

**ITALY. PROGRESS REPORT ON CETACEAN RESEARCH, JANUARY 2000 TO DECEMBER 2000, WITH
STATISTICAL DATA FOR THE CALENDAR YEAR 2000**

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This report summarises information obtained from: Accademia del Leviatano (AL), CASTALIA-ECOLMAR (CE), CE.TU.S., Centro Interuniversitario di Biologia Marina dell'Università di Siena (Biomarkers Laboratory/CIBM), Centro Interdisciplinare di Bioacustica e Ricerche Ambientali dell'Università di Pavia (CIBRA), Associazione Culturale per la Didattica Ambientale e Censimento Mammiferi acquatici (DORAD), Dipartimento Scienze Ambientali, Università di Siena (DSA), Istituto Centrale per la Ricerca Scientifica e Tecnologica Applicata al Mare (ICRAM), Laboratori di Biologia Marina ed Ecologia Animale dell'Università di Genova, (DIP.TE.RIS /IZUG), Tethys Research Institute (TRI).

1. Species and stocks studied (subdivided by geographic area within the Mediterranean Sea)

Common name	Scientific name	Area/stock(s)	Items referred to
Bottlenose dolphin	<i>Tursiops truncatus</i>	Northern Adriatic, eastern Ionian, southern Adriatic Sea	2.1.1; 2.2; 3.1.1; 4.1; 4.3; 4.4; 5; 9; 10; 11.2
Bottlenose dolphin	<i>Tursiops truncatus</i>	North-eastern Adriatic Sea (Croatia, Slovenia)	2.1.1; 2.2; 3.1.1; 4.3; 5; 8; 10; 11.2
Short-beaked common dolphin	<i>Delphinus delphis</i>	Eastern Ionian Sea	2.1.1; 2.2; 3.1.1; 4.2; 4.4; 5; 9; 10; 11.1, 11.2
Striped dolphin	<i>Stenella coeruleoalba</i>	Ligurian/Corsican/Tyrrhenian, Ionian Seas	2.1.1; 2.2; 4.1; 4.4; 5; 9; 10; 11.2
Risso's dolphin	<i>Grampus griseus</i>	Ligurian Sea	2.1.1, 2.2, 3.1.1, 9, 10, 11.2
Long-finned pilot whale	<i>Globicephala melas</i>	Ligurian / Tyrrhenian Seas	2.1.1, 2.2, 3.1.1, 3.1.3, 4.1, 4.4; 5; 9, 10, 11.2
Cuvier's beaked whale	<i>Ziphius cavirostris</i>	Ligurian Sea	2.1.1, 2.2, 3.1.1, 9, 10, 11.2
Sperm whale	<i>Physeter macrocephalus</i>	Ligurian / Corsican / Tyrrhenian Seas	2.1.1, 2.2, 3.1.1, 9, 10, 11.2
Fin whale	<i>Balaenoptera physalus</i>	Ligurian / Corsican / Tyrrhenian Seas	2.1.1; 2.2; 3.1.1; 3.1.3; 4.1; 4.4; 5; 9; 10; 11.1 11.2

2. Sightings data

2.1 Field work

2.1.1 SYSTEMATIC

AL. Long term studies are carried out in the coastal waters of the Sardinia since 1990 on resident populations of bottlenose dolphins. Sightings are carried out from the seashore and from independent boats in two areas. In one of them, sightings are carried out from a floating fish farm. Population and behavioural data are recorded and interactions with human activities (fishery, nautical impact, fish farming, etc.) are observed.

CE.TU.S. Study of the cetaceans in the Tuscany Archipelago and study of the interaction with human activities.

