---|---|
| ID | 190 |
| First sighting | 09/08/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 191 |
| First sighting | 09/08/2020 |
| Resighting(s) | 27/09/2020 |

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|---|---|
| ID | 192 |
| First sighting | 09/08/2020 |
| Resighting(s) | 18/08/2020<br>06/09/2020<br>27/09/2020 |

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|---|---|
| ID | 193 |
| First sighting | 09/08/2020 |
| Resighting(s) | 06/09/2020<br>15/09/2020 |

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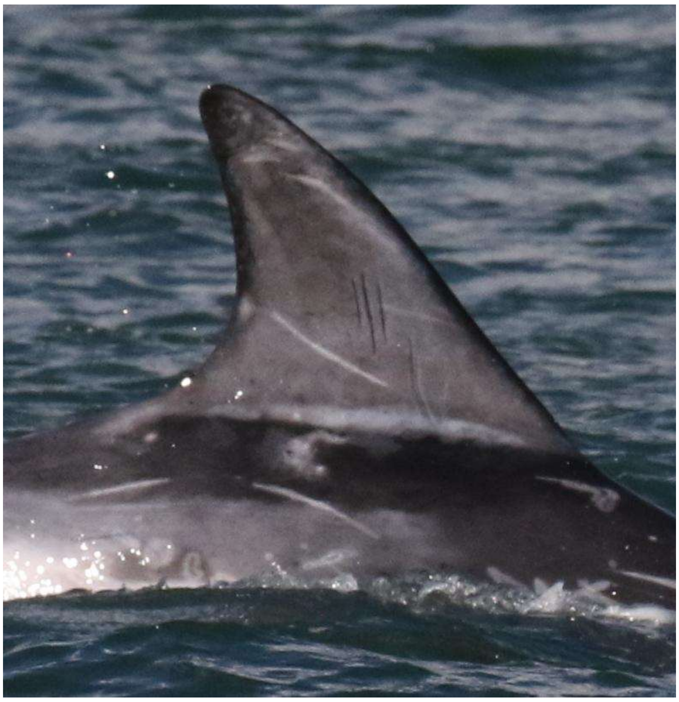
|---|---|
| ID | 194 |
| First sighting | 09/08/2020 |
| Resighting(s) | 06/09/2020 |



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|---|---|
| ID | 195 |
| First sighting | 09/08/2020 |
| Resighting(s) | 06/09/2020<br>27/09/2020 |

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|---|---|
| ID | 197 |
| First sighting | 09/08/2020 |
| Resighting(s) | 06/09/2020 |

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|---|---|
| ID | 198 |
| First sighting | 09/08/2020 |
| Resighting(s) | 06/09/2020<br>27/09/2020 |

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|---|---|
| ID | 199 |
| First sighting | 09/08/2020 |
| Resighting(s) | 06/09/2020 |

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|---|---|
| ID | 200 |
| First sighting | 09/08/2020 |
| Resighting(s) | 06/09/2020 |

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|---|---|
| ID | 201 |
| First sighting | 09/08/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 202 |
| First sighting | 18/08/2020 |
| Resighting(s) | 27/09/2020 |

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|---|---|
| ID | 203 |
| First sighting | 06/09/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 204 |
| First sighting | 06/09/2020 |
| Resighting(s) | - |

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| ID | 205 |
| First sighting | 06/09/2020 |
| Resighting(s) | - |

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| ID | 206 |
| First sighting | 06/09/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 207 |
| First sighting | 06/09/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 208 |
| First sighting | 15/09/2020 |
| Resighting(s) | 27/09/2020<br>25/09/2021<br>13/10/2021<br>11/10/2022 |

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|---|---|
| ID | 209 |
| First sighting | 15/09/2020 |
| Resighting(s) | 19/09/2020<br>25/08/2022 |

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|---|---|
| ID | 210 |
| First sighting | 15/09/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 211 |
| First sighting | 15/09/2020 |
| Resighting(s) | 19/09/2020 |

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|---|---|
| ID | 212 |
| First sighting | 15/09/2020 |
| Resighting(s) | 19/09/2020<br>20/08/2021<br>27/09/2022 |

