

ACOUSTIC AND BEHAVIOUR OF SPERM WHALE NURSERY GROUPS IN THE WATERS OF ISCHIA, ITALY.

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Sperm whale (*Physeter macrocephalus*) nursery groups are poorly known in the Mediterranean Sea. Since 2002, 8 visual sightings of sperm whale social groups were listed in the deep waters of the canyon of Cuma (Island of Ischia, Italy). Whales were observed from August to October between 320 and 750 bathymetric lines (Fig. 1).

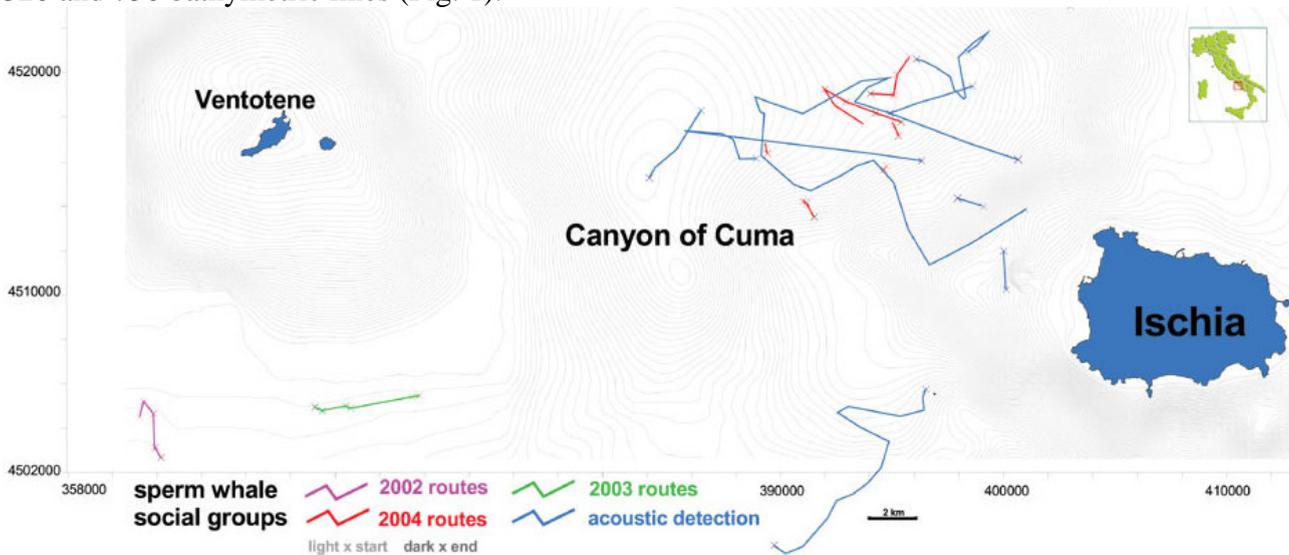


Fig. 1 Sperm whales social groups' routes in the study area

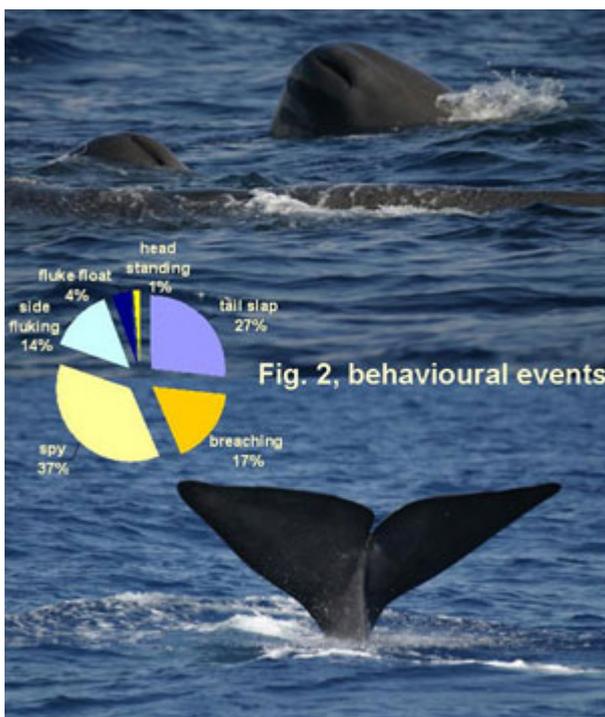


Fig. 2, behavioural events

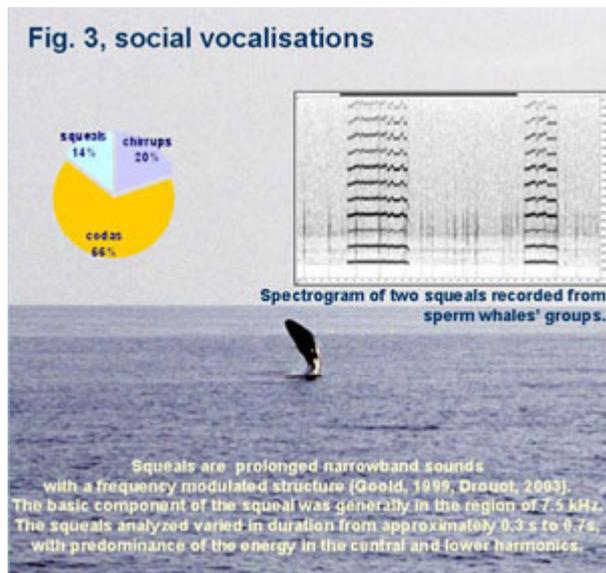
Animals were localized by the means of stereo hydrophone and 820 minutes of recordings were collected. IFAW cetaceans' software was used during the boat surveys: navigation and data storage were controlled by Logger 2000; whales' clicks detections were monitored by Rainbow Click. Real time analysis was performed using SIA SmartLive 5. Post processing was made with SpectraLab and Cool Edit software.

Difference in group size between visual and acoustic detections were found. Visual ones revealed a range of 1-5 whales (mean 3.02, SD 1.54), whereas acoustic ones allowed to identify greater group size values (range 1-15, mean 8, SD 5.86).

In 2004 both acoustical and behavioural activities were recorded, since whales stayed waters of Ischia for 20 days.

Slow travelling (2.5/3 knots) and clustering at the

surface were the most frequent activities seen, with a relevant number of associated surface behavioural events (spy hop, tail slap, side fluke, fluke out, fluke float and breach) (Fig. 2).



Adults spent most of their time diving while juvenile individuals remained at the surface (or just below it) for at least one hour or more. Although adult whales appeared to dive scattered in a wide area (1370 km²), they immediately joined juveniles when the research vessel tried to approach them, showing a clear protective behaviour.

Recordings of acoustic vocalizations showed long sequences of regular clicks and social sounds as codas, chirrups and squeals (Fig. 3).

