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Field Notes on Risso's Dolphin (*Grampus griseus*) Distribution, Social Ecology, Behaviour, and Occurrence in the Azores

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Abstract

This study reports new information on *Grampus griseus* (G. Cuvier, 1812) distribution with depth and slope, group size, general and interspecific behaviour, and calving intervals for the Azorean archipelago. Observations are in agreement with scarce previous work and most other regions in the North Atlantic and Mediterranean. Data were collected on 107 sightings south of Pico Island that took place between 17 May and 29 August 2003 from opportunistic research platforms. Information on occurrence, provided by an observer with 50 y of land-based cetacean experience, was included for comparison. Risso's dolphins preferred areas between 497 and 1,233 m depth (modal class 600 to 650 m; N = 69), with slopes between 27 and 35%, although these data require validation. The majority of groups were composed of up to 20 individuals (modal 6 to 10), averaging 12.3 (1 to 55; N = 74). Large socializing aggregations observed during July and August (55 to ~175 individuals) were similar to land-based observations between 1992 and 2005. *G. griseus's* diurnal activities in this study were mostly traveling (77%) and socializing (13%), with feeding (5%) and resting (3.7%) occurring less frequently. The first newborn calves are reported. Two-species groups and interactions with six cetacean species are described. Harassment behaviours with *Globicephala* spp. and *Physeter macrocephalus* suggest competitive interference. Year-round observations between 1992 and 2005 near Pico Island, together with birth reports and recent data on site fidelity, suggest population residency.

Key Words: Risso's dolphin, *Grampus griseus*, ecology, behaviour, aggregations, newborn, mixed-species groups, harassment

Introduction

Risso's dolphin (*Grampus griseus*) (G. Cuvier, 1812) is the smallest member of the subfamily Globicephalinae (Delphinidae) and is distributed in tropical and temperate oceans worldwide (Leatherwood et al., 1980; Le Duc et al., 1999). In the North Atlantic, it is known from New Foundland to the Caribbean Sea (Fritts & Reynolds, 1981; Leatherwood et al., 1982; Ward et al., 2001), occurring off most European coasts from Norway to Greece (Raga et al., 1985; Gannier, 1989; Evans, 1998; Pollock et al., 2000; Frantzis & Herzing, 2002) and around all Macaronesian Islands (Chaves, 1924; Vonk & Martín, 1988; Reiner et al., 1996; Freitas et al., 2002).

These mainly teuthophagous delphinids (Clarke, 1966; Blanco et al., 2006) prefer habitats over steep slopes between 400 and 1,200 m depth, recurrently near the slope edge (Dohl et al., 1983; Hain et al., 1985; Kenney & Winn, 1986; Gannier, 1989; Fabbri et al., 1992; Baumgartner, 1997; Evans, 1998; Cañadas et al., 2002) or near strong bathymetric features such as submarine canyons and seamounts (CeTAP, 1982; Kenney & Winn, 1987; Evans, 1992; Waring, 1993). Shallower occurrences are less frequent, and the Risso's dolphins apparently favour areas where the slope is close to the coastline, such as in the proximity of islands, where they become more accessible for observation (Notarbartolo di Sciara et al., 1993; Shane, 1995a; Pálacios, 2002). Feeding mostly at night, *G. griseus* travels during the day (Shane, 1995a) in groups of 3 to 30 individuals (Kruse et al., 1999), apparently forming longer, stable clusters than the "fusion-fission" societies in a recently proposed "stratified social organization" (Hartman et al., 2008). Large aggregations of several hundred individuals have been observed in the Pacific (Kruse et al., 1999), and mixed-species groups and interactions with other cetaceans have been registered in different areas (Würsig & Würsig, 1980; Frantzis & Herzing, 2002).