CIBRA. Most field work in 2000 has been devoted to study marine mammals in their environment and to record their underwater sounds. New methodologies and instrumentation have been developed and tested to better support the recording and classification of underwater sounds for monitoring and censusing purposes. Systematic activities carried out in 2000 are:

- Participation in the research cruise "Sirena '00" organized by Saclantcent in the Ligurian Sea (August 20 – September 8, 2000) with the research vessel R/V Alliance. The cruise was aimed at testing "Dual Uses" of acoustic detection methodologies and instruments and at conducting a combined acoustic/visual survey. Within the cruise, CIBRA carried out an acoustic survey totalling 161 hours of continuous acoustic monitoring and classification in 8 days.
- Participation in the aerial surveys organized by Saclantcent and by the Italian Navy in the Ligurian Sea to provide wide area information to the R/V Alliance while performing the Sirena '00 cruise. The flights were aimed at estimating cetacean abundance in a specific area and at testing survey methodologies to be applied on a larger scale. Sonobuoys were also used to confirm sightings and to detect diving animals. CIBRA carried out three aerial surveys totalling 15 hours of survey (about 2400 miles) in 24 in hours of flying time.

DORAD. Dedicated surveys to monitor the cetaceans off Tuscany Archipelago (Tyrrhenian Sea)

ICRAM. A study on the competitive interaction between small scale fisheries and bottlenose dolphin is in progress in Marine Protected Areas of Asinara Island (Corsican Sea). The study represent the first attempt in the Mediterranean Sea to monitor the operational interactions between bottlenose dolphins and fishing activities, check-out the gears interested by the

interaction and to estimate the damages to the local fishing industry both in terms of diminished catches (through removal of captured fishes) and of damages to fishing gears.

DIP.TE.RIS/IZUG. Researches have been carried out on the following subjects:

- Food web of the Ligurian Cetacean Sanctuary: alimentary niches of krill consumers and top predators, in particular during 2000 *Grampus griseus*
- Studies on historical data concerning the Mediterranean fin whales, with identification of the calving ground and calving season.
- Monitoring of the professional fisheries of the Western Ligurian Sea to ascertain their impact (and/or interactions) on the Cetacean populations.

TRI. The following surveys were carried out

- *Ad libitum* 90 daily boat surveys were conducted in June-September period in Eastern Ionian Sea - Sightings of Common dolphin (54) and bottlenose dolphin (28) were made
- *Ad libitum* boat surveys from June to September were conducted in the North-eastern Adriatic Sea (Croatia) to study a bottlenose dolphin community
- *Ad libitum* 53 daily boat surveys were made in June-October in Northern Adriatic Sea - 35 sightings of bottlenose dolphin were recorded
- Systematic observations on a solitary sociable dolphin were conducted yearly in the Southern Adriatic Sea
- *Ad libitum* 146 daily boat surveys were conducted from April to October in the Ligurian Sea. The following sightings were recorded: Fin whale (23), Striped dolphin (134), Risso's dolphin (11), Bottlenose dolphin (2), Long-finned pilot whale (2), Cuvier's beaked whale (4) and Sperm whale (11)

2.1.2 OPPORTUNISTIC, PLATFORMS OF OPPORTUNITY

CE. CE operates under a contract with the Ministry of Environment for patrolling of Italian territorial waters and response to pollution from oil spills and spills of others dangerous substances. CE operates through the following, fully integrated structure:

- 71 oil pollution vessels, subdivided into supply vessels and coastal ships.
- A Main Co-ordination Centre, located in Rome, whose main task is the co-ordination of all operations also utilising a computerised information system.
- 7 sub-co-ordination centres distributed along the Italian coasts to operate locally also in emergency conditions.
- Chemical laboratories specialised in sea water analysis.

In these contest the vessels operate also for the sighting of cetaceans. A total of 87 sightings (fin whale, common dolphin, striped dolphin, bottlenose dolphin and unidentified dolphins) were made from the naval units.

