HABITAT VARIABILITY AND SITE FIDELITY OF THE RISSO'S DOLPHIN IN THE NORTHWESTERN MEDITERRANEAN: DEFINING A HOME RANGE FOR A NOMAD

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INTRODUCTION A photo-identification catalogue aims to evaluate and study a definite population, on the basis of recognisable animals. Since 1988, photographs of Risso's dolphins (*Grampus griseus*) from the western Mediterranean are collected by the Groupe de Recherche sur les Cétacés. Past analysis of survey results and short term (1-2 years) results of photo-ID work have so far delivered a coherent picture of the Risso's dolphin habitat in the Northwestern Mediterranean where Risso's dolphin can be defined as year-round resident (Bompar, 1997), in with a strong affinity for the continental slope (Gannier and Gannier, 1994; Gannier; 1998) and some degree of site fidelity both during a summer season and between different years (David and Di-Méglio, 1999).
However several sightings occurs off the usual slope habitat, and can be interpretated differently. We use here comprehensive data for the 1988-1999 period to shed a new light on the species habitat and residency. Surveys took place with small boats (9-12m) with the same basic sighting protocole, they were random with respect to the Risso's dolphin known distribution.

MATERIALS AND METHODS Risso's dolphins were photographed from a 9 m sailing ship, using colour slides. Attempts were made to photograph both sides and bottom side of each animal. Particularly distinctives scars and markings or pigmentation patterns on sides of the animals were documented. These were essentially coded in relation to their shape, angle. The most common marks were: L, linear scars; LL, double linear scars, rails; T, spot; C, circular scars; N, nick; R, rake; E, notch; TR, triangle, as in Gannier and Gannier (1997).
The location of these marks on dolphins were recorded by dividing the body into nine areas, four on each side: dorsal fin (right: Δd / left: Δg); head to the blow hole (right: 1d / left: 1g); flank, from blow hole to dorsal fin (right: 2d / left: 2g); peduncle, from dorsal fin to flukes (right: 3d / left: 3g).
This arrangement allowed for a precise description of the location of the markings and classification of the records. Ideally, all of the above nine areas should be photographed for each dolphin. However, only one view is in some case enough to identify a Risso's dolphin when the mark is particularly characteristic. For each animal an identikit is drawn.
The pigmentation is defined by a colour scale from black to white. Likewise, the density of marks is described on a scale from 1 (no marks) to 5 (body covered of marks) differentiating body and dorsal fin.
Finally; dolphin photo-identifications were given a quality index: *, * * , * * * , according to their increasing reliability. The more areas of the dolphin that are

photographed, the higher the quality index would be. With a quality score of ″ * ″, re-identification of the animal could be difficult because photographs were either of too poor quality or too few were taken to enable a subsequent match. With a quality score of ″ * * ″, the dolphin is identifiable, with a sufficient set of pictures, and pigmentation patterns are documented. However, the animal might not be identifiable during subsequent re-sightings. Individuals with a quality score of ″ * * * ″, possess one or many patterns were particularly distinctive, and would certainly be recognised if seen again, regardless of which part of the dolphin is photographed.

RESULTS From 33 sightings, 23 have been documented with photo-ID work (**Table 1**). Surveys results show that 18% of the sightings are located over a depth in excess of 2500 m, some more than 50 kilometer from the 200m isobath, i.e. off the usual slope habitat of this species.

In our photo-ID catalogue of 113 individuals, 56 animals have received a good or very good quality index, meaning they are very likely to be re-identified if photographed. There are 2 long-term (>4yrs) resightings (**Table 2**):
- dolphin 93149 i1 (*date*) was re-identified in 1998, as 98099 i2 (*date*), less than 10 km from its initial position (number **2** on map).
- individual 93163 i1 was reidentified twice at different times (September 1993 and July 1997) and different locations (43°31,2N; 7°10,3E and 42°56,7N; 5°29,2E, number **3** on the map).
An other idividual 93163 i3 who was in the same group as individual 93163 i1 was reidentified twice at different times (september 1993 and july 1994) and different locations (43°31,2N; 7°10,3E and 43°32,5N; 7°140E, number **4** on the map). It is interesting to observe that among the dolphins identified on the first occasion, none was further resighted with dolphins 93163 i1 or 93163 i3. However, only 3 individuals were identified with a good or very good quality score during sighting 93163.

DISCUSSION The question of the stability of characteristic marks used for identification receives two interesting answers, with dolphins re-identified after 4 and 5 years. The use of such marks in the photo-identification of *G.griseus* is then a very useful tool even for long term studies.

From the examples of individuals 93149 i1 and 93163 i1, we observe that Risso's dolphins appear to have some sort of long term (inter-annual > 3 years) site fidelity, as suggested by David and Di-Méglio (1999). This also confirms that particular sites along the continental slopes are favoured by this species, probably for trophic reasons. This habitat use may be called a " nomad " strategy, as animals are seen across a wide range but may actually feed in only several particular places.

How does that cope with out-of-range sightings, i.e. sightings obtained far from the usual slope range of Risso's dolphins ? The " outlier " sightings might be schools travelling from one major feeding region to another, or schools engaged in a delicate phase of the biological cycle (parturition), or temporary excursions from the main feeding region, for trophic reasons. Given that *G.griseus* are year-round residents in the northwestern Mediterranean Sea (Gannier, 1998b; Bompar, 1997), " outliers " cannot be explained by migrating schools from a wintering site to a summer feeding area. However, Risso's dolphins are common across all the western Mediterranean, and also

in the Ionian Sea, and groups travelling from one part of the basin to another may well take the shortest way, trough the open sea, rather than moving along the continental slope.

CONCLUSIONS Risso's dolphins have a extensive distribution range in western Mediterranean, in contrast with an habitat centered on continental slope waters. Risso's dolphins pigmentation marks show a remarkable stability, enabling long term studies to be continued. Results on long term recaptures suggest multi-year site fidelity, probably linked with good foraging opprortunities.

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Il faut mettre les dates dans le tableau numéro 1

Table 1: Photo-ID groups: number and quality score index.

Photo-ID group	Number of photo-ID animals	Quality score (number)
88019	5	* (3) , * * (2)
89016	5	* (5)
89095	1	*
91003	1	*
91059	9	* (2) , * * (6) , * * * (1)
91060	15	* (6) , * * (7) , * * * (2)
93015	1	*
93100	3	* (2) , * * (1)
93143	1	* *
93149	2	* * (2)
93163	3	* * (2) , * * * (1)
94011	2	* (1), * * (1)
95144	6	* (1) , * * (5)
95154	6	* (4) , * * (2)
96003	1	* *
96083	5	* (2) , * * (3)
96085	2	* (1) , * * (1)
97032	5	* (4) , * * * (1)
97106	3	* (2) , * * (1)
98001	9	* (6) , * * (3)
98002	6	* (2) , * * (4)
98098	5	* (3) , * * (2)
98099	17	* (10) , * * (6) , * * * (1)

Table 2: Recaptured animals and localisation. Each phto-ID group is represented by a number.

Photo-ID animal	Recapture	Map index
91059 i3	91060 i6	5
91059 i4	91060 i7	5
91059 i5	91060 i8	5
91059 i6	91060 i9	5
91059 i7	91060 i10	5
93149 i1	**98099 i2**	**2**
93163 i1	**97032 i1**	**3**
93163 i3	**94011 i2**	**4**
95144 i3	95154 i2	7
96083 i1	96085 i1	6
96083 i5	96085 i2	6
98098 i1	98099 i6	1
98098 i3	98099 i7	1