G. griseus occurs in the Azores region along with 25 other cetacean species (see Pereira, 2008, for a recent review). The Azores consist of nine volcanic islands and several seamounts that rise east of the Mid-Atlantic Ridge between 36º 55' to 39º 43' N and 24º 46' to 31º 16' W from a theoretical 2,000-m depth micro-plate limit (Needham

& Francheteau, 1972). Regional scientific registries consist mostly of faunal listings since the early 20th century (Chaves, 1924; Ferreira, 1935; Clarke, 1981; Reiner, 1988) and a short report by Arnborn et al. (1988) near the Azores. The first regional ecological information was reported by Silva et al. (2003), placing Risso's dolphin among the five cetacean species with higher sighting rates and reporting an even distribution throughout the whole Archipelago. Silva et al. (2003) also reported a preferential distribution over depths below 500 m and an average group size of 5.8. This requires further validation as it was based only on 16 sightings. Near the study area, the species has been observed via whale-watching since 1992 and throughout the whole season between 2001 and 2004 (April to October; Pereira, 2008). Hartman et al. (2008) found strong fidelity within this area through photo-identification work between 2004 and 2006, estimating a population size exceeding 904 individuals. The present study adds to the poor knowledge on *G. griseus* distribution with depth, group size, general and interspecific behaviour, and calving intervals for the Azorean archipelago. Data were collected through opportunistic research platforms and are compared with previous studies and other regions, mostly from the North Atlantic and the Mediterranean. Information from local unreported multi-decadal observations on the Risso's dolphin was included for comparison.

Materials and Methods

Sampling and Study Area

Sampling was carried out from 17 May to 29 August 2003 onboard whale-watching rubber inflatable boats (RIBs) of 4.7 and 7.35 m, with 70 and 140 hp, respectively. Platforms departed from Lajes on the south coast of Pico (Figure 1) and were directed to cetaceans through VHF radio by lookouts at advantage points on land, using Carl Zeiss magnifying lens (15 × 60). Pico is located in the central group of islands, with a WNW-ESE orientation, surrounded by steep bathymetric slopes.

The main land lookout (called Queimada: 38º 23' 094" N, 28º 14' 498" W; Figure 1) is situated near the departing harbour 75 m above sea level (Silva et al., 1994). Used since 19th-century whaling, it can cover approximately 733 nmi^2, based on 210º of a circle centred on the observation point on land and a 20 nmi visibility. Due to the sporadic use of alternative lookouts from Pico, the surrounding areas were included (Figure 1).

Observation effort took place from this land-based lookout and was not quantified. Searches were both random and directed, based on previous knowledge of species distribution and favouring proximity of the departing harbour. The number of daily boat trips, location, and duration of sightings were determined by a series of uncontrolled factors related to weather conditions and the tourism observational activity (see Pereira, 2008, for a review). Sampling occurred during surface or underwater observation trips, averaging 3 h. With the tourism activity favouring the observation of different species (Pereira, 2008), *G. griseus* group resighting was minimized within each 3-h period through radio communications at sea and daily data analysis.

Data Collection

Data on 107 sightings of *G. griseus* were collected between 0950 and 1830 h. These were recorded on 65 of the 105 d of field work, totalling 21:02 h of observation. On each sighting, date, time, group activity (see below), position (GPS Garmin), duration, group size (including single individuals and all individuals in close proximity, moving in the same direction, and often engaged in similar behaviour; Shane, 1990) were recorded. The presence of juveniles (brownish), calves, and newborn calves (approximately 1 to 1.5 m with birth marks, flaccid dorsal fin, and asynchronous swimming; Tayler & Saayman, 1973; Jefferson et al., 1993) was also registered.

The natural behaviour of *G. griseus* was recorded cautiously based on activity noted at a distance of more than 50 m from the boat and comparing information with the lookout on land. The following activities were considered: traveling (unidirectional movement), resting (floating at surface, stationary, or moving forward very slowly), socializing (frequent corporeal contact, usually accompanied by surface displays and no apparent movement), feeding (group moving in a line abreast formation with the animals at similar distances, or group diving in the same location and surfacing facing in varying directions), and unidentified behaviours (Shane, 1995a; Heithaus & Dill, 2002). Combinations of activities were not considered, and the generalized group behaviour was recorded as the main activity. As the employed platforms tend to approach progressively closer, behaviour was registered only once per sighting as the ongoing behaviour before boat arrival. Behaviour of mixed-species groups and interspecific behavior were registered separately, independent of boat proximity, consisting of general descriptions of the events.