2.2 Analyses/development of techniques

Area	Species	Methods	Results	Institute
Ligurian Sea	Cetaceans	New instrumentation for real-time sound recording, analysis and display were used in order to facilitate the detection of biological sound while surveying an area with towed arrays and/or sonobuoys to support the application of Acoustic Risk Mitigation Policies as well as to carry out monitoring and censusing activities. The developed instrumentation is easily portable and can be operated on small platforms; it allows continuous unattended recording for long periods of time, days to weeks, depending on the installed storage options. Major improvements concerned the ability to detect wide band sounds emitted by marine mammals, including infrasounds emitted by fin whales and high frequencies emitted by echolocating dolphins		CIBRA
Ligurian Sea	Cetaceans	Oceanographic and lower trophic level measurements and zooplankton tows were undertaken from Aug. 21 to Sep. 5 from ITS Ammiraglio Magnaghi within the Sirena 2000	For the time and area frame considered a comprehensive set of measurements (temperature, salinity, Chla, Nutrients, meso- and macrozooplankton distribution, cetacean distribution, weather, remote SST) were made.	ICRAM, SWFSC, BAE-Systems, Saclantcen,

		collaborative effort.	distribution, weather, remote SST) were made.	DIP.TE.RIS/IZUG, TRI
Ligurian Sea	Sperm whale, Fin whale	ICRAM-Cornell University placed autonomous sound-recording units known as "Pop-ups" and recorded the presence of whales, occurrence of ship-traffic and relations between presence of whales and environmental constraints.	Continuous recordings of whales and ambient noise were collected during January-March 2000. Opportunistic sightings of fin whales, striped dolphins, sperm whales, Cuvier's beaked whales, long-finned pilot whales, and Risso's dolphins were made. (Clark <i>et al.</i> , in press.)	ICRAM
Corsican Sea	Bottlenose dolphin	A total of 116 fishing haul-out operations were sampled through on-board observers. Data collected regard the fishing gears used, their catch composition and the occurrence of the bottlenose dolphin on the nets. A total of 6,708 minutes were spent patrolling the study area during different fishing seasons and 1,613 minutes were spent directly observing the fishing gears. Cases in which bottlenose dolphins are on the net as opposed to when they do not occur are compared in terms of the yield of the trammels nets, expressed as the total catch (kg) vs. km of net for single species.	The sighting frequencies of the bottlenose dolphin differ according to the different gears used in the area. The interactions occur mainly on the set bottom trammel net used from the end of August until November to catch red mullet (<i>Mullus surmuletus</i>) (Lauriano <i>et al.</i> , in press). The total mean yield (catch per effort unit) is significantly lower when interactions occur for red mullet trammel net (ANOVA F=6.40; df=79; p<0.05). The total catch drop is of 7.06 kg/km of net. The mean yield reduction is prevalently due to a drop in the catches of red mullet (<i>Mullus surmuletus</i>) (mean 4.4 kg/km) (F=8.65; df=79; p<0.05). Specific fishes damages are recorded when interaction occurs (Lauriano & Di Muccio, in press)	ICRAM
Eastern Ionian Sea	Bottlenose dolphin	<i>Ad libitum</i> surveys, photoidentification, behavioural sampling	Relative sighting frequency 0.7 sight./100 km (Politi <i>et al.</i> 1998); largely feeding on demersal prey; lack of prey resources; high percentage of individuals showing signs of emaciation (Politi <i>et al.</i> 2000); site-fidelity	TRI
Eastern Ionian Sea	Common dolphin	<i>Ad libitum</i> surveys, photoidentification, behavioural sampling	Relative sighting frequency 1.6 sight./100 km; decrease in average group size; decrease in number of yearly encountered identified individuals (Politi and Bearzi in press); focusing on epipelagic prey (Agazzi <i>et al.</i> in press); fission-fusion society (Bruno <i>et al.</i> in press); site-fidelity	TRI
North-eastern Adriatic Sea	Bottlenose dolphin	Photoidentification	Population dynamics, population habitat use & individual home range	TRI
North-eastern and Central Adriatic Sea (Slovenia)	Bottlenose dolphin	<i>Ad libitum</i> surveys	Relative sighting frequency, distribution	TRI
North-eastern Adriatic Sea (Croatia)	Bottlenose dolphin	Behavioural sampling (focal animal) & photo identification	Social structure, individual associations, parental & alloparental care	TRI
North-eastern Adriatic Sea (Croatia)	Bottlenose dolphin	Skin injuries analysis	Social structure, aggressive interactions	TRI
North-eastern Adriatic Sea (Croatia)	Bottlenose dolphin	Behavioural sampling (focal group) & stomach contents	Behavioural ecology, feeding habits and strategies	TRI
North-eastern and Central Adriatic Sea (Croatia)	Cetacea	<i>Ad libitum</i> surveys	Relative sighting frequency, distribution Preliminary results: 3 sightings of <i>Tursiops truncatus</i>	TRI
North-eastern and Central Adriatic Sea (Croatia)	Cetacea	Reported sightings	Qualitative occurrence, none statistic relevance Preliminary results: documented species identification: <i>Tursiops truncatus</i> , <i>Balaenoptera physalus</i>	TRI
Southern Adriatic Sea	Bottlenose dolphin	Behavioural sampling on a solitary sociable dolphin, remote biopsy sampling	Year-round site-fidelity; predictable and consistent behaviour, regular interactions with humans (Barbieri and Bearzi 2000)	TRI
Ligurian Sea	Fin whale, Striped dolphin,	<i>Ad libitum</i> surveys, photoidentification, behavioural sampling	Habitat choice and preferences (Azzellino <i>et al.</i> in press). Distribution and seasonal occurrence (Panigada <i>et al.</i> in press). Hierarchical genetic structure of striped dolphins	TRI