In order to define the length of the clicking whales, IPI (Inter Pulse Interval) was calculated for regular clicks sequences (789 clicks measured) (Tab. 1).

Regular clicks sequences = 570 minutes			
average IPI (ms)	N	Lenght estimates equation 1	Lenght estimates equation 2
0,6	21	5,7	9,6
0,9	42	6,1	9,5
1	101	6,3	9,4
1,3	38	6,7	9,4
1,6	77	7,2	9,3
1,8	21	7,4	9,3
2	73	7,7	9,3
2,5	44	8,5	9,3
3	93	9,2	9,5
3,4	75	9,8	9,6
3,8	60	10,3	9,9
4	68	10,6	10,0
4,5	16	11,4	10,5
5	35	12,1	11,1
5,5	32	12,8	11,8

Both equations by Gordon (1991) were used
 Body Length 1= 4,833 + 1,453 IPI - 0,001 IPI²
 Body Length 2= 9,75 - 0,521 SL + 0,068 SL² + 0,057 SL³
 where SL is spermaceti length, calculated as
 SL= IPI x sound speed in spermaceti/2
 The sound velocity used was 1430m s, Goold et al., (1996).

A sperm click is made up of a number of regularly spaced sound pulses resulting from multiple reflection of the initial sound pulse within the head of the animal. The spacing between the pulses in a click, termed inter-pulse interval (IPI), has been demonstrated to be solely a function of the length of the spermaceti organ (backed by the distal and frontal sacs) and the speed of sound in spermaceti oil (Gordon, 1991; Goold and Jones, 1995). Assuming the latter to be a constant property and the length of the spermaceti organ to be related to total body length, the size of a sperm whale may be estimated from the length of the pulse interval of its clicks. Gordon (1991) fitted a polynomial equation to Clarke's data (1978) to relate the total body length to the spermaceti organ length.

Tab. 1, Inter Pulse Interval measurements

Preliminary results confirm the absence of large bulls in the groups, probably composed only by females with juveniles and calves.

The presence of sperm whale nursery groups in the study area over periods of years may represent the first evidence that reproductive and breeding activities occur within the Tyrrhenian Sea. Where and when they mate, as well as they produce offspring is still unknown.

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