Depths and slopes were calculated from bathymetric data made available by the Portuguese Hydrographic Institute through *Generic Mapping Tools* (*GMT*) software with *Mirone*, Version 5.0,

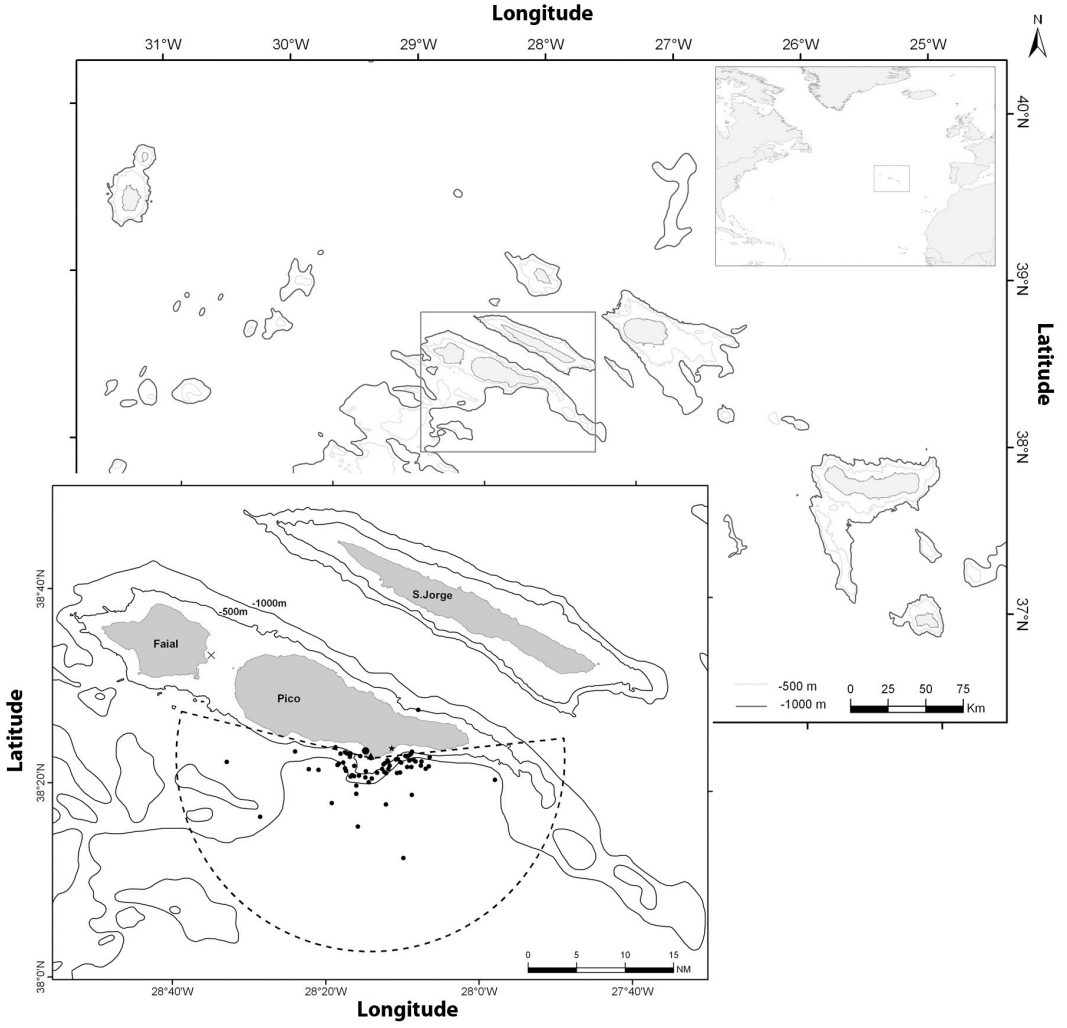

Figure 1. Azores archipelago in the North Atlantic context and map of the main area covered in the central group of islands, showing main lookout (▲) and respective area of coverage (---), departing harbour (●), home location of long-time cetacean observer (★), geo-referenced sighting locations (●), and location of the largest aggregation observed (×)

interface. Depths were grouped on 50- and 500-m depth classes.