	Risso's dolphin, Bottlenose dolphin, Long-finned pilot whale, Cuvier's beaked whale, Sperm whale		(Gaspari <i>et al.</i> in press).	
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3. Marking data

3.1 Field work

3.1.1 NATURAL MARKING DATA

Species	Feature	Area/stock	Calendar year/season/ n° photographed	Catalogued(Y/N)	Catalogue total	Contact institute
Bottlenose dolphin	Dorsal fin	North Tirrenian Sea (W Sardinia)	15	Y	25	AL
Bottlenose dolphin	Dorsal fin	Corsican Sea	13	y	30	ICRAM
Bottlenose dolphin	Dorsal fin	E Ionian Sea	Not analysed	Y	40	TRI
Common dolphin	Dorsal fin	E Ionian Sea	Not analysed	Y	97	TRI
Bottlenose dolphin	All body marks and features	S Adriatic Sea	1	Y	1	TRI
Bottlenose dolphin	Dorsal fin	North-eastern Adriatic Sea (Croatia)	about 60 analyses in progress	Y	144	TRI
Risso's dolphin	Dorsal fin, body scars	Ligurian Sea	Not analysed	Y	145	TRI
Long-finned pilot whale	Dorsal fin	Ligurian Sea	Not analysed	Y	20	TRI
Cuvier's beaked whale	Dorsal fin	Ligurian Sea	Not analysed	Y	9	TRI
Sperm whale	Flukes	Ligurian Sea	Not analysed	Y	15	TRI
Fin whale	Dorsal fin, blaze and chevron, major scars	Ligurian Sea	34	Y	390	TRI

3.1.2. ARTIFICIAL MARKING DATA

3.1.3 TELEMETRY DATA

not available

3.2 Analyses/development of techniques

not available

4. Tissue/biological samples collected

4.1 Biopsy samples

Species	Area/stock	Calendar year/ season n° collected	Archived (Y/N)	n° analysed	Contact person/institute
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Fin whale	Ligurian Sea	3	Y	3	Biomarkers Laboratory/CIBM
Striped dolphin	Ligurian Sea	7	Y	7	Biomarkers Laboratory/CIBM
Bottlenose dolphin	Adriatic Sea	1	Y	1	Biomarkers Laboratory/CIBM
Common dolphin	Ionian Sea	1	Y	1	Biomarkers Laboratory/CIBM
Pilot whale	Ligurian Sea	1	Y	1	Biomarkers Laboratory/CIBM
Bottlenose dolphin	S Adriatic Sea	1	Y	1	TRI; Biomarkers Laboratory/CIBM
Striped dolphin	Ligurian Sea	44	Y	In progress	TRI; University of Durham
Striped dolphin	Ligurian Sea	7	Y	In progress	TRI; Biomarkers Laboratory/CIBM
Risso's dolphin	Ligurian Sea	1	Y	In progress	TRI; University of Durham
Long-finned pilot whale	Ligurian Sea	1	Y	In progress	TRI; Biomarkers Laboratory/CIBM
Fin whale	Ligurian Sea	1	Y	In progress	TRI; Biomarkers Laboratory/CIBM