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|---|---|
| ID | 213 |
| First sighting | 15/09/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 214 |
| First sighting | 15/09/2020 |
| Resighting(s) | 19/09/2020<br>20/08/2021<br>13/10/2021 |

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|---|---|
| ID | 215 |
| First sighting | 15/09/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 216 |
| First sighting | 15/09/2020 |
| Resighting(s) | 19/09/2020 |

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|---|---|
| ID | 217 |
| First sighting | 15/09/2020 |
| Resighting(s) | 29/09/2020 |

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|---|---|
| ID | 218 |
| First sighting | 15/09/2020 |
| Resighting(s) | 29/09/2020 |

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|---|---|
| ID | 219 |
| First sighting | 15/09/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 220 |
| First sighting | 15/09/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 221 |
| First sighting | 15/09/2020 |
| Resighting(s) | 19/09/2020<br>01/10/2022<br>07/10/2022 |

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|---|---|
| ID | 222 |
| First sighting | 15/09/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 223 |
| First sighting | 15/09/2020 |
| Resighting(s) | - |

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| ID | 224 |
| First sighting | 15/09/2020 |
| Resighting(s) | - |

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| ID | 225 |
| First sighting | 15/09/2020 |
| Resighting(s) | - |

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| ID | 227 |
| First sighting | 15/09/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 229 |
| First sighting | 19/09/2020 |
| Resighting(s) | 25/08/2022 |

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|---|---|
| ID | 230 |
| First sighting | 19/09/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 231 |
| First sighting | 19/09/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 232 |
| First sighting | 19/09/2020 |
| Resighting(s) | 25/09/2021 |

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|---|---|
| ID | 233 |
| First sighting | 27/09/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 234 |
| First sighting | 27/09/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 235 |
| First sighting | 27/09/2020 |
| Resighting(s) | 20/08/2021 |

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|---|---|
| ID | 236 |
| First sighting | 29/09/2020 |
| Resighting(s) | 13/10/2021 |

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|---|---|
| ID | 237 |
| First sighting | 29/09/2020 |
| Resighting(s) | 02/10/2022 |

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|---|---|
| ID | 238 |
| First sighting | 29/09/2020 |
| Resighting(s) | - |

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|---|---|
| ID | 239 |
| First sighting | 29/09/2020 |
| Resighting(s) | 07/10/2022<br>08/08/2023 |

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|---|---|
| ID | 240 |
| First sighting | 14/08/2021 |
| Resighting(s) | - |

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|---|---|
| ID | 241 |
| First sighting | 14/08/2021 |
| Resighting(s) | - |

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|---|---|
| ID | 242 |
| First sighting | 14/08/2021 |
| Resighting(s) | - |

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|---|---|
| ID | 243 |
| First sighting | 14/08/2021 |
| Resighting(s) | - |

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| ID | 244 |
| First sighting | 14/08/2021 |
| Resighting(s) | 20/08/2021 |

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|---|---|
| ID | 245 |
| First sighting | 14/08/2021 |
| Resighting(s) | - |

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|---|---|
| ID | 246 |
| First sighting | 14/08/2021 |
| Resighting(s) | 20/08/2021 |

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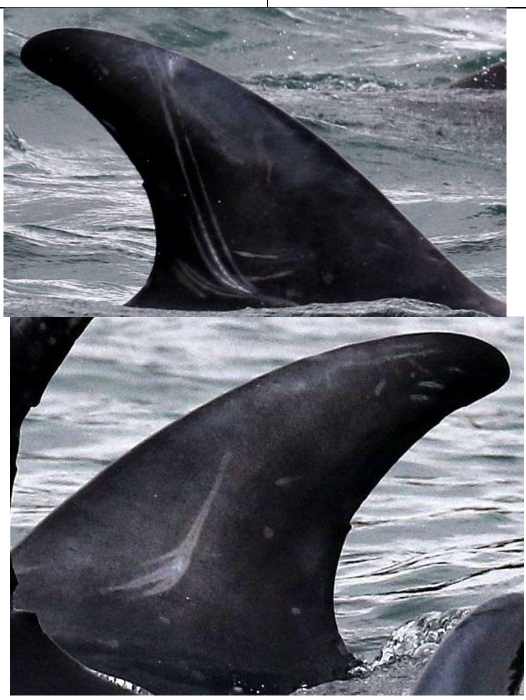
| First sighting | 20/08/2021 |
| Resighting(s) | - |



| | |
|---|---|
| ID | 248 |
| First sighting | 20/08/2021 |
| Resighting(s) | - |