Empiric information on the local occurrence of *G. griseus* was collected through tape recording conversations with João José Gonçalves, a life-time professional cetacean observer who worked for 50 y as a lookout, first for whale boats beginning age 15 (1947 to 1984), and later for the first tourism company from 1992 to 2005. Whale watching officially began in the Azores in 1993 (Silva et al., 2003), although the first company, for which this lookout was operating, had already been running in the previous year (Espaço Talassa). Observations were made mainly from south of Pico Island, and year-round information between 1992 and 2005 were based on sporadic winter surveys performed from his house, a vantage point on land (covering the same area) where he frequently worked from until ceasing activity in 2005 (Figure 1; see, also, Pereira, 2008). Personal communications were recorded in 2003 and were repeated in 2005 to verify possible inconsistencies; these are included in the "Results" section.

Results

Distribution with Bottom Features

Relative depths of 69 geo-referenced surface sightings ranged from 46 to 1,812 m, with a modal distribution over the 600- to 650-m depth class (Figure 2). The distribution of Risso's dolphins was unequal over depths and slopes (Pearson's

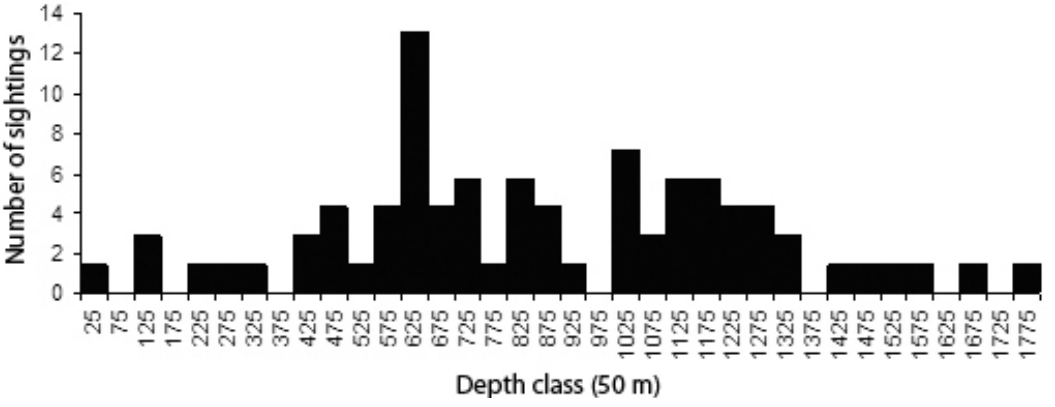

Figure 2. Risso's dolphin sightings distribution over 50-m depth classes (mid-class values are indicated; N = 69)

chi-square $\alpha = 0.05$), occurring preferentially over 497- and 1,288-m depth areas ($Z\alpha = 0.05$ assuming normality), averaging 893 m (SD = 461.1). Considering the larger depth classes, most sightings occurred over areas below 500 m (500 to 1,000 m, 41%; 1,000 to 1,500 m, 36%). Bottom slopes oscillated between 9 and 622 m/km, with an average of 308 m/km (SD ± 182), or 30.8%, between 265 and 351 m/km ($\alpha = 0.05$). Due to the inclusion of directed search, distribution data will require future validation.

Group Size

The number of Risso's dolphins was registered on 74 encounters and varied between 1 and 170 to 180 individuals. During four events, the number greatly exceeded the typical 3 to 30 (Kruse et al., 1999), namely 55, 63, 87, and ~175 individuals, respectively, with intraspecific socialization as the generalized behaviour. These aggregations were excluded from the estimated average group size of 12.3 (SD = 9.9).

Groups were mostly composed of 6 to 10 individuals ($n = 26$; Figure 3), followed by groups of 1 to 5 individuals ($n = 17$) and groups of 16 to 20 individuals ($n = 11$), accounting for 77% of the overall sightings. The class of 31 to 35 individuals was the most frequent among larger groups. Aggregations of over 50 individuals (09, 17, 25 July, and 2 August) represent less than 5% of the overall sightings. These were registered during four events separated by 6 to 8 d (55, 175, 63, and 87 individuals, respectively) at different locations within the Pico-Faial-São Jorge Islands "triangle"—a central group of islands (Figure 1). During these sightings, intraspecific socialization was the ongoing activity, and a diversity of energetic behaviours were registered such as chasing; biting; distinct aerial behaviours; lob-tailing; dorsal fin, pectoral, and head slapping; inverted and lateral swimming; and vertical diving, among