4.2 Samples from directed catches or bycatches

Species	Area/stock	Calendar year/season total	Archived (Y/N)	Tissue type(s)*	Contact person/institute
Common dolphin	E Ionian Sea	1	Y	Skin, muscle, blubber, liver, brain	TRI; Biomarkers Laboratory/CIBM

*e.g. liver, skin, blubber etc.

4.3 Samples from stranded animals

Species	Area/stock	Calendar year/season total	Archived (Y/N)	Tissue type(s)*	Contact person/institute
Bottlenose dolphin	North-eastern Adriatic Sea (Croatia)	1	Y	Skin, blubber, teeth	TRI/Croatian Natural History Museum
Bottlenose dolphin	North-eastern Adriatic Sea (Croatia)	1	Y	Skin, blubber, stomach, teeth, skeleton	TRI/Croatian Natural History Museum
Bottlenose dolphin	North-eastern Adriatic Sea (Croatia)	1	Y	Skin, blubber	TRI/Croatian Natural History Museum
Bottlenose dolphin	N Adriatic Sea	1	Y	Skin, blubber, muscle, liver, brain	TRI; Biomarkers Laboratory/CIBM; University of Durham

*e.g. liver, skin, blubber etc.

4.4 Analyses/development of techniques

Biomarkers Laboratory (CIBM-Siena University). In the free-ranging cetacean biopsies were valuated the Benzo(a)pyrene monooxygenase (BPMO) activity and the residue levels: chlorinated hydrocarbons (HCB, DDTs and PCBs) and polycyclic aromatic hydrocarbons (PAHs). MFO activity (BPMO) has been assayed in skin biopsy samples by Fossi *et al.* (1992). BPMO activity was detected in the whole tissue. BPMO activity was assessed using the incubation mixture proposed by Kurelek *et al.* (1977) incubating each sample (plus the blanks) in a shaking bath for 2 h at 37°C. The activity was expressed in arbitrary units of fluorescence (AUF/h/g tissue). For analysis of HCB, DDTs and PCBs, the samples were freeze-dried and extracted with n-hexane in a Soxhlet apparatus followed by sulphuric acid clean-up and Florisil chromatography (Marsili & Focardi, 1996). The analytical method used was high resolution capillary gas chromatography with a 63Ni electron capture detector and an SBP-5 bonded phase capillary column (30 m long, 0.2 mm i.d.). The carrier gas was N₂ or He with a head pressure of 15.5 psi (splitting ratio 50/1). The scavenger gas was argon/methane (95/5) at 40 ml/min. Oven temperature was 100°C for the first 10 min, after which it was increased to

280°C at 5°C/min. Injector and detector temperatures were 200°C and 280°C respectively. A mixture of specific isomers was used to calibrate the system, evaluate recovery and confirm the results, which were expressed in ng/g or µg/g dry weight (d.w.). Recoveries were calculated by adding known quantities of standard to homogeneous replicates of the same sample. PAHs were analysed by HPLC/Fluorescence system. Extraction was according to Griest & Caton (1983) and Holoubek et al. (1990), with several modifications developed in our lab Marsili et al., 1997). The organic fraction, concentrated to 1 ml in acetonitrile, was analysed by HPLC with fluorescence detection. A reversed-phase column (Supelcosil LC-18, 25 cm x 4.6 mm i.d., 0.5 µm particle size) was used with an acetonitrile/water gradient. The initial concentration of the gradient was 60% acetonitrile, increasing over 20 min to 100% acetonitrile, and then remaining stable for 10 min. The flow rate was 1 ml/min. Quantification was carried out using an external standard consisting of 16 PAHs from Supelco (EPA 610 polycyclic aromatic hydrocarbon mixture).