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| ID | 249 |
| First sighting | 20/08/2021 |
| Resighting(s) | - |

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|---|---|
| ID | 250 |
| First sighting | 20/08/2021 |
| Resighting(s) | - |

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|---|---|
| ID | 251 |
| First sighting | 20/08/2021 |
| Resighting(s) | 11/10/2022 |

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|---|---|
| ID | 252 |
| First sighting | 20/08/2021 |
| Resighting(s) | - |

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|---|---|
| ID | 254 |
| First sighting | 20/08/2021 |
| Resighting(s) | - |

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|---|---|
| ID | 255 |
| First sighting | 20/08/2021 |
| Resighting(s) | - |

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|---|---|
| ID | 256 |
| First sighting | 20/08/2021 |
| Resighting(s) | - |

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|---|---|
| ID | 257 |
| First sighting | 25/09/2021 |
| Resighting(s) | - |

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|---|---|
| ID | 259 |
| First sighting | 25/09/2021 |
| Resighting(s) | 25/09/2021 |

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|---|---|
| ID | 263 |
| First sighting | 25/09/2021 |
| Resighting(s) | - |

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|---|---|
| ID | 265 |
| First sighting | 25/09/2021 |
| Resighting(s) | - |

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|---|---|
| ID | 267 |
| First sighting | 13/10/2021 |
| Resighting(s) | - |

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|---|---|
| ID | 268 |
| First sighting | 13/10/2021 |
| Resighting(s) | - |

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|---|---|
| ID | 269 |
| First sighting | 13/10/2021 |
| Resighting(s) | - |

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|---|---|
| ID | 270 |
| First sighting | 28/07/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 272 |
| First sighting | 28/07/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 274 |
| First sighting | 25/08/2022 |
| Resighting(s) | 27/09/2022 |

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|---|---|
| ID | 276 |
| First sighting | 25/08/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 277 |
| First sighting | 25/08/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 279 |
| First sighting | 25/08/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 280 |
| First sighting | 25/08/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 282 |
| First sighting | 25/08/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 284 |
| First sighting | 25/08/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 285 |
| First sighting | 28/09/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 286 |
| First sighting | 28/09/2022 |
| Resighting(s) | 11/10/2022 |

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|---|---|
| ID | 287 |
| First sighting | 28/09/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 288 |
| First sighting | 28/09/2022 |
| Resighting(s) | 01/10/2022 |

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|---|---|
| ID | 289 |
| First sighting | 28/09/2022 |
| Resighting(s) | - |

| ID | 291 |
|---|---|
| First sighting | 02/10/2022 |
| Resighting(s) | 11/10/2022 |

| ID | 293 |
|---|---|
| First sighting | 02/10/2022 |
| Resighting(s) | - |

| ID | 294 |
|---|---|
| First sighting | 02/10/2022 |
| Resighting(s) | - |

| ID | 295 |
|---|---|
| First sighting | 02/10/2022 |
| Resighting(s) | 11/10/2022 |

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|---|---|
| ID | 297 |
| First sighting | 02/10/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 300 |
| First sighting | 11/10/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 301 |
| First sighting | 11/10/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 303 |
| First sighting | 11/10/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 307 |
| First sighting | 11/10/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 308 |
| First sighting | 13/10/2022 |
| Resighting(s) | - |

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| ID | 309 |
| First sighting | 13/10/2022 |
| Resighting(s) | - |

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| ID | 310 |
| First sighting | 13/10/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 311 |
| First sighting | 13/10/2022 |
| Resighting(s) | - |

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|---|---|
| ID | 312 |
| First sighting | 13/10/2022 |
| Resighting(s) | 08/08/2023<br>10/08/2023 |