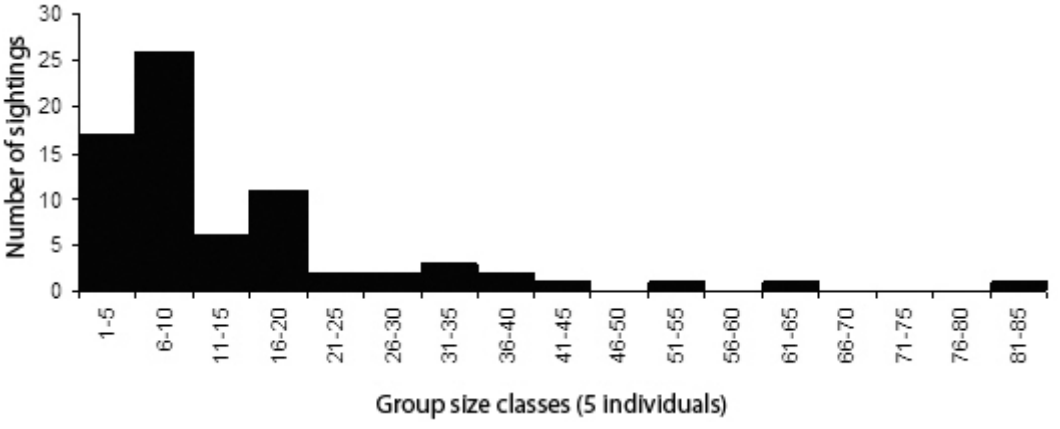

Figure 3. Group size sighting distribution over size classes of 5 individuals (1 to 85); the aggregation with 170 to 180 individuals is not represented (N = 73).

others. The largest aggregation was registered west of Faial Island over depths of 50 to 55 m and a 270 m/km slope (Figure 1). Contrary to the other stationary events, a generalized southward movement of the aggregated *G. griseus* was noted.

Calves

Calves were observed on 11 different sightings between 17 July and 25 August. The research method did not allow differentiating all the groups where calves were observed and, subsequently, the total number of calves. Based on the author's unpublished photo-identification data, one very young calf and two newborns were identified in two distinct groups. On 13 August, a group of ~36 individuals (including 6 juveniles) had two calves, one slightly smaller, showing a flaccid dorsal fin. The other group with a newborn was observed on 25 August, being composed of 11 individuals reaching 30 to 32 individuals on the following day (adults and juveniles). The newborn in this group showed all newborn features (see "Materials and Methods"), including asynchronous swimming. This last was accompanied by a juvenile, photo-identified at the study area the previous May.

General Behaviour

Behaviour was identified on 79 sightings, with traveling as the most frequent activity (77%; $n = 61$). *G. griseus* socialized 13% of the time recorded (11) and rested in 3.7% of the sightings. (3). Feeding behaviour was observed during 5% of the sightings (4 events): once at the end of June and three times in August. The parallel formation, with animals moving in the same direction side by side at similar distances, was observed only on 15 August at 1219 h. Four fragments of small gelatinous opaque red-coloured octopods (suborder Incirrata) were observed floating on different locations within the area of this event. The fragments consisted mainly of arm remains, lacking the beak mass region and most of the mantle, which made positive identification difficult.

Interspecific Behaviour

Sympatric occurrences with six cetacean species south of Pico Island were recorded in 10 of the 107 sightings. Six mixed-species groups, with Atlantic spotted dolphins (*Stenella frontalis*) (1), short-beaked common dolphins (*Delphinus delphis*) (1), pilot whales (*Globicephala* spp.) (2), and bottlenose dolphins (*Tursiops truncatus*) (2); and four interactions without the formation of mixed-species groups, with bottlenose dolphins plus fin whales (*Balaenoptera physalus*) (1) and with sperm whales (*Physeter macrocephalus*) (3). The events are described below.

Atlantic Spotted Dolphins and Short-Beaked Common Dolphins—Two traveling mixed-species groups were observed, one with each species. Interactions were not clear in either event, the number of individuals was not registered, and the species separated just after the boat's arrival.