DSA. Persistent Organic Pollutants analyses. Analyses of POPs followed the method by Corsolini *et al.*, (1995). Samples were digested with 1N KOH-ethanol solution and the extract was then transferred to hexane. The concentrated hexane layer was cleaned on a silica gel column and eluted with n-hexane. This eluate was concentrated in a rotary evaporator and an aliquot of 3 ml was reserved for GC-ECD and GC-MS to determine 50 PCB isomers. Hexane extracts were cleaned with 10% fuming sulfuric acid and rinsed in distilled water. Remaining 3 ml was run through a column packed with activated carbon to separate the non-*ortho* coplanar PCB congeners 3,3',4,4' (PCB77), 3,3',4,4',5 (PCB126) and 3,3',4,4',5,5' (PCB169). Non-*ortho* coplanar PCBs were eluted with benzene and ethylacetate mixture. Analysis of total PCBs was performed with a Perkin Elmer Autosystem gas chromatograph equipped with ⁶³Ni electron capture detector. A SPB-5 bonded phase capillary column was used. A mixture of specific isomers was used for calibration, recovery evaluation and confirmation. Coplanar PCBs were quantified using the same gas chromatographic conditions as for GC/ECD. Recovery rates for non-*ortho* substituted PCBs were: PCB-77: (n = 6), mean 98%, S.D. 10%; PCB-126: (n = 6), mean 93%, S.D. 18%; PCB-169: (n = 6), mean 87%, S.D. 18%. The results obtained for the planar PCB congeners were used to calculate the toxic potential as TEQs in different animals. The 2,3,7,8-TCDD toxic equivalents (TEQs) of coplanar congeners were estimated by the Toxic Equivalency Factors (TEFs) approach proposed Van den Berg *et al.* (1998).

TBT analyses. Analysis of samples collected on previous year on striped, common and bottlenose dolphin, were carried out according to Kannan *et al.* (1995). Briefly, samples were extracted in a 0.1% tropolone/acetone and 1M HCl solution. The organic fraction was collected after partitioning in a 0.1 % tropolone/benzene solution. The organic extract was run on a column packed with sodium sulfate to remove excess water. The concentrated extract was treated with n-propylmagnesium bromide to obtain the propyl derivatives of any extractable BT species present. After the sulfuric acid clean up, the extract was run on a Florisil column and eluted with n-hexane to obtain the tetra-alkyltin derivatives. The extract was concentrated and analysed by capillary gas chromatography (GC). The GC separation was carried out on a SPB-5 capillary column and detected by a flame photometric detector (FPD) equipped with a 610 nm bandpass filter selective for tin-containing compounds.

PFOS. Recently, we analysed cetaceans tissues for evaluating the presence of perfluorocotane sulfonic acid (PFOS). The method is described in Hansen *et al.* (2001).