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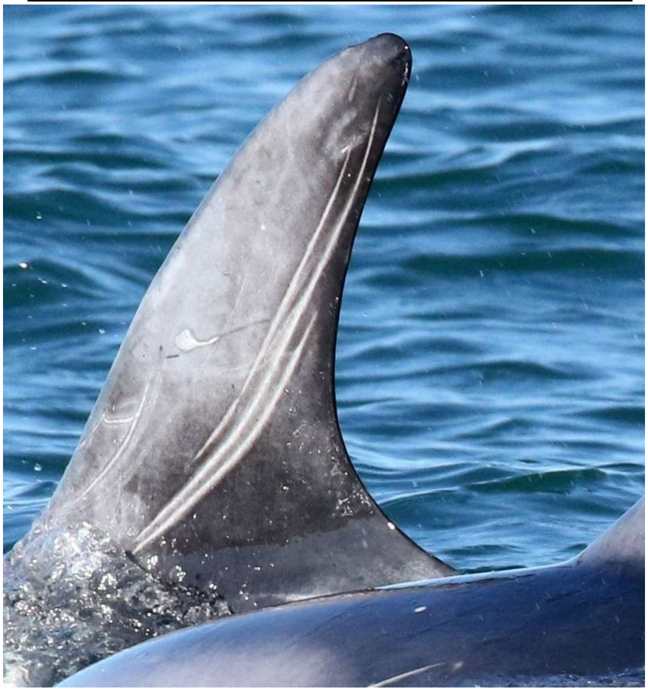
|---|---|
| ID | 314 |
| First sighting | 13/10/2022 |
| Resighting(s) | 10/08/2023 |



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|---|---|
| ID | 315 |
| First sighting | 08/08/2023 |
| Resighting(s) | 08/08/2023 |

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|---|---|
| ID | 316 |
| First sighting | 08/08/2023 |
| Resighting(s) | 08/08/2023<br>10/08/2023 |

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|---|---|
| ID | 317 |
| First sighting | 08/08/2023 |
| Resighting(s) | 08/08/2023 |

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|---|---|
| ID | 318 |
| First sighting | 08/08/2023 |
| Resighting(s) | 08/08/2023<br>10/08/2023 |

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|---|---|
| ID | 319 |
| First sighting | 08/08/2023 |
| Resighting(s) | 08/08/2023 |

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|---|---|
| ID | 320 |
| First sighting | 08/08/2023 |
| Resighting(s) | 08/08/2023<br>10/08/2023 |

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|---|---|
| ID | 321 |
| First sighting | 08/08/2023 |
| Resighting(s) | 08/08/2023 |

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|---|---|
| ID | 322 |
| First sighting | 08/08/2023 |
| Resighting(s) | 08/08/2023<br>10/08/2023 |

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|---|---|
| ID | 323 |
| First sighting | 08/08/2023 |
| Resighting(s) | 08/08/2023<br>10/08/2023 |

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|---|---|
| ID | 324 |
| First sighting | 08/08/2023 |
| Resighting(s) | 08/08/2023 |

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|---|---|
| ID | 325 |
| First sighting | 08/08/2023 |
| Resighting(s) | 10/08/2023 |

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| ID | 326 |
| First sighting | 08/08/2023 |
| Resighting(s) | 10/08/2023 |

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|---|---|
| ID | 327 |
| First sighting | 08/08/2023 |
| Resighting(s) | - |

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|---|---|
| ID | 329 |
| First sighting | 08/08/2023 |
| Resighting(s) | 10/08/2023 |

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|---|---|
| ID | 330 |
| First sighting | 08/08/2023 |
| Resighting(s) | - |

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|---|---|
| ID | 331 |
| First sighting | 08/08/2023 |
| Resighting(s) | - |

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|---|---|
| ID | 332 |
| First sighting | 08/08/2023 |
| Resighting(s) | - |

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|---|---|
| ID | 333 |
| First sighting | 10/08/2023 |
| Resighting(s) | - |

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|---|---|
| ID | 334 |
| First sighting | 10/08/2023 |
| Resighting(s) | - |

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|---|---|
| ID | 335 |
| First sighting | 10/08/2023 |
| Resighting(s) | - |