Pilot Whales—In the two mixed-species groups with pilot whales, interactions initiated by Risso's dolphins were observed. On 2 July, four Risso's dolphins moved into a large stationary group of pilot whales of 46 to 54 individuals (ratio 1:16), which was formed by subgroups of adults and juveniles spread over ~800 m^2. On several occasions, the Risso's dolphins positioned in front of adults, head to head, initiating the interaction, with pilot whales reacting energetically, sometimes speeding towards *G. griseus*. During another event (15 July), six Risso's dolphins were circulating calmly in a stationary group of over 75 to 100 pilot whales (ratio 1:14), which was composed of several subgroups of adults, juveniles, and calves. Sporadic moments of interaction were observed, again initiated by *G. griseus*.

Bottlenose Dolphins—On 25 July 2003, an interaction with bottlenose dolphins was registered within an aggregation of 75 to 100 socializing Risso's dolphins. A chase was observed, involving ~30 to 50 bottlenose dolphins, with larger individuals ahead of the group, breaching out in speed after 10 to 15 adult *G. griseus*, also breaching completely out of the water. The interaction initiated in the area of the Risso's dolphins' aggregation and terminated with the bottlenose dolphins leaving this area. On 16 August 2003, a mixed-species group with over 50 bottlenose dolphins and eight Risso's dolphins (ratio 1:12) was observed. The dolphins were traveling, spread out over a wide area, distancing the outermost individuals ~130 m. The bottlenose dolphins were dispersed, and the Risso's dolphins were traveling more closely packed, maintaining the "borders" of their single-species group with only three active individuals 20 to 30 m ahead of their conspecifics. No interaction between the species was observed.

Three Species Interaction—During a sighting with fin whales and bottlenose dolphins, an interaction was registered between the three species (20 June 2003). A group of four fin whales was traveling at an average speed of 6 nmi/h, with 3 to 4 breathing surfaces, spaced by 3 to 5 min of submersion. Suddenly, during the breathing sequence, these fin whales dove rapidly, with one of the individuals "showing" the inferior of the caudal fin (an uncommon behaviour for the species), surfacing over 200 m further in the same direction after no more than 30 s. Before being resighted, another fin whale surfaced, moving in

the same direction accompanied by bottlenose dolphins (7 to 12) at 20 m distance. This last whale also plunged and disappeared, leaving the bottlenose dolphins behind. Eighteen seconds later, four *G. griseus* arrived, moving at high speed with short surface breaths in the same direction as the fin whales, slowing down and ending the chase while crossing the RIBs that were stopped since the first fin whales submerged rapidly.

Sperm Whales—During the three sightings with sperm whales (2, 6, and 17 August), Risso's dolphins engaged in energetic behaviours surrounding the physeterids. These responded by agitating vigorously in the water, spinning, and sometimes defecating, terminating all sightings with the sperm whales diving. On 6 August, three sperm whales from a large group of females were resting tightly at surface. Around 20 Risso's dolphins were observed at a distance, breaching and moving at a high velocity towards them. The sperm whales plunged vertically and clearly precipitously, while the Risso's dolphins were still at a distance of 70 m. These dolphins came from an unregistered aggregation of 50 to 60 individuals at a distance of more than 400 m. After arriving at the area, the Risso's dolphins slowed down and dispersed.

Notes on Occurrence

A resident cetacean observer from Pico Island reports the occurrence of *G. griseus* around Pico since 1947, and also year-round sightings were made from 1992 to 2005 in this particular area (João Gonçalves, see "Materials and Methods"). Large aggregations were also reported to occur in the area, at least from 1992 to 2005 (not every year), "during the summer months (months not discriminated), sometimes at a distance further than usual from the coast" (J. Gonçalves, pers. comm.).

Discussion

Distribution with Bottom Features

A clear prevalence between 497 and 1,288 m was shown for the first time in the Azores (Silva et al., 2003), although these results require further validation as the method includes directed search, and effort was not quantified. Nevertheless, relative depths of main occurrence were broadly similar to most European regions (400 to 1,200 m; Evans, 1998), corresponding also to the distribution reported in the Mediterranean (Fabbri et al., 1992; Cañadas & Sagarminaga, 1996; Airoldi et al., 2000; Azzellino et al., 2001) and in the northern Gulf of Mexico (Baumgartner, 1997). The characteristic preference for steep slopes was also observed in this study (Baumgartner, 1997; Cañadas et al., 2002; Palácios, 2002).

Group Size and Reproduction

Knowledge on the reproductive seasonality of *G. griseus* is still limited in the North Atlantic. There are birth reports year-round, occurring mostly from April to September (Evans, 1987). This study reports for the first time the birth of *G. griseus* in the Azores through three recently born calves with estimated birth dates between June and August 2003 (summer months). Assuming a 12- to 14-mo gestation period (Kasuya, 1985; Evans & Raga, 2001), reproductive activity must have occurred between March and August 2002.

The present study reveals group sizes in the Azores usually below 20 individuals (more often below 10), which is in general agreement with the typical 3 to 30 described by Kruse et al. (1999). Risso's dolphin group sizes were similar to Arnborn et al.'s (1988) observations in the proximities of the Archipelago and by Silva et al. (2003) (5.9; 1 to 15; $n = 16$), considering sightings within the same range (6.4; $n = 49$ in this study). Values also agree with Hartman et al.'s (2008) long-term clusters of 3 to 12 individuals in this area ($n < 62$). Off the United Kingdom, the modal class of 6 to 12 is identical to this study (Reid et al., 2003, and references therein). Average group sizes in the Azores (this study; Hartman et al., 2008) are larger than those in the Ligurian Sea (Mediterranean), averaging 12 for groups between 1 to 70 (Airoldi et al., 2000), while strikingly inferior to the Alborean Sea (17.2 from 1 to 55) (Cañadas & Sagarminaga, 1996). In the Northeast Pacific, average values vary between 11 and 45 (Leatherwood et al., 1980; Kruse, 1989), with groups from the Galápagos volcanic islands having generally similar average sizes (13) (Smith & Whitehead, 1999) to the Azorean archipelago.

Large aggregations of *G. griseus* observed here between July and August 2003 have been reported elsewhere, such as the Northeast Pacific, where they can reach several hundred individuals (Kruse et al., 1999). In the Azores, as these "large aggregations" were not observed every year south of Pico by J. Gonçalves's land-based surveys, it suggests they occur in other areas within their home range, which is confirmed by the observation of a large aggregation west of Faial in the present study, supporting its multiyear occurrence (Figure 1).

Considering the bathymetric reality of south Pico Island (Figure 1), the formation of large aggregations further from the coast "than usual" (J. Gonçalves, pers. comm., 2005) suggests that these events are not necessarily related to seafloor depth. Risso's dolphin groups' fusion in large aggregations has been related to the local abundance of food resources (Norris & Dohl, 1980). The aggregations reported here, with intense intraspecific

socialization, might be related with reproductive activities based on the limited available evidence. Similar surface behaviours have been observed in large aggregations called "copulation gatherings" of *Globicephala melas* (a *G. griseus* sister genera) in the Mediterranean (Cañadas & Sagarminaga, 2000). Sexual behaviours were confirmed from underwater observations, and the events were registered in a variable way between July and September 1992 to 1997, a period analogous to the Azores. Also, the apparent independence of these social events with depth and the correspondence with the estimated breeding season of the previous year in this study are relevant arguments which cannot be ignored. Furthermore, the results from several winters of surveying near Santa Catalina Island, California, reveal a much lower intraspecific socializing behaviour (Shane, 1995a) (see "General and Interspecific Behaviour" below). Only one large aggregation was reported in the proximity of commercial squid (*Loligo opalescens*) jigging boats. Full descriptions of these events, including underwater observations, knowledge of main preys, and more birth reports will promote further understanding.

General and Interspecific Behaviour

The general behaviour of Risso's dolphins was similar to winter observations off Santa Catalina Island, California (Shane, 1995a), with traveling as the most frequent diurnal activity, although a different method was used. A slightly higher percentage of resting *G. griseus* were observed, possibly related to the land-based search method used in this study. Also intraspecific socialization was slightly higher than Shane's (1995a) observations (8%).

Several records of mixed-species groups and interactions of *G. griseus* with other cetacean species such as reported in this study have been published (e.g., Shane, 1994; Kruse et al., 1999). *G. griseus's* propensity for "intense interactions" is an expected characteristic mentioned in grey literature and suggested by the increasingly scarred dermal patterns throughout their lives. Harassing behaviours by *G. griseus* with different cetaceans are known, even when resource sharing should be nonexistent or very small such as chasing gray whales (*Eschrichtius robustus*) (Shelden et al., 1993) or fin whales (this study). For instance, a recent study reported that in two three-species groups, interactions always occurred between Risso's dolphins and one of the other species (Frantzis & Herzing, 2002). These behaviours, such as chasing, can be considered potentially playful or aggressive and might vary between species and ecological contexts.

Interactions reported here reveal harassment behaviour in every sighting with the pilot whales and sperm whales. These are likewise teuthophagous delphinids, which favour depths greater than 500 m (Clarke et al., 1993; Cañadas & Sagarminaga, 2000; Davis et al., 2002; Silva et al., 2003). Aggressive behaviour between sympatric species of the family Delphinidae have been observed only occasionally (Bearzi, 2005). Near the Island of Santa Catalina, California, Shane (1995b) reported interactions with *G. macrorhynchus* generally similar to this study, always with *G. griseus* approaching the pilot whales and not the opposite. These closely related genera are medium-sized delphinids, which feed mostly on cephalopods, with overlapping ubiquitous distributions in temperate and tropical seas. Polacheck (1987) classified them as main competitors, and Shane (1995b) argues that competitive exclusion is a rule on a local scale. There is very limited knowledge in regards to the ecology of pilot whales in the Azores (*G. macrorhynchus* and the less often sighted *G. melas*). From opportunistic sightings between April and September 2000 to 2004, *Globicephala* spp. were more frequent in surface waters over 18º C (early June to September) (Pereira, 2008). The mixing of these species has been observed in this area from 1999 to 2007, always with "the presence of Risso's dolphins 'conditioning' the behaviour of pilot whales," with one underwater photographer witnessing Risso's dolphins biting pilot whales' pectoral fins (J. Quaresma, pers. comm., 2008; João Quaresma has been a professional whale-watching skipper since 1996). Risso's dolphins' harassment behaviours in the same area towards pilot whales, sperm whales, and false killer whales were observed in the following 3 y after this study (K. L. Hartman, unpub. data; see Hartman et al., 2008). As these were done generally by males, Hartman et al. (2008) hypothesised that males benefit in regards to access to females and foraging grounds, using a mechanism termed *habitat defence*, based on their tendency to form large groups and remain within the population, constantly sharing the same area. Do the behaviours of Risso's dolphins keep pilot whales out or make them spend less time in the studied area? The existing data points towards Shane's (1995b) local exclusion hypothesis. While historical regional references to pilot whales' "blackfish" during the whaling period are abundant (e.g., Drouët, 1876), the lack of quantitative data does not allow for further conclusions at the moment.

The first interactions of Risso's dolphins with sperm whales are reported here. Observations during the interaction and approach indicate recognition of some type of harassment behaviours developed by the delphinids, with evident stress

demonstrations such as rushed diving by the sperm whales. The momentary shift of forage area induced by the arrival of *G. griseus* was obvious in the three events, which is interpreted as a competitive interference (May, 1981). Niche overlap studies between these three species should be carried out.

Final Remarks

The *quasi* historical land-based observations from João Gonçalves suggest the existence of a resident population of *G. griseus* in the Azores that have been frequenting the area south of Pico year-round during at least a 13-y period (1992 to 2005). Their geographic isolation, wide regional distribution (Silva et al., 2003), and birth reports (this study) fall within this context. Resident populations of *G. griseus* are known from other locations (e.g., Fraser Island, Australia) (Bannister et al., 1996), and residency has been found for bottlenose dolphins in the Azores (Silva, 2007). Validation is usually based on photo-identification data, which was recently made available by Hartman et al. (2008), revealing the high frequency of the studied area during spring/summer 2004 to 2006 and strong site fidelity for over 40% of an estimated population of more than 904 individuals. Further studies are bound to support this assertion.

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