5. Pollution studies

Biomarkers Laboratory (CIBM-Siena University). See 4.4 section

DSA. Concentration of tributyltin (TBT) and its degradation products, monobutyltin (MBT) and dibutyltin (DBT), were determined in the liver and kidney of striped dolphin (*Stenella coeruleoalba*), bottlenose dolphin (*Tursiops truncatus*) and common dolphin (*Delphinus delphi*), found stranded along Italian and Greek coasts in 1992, 1993, 1994 and 1997 (Focardi *et al.*, 2000). BT compounds were detected in all the samples analysed and were higher in the kidney (0.78-8.05 µg/g wet weight in striped dolphin, the most contaminated species) than in the liver (0.015-1.02 µg/g wet weight). Moreover, results suggested that BTs were transferred from the mother to foetus. Accumulation of BT compounds was higher in Mediterranean specimens of bottlenose and striped dolphins respect to dolphins stranded in other coastal areas in which BTs are widely used, such as Japan. The presence of TBT or its metabolites in Italian coastal areas may be related to heavy shipping and their use as slimicides in the cooling pipes of thermoelectric plants. As suggested by other authors (Kannan *et al.*, 1997) TBT in addition to certain organochlorine contaminants (PCBs, DDTs) may cause immune suppression in dolphins, making them more susceptible to diseases, although this link is yet to be well established. The Department of Environmental Science – Section of Applied Ecology has carried out research on the presence of chlorinated hydrocarbons (dioxin-like compounds, pesticides) and the relative dioxin Toxic Equivalents (TEQs) in cetaceans from the Mediterranean Sea since many years. Studies on the presence of polychloronaphthalenes (PCNs), PCDDs and PCDFs, PCBs and relative TEQs, are in progress.

6. Statistics for large cetaceans

6.1 Direct catches.

Not applicable

6.2 Other non-natural mortality for the calendar year 2000 or the season 2000

Centro Studi Cetacei (CSC) 2000 report in preparation

6.3 Earlier years' statistics

CSC 1999 report in preparation
(CSC, 1987; 1988; 1989; 1990; 1991; 1992; 1993; 1994; 1995; 1996)

7. Statistics for small cetaceans

7.1 For the calendar year 2000

CSC 2000 report in preparation

7.2 Earlier years' statistics

CSC 1999 report not available (CSC, 1987; 1988; 1989; 1990; 1991; 1992; 1993; 1994; 1995; 1996)

6.3 Earlier years' statistics

7. Statistics for small cetaceans

7.1 For the calendar year 2000

7.2 Earlier years' statistics

CSC 1999 report not available (CSC, 1987; 1988; 1989; 1990; 1991; 1992; 1993; 1994; 1995; 1996)

8. Strandings

A network to monitor cetacean stranding along the Italian shore has been operating since 1986 by CSC, resulting in annual stranding reports. The CIBRA participates in these research program by the organisation of data and managing databases and GIS (see paragraph 9).

A stranding network has been organised in Croatia with the of co-operation of the Croatian Natural History Museum of Zagreb (CNHM), the Faculty of Natural Sciences (University of Zagreb) and the Veterinary Faculty (University of Zagreb) and TRI.

9. Other studies and analyses

CIBRA. The CIBRA participates in the "Sound Oceanography and Living Marine Resources" (SOLMAR) research project set up by the NATO Saclant Undersea Research Center. The activities of CIBRA focused mainly on:

- managing databases on scientific literature concerned with underwater bioacoustics, strandings, sightings
- developing sound analysis systems for field research on the acoustic emissions of cetaceans
- scientific support and participation in acoustic and visual surveys
- scientific support for the development and tuning of Acoustic Risk Mitigation Policies

CIBRA also carried out the project "Bioacoustic Characterization of the Mediterranean Sea" granted by Office of Naval Research (ONR USA - Grant N00014-99-1-0709). The project is aimed at:

- collecting information about the sounds emitted by marine mammals in the Mediterranean
- improving the already existing Cetacean Sound Library at CIBRA
- developing classification methods to identify vocalizing species
- developing instrumentation and methodologies for field research
- education and training

Biomarkers Laboratory (CIBM-Siena University). Cell cultures. An epidermal/dermal layer including a portion of the underlying blubber tissue was used to prepare culture fibroblasts. The main result of this research is the successful growth of fibroblasts from Mediterranean free-ranging cetaceans (Marsili *et al.*, 2000). In fact, an on-line bibliographic search

from 1980 to 1999 showed that the cases of success in getting ready of marine mammals epidermic cell culture are very rare. Moreover, there aren't good issues published for fibroblast culture obtained from the cetaceans specimens used in this study. It is hoped to obtain genetic, biochemical and toxicological information from cultures of fibroblast cells grown from skin biopsy specimens. This data will be valuable for long-term field study of free-ranging cetaceans. In particular the tissue culture system will allow the study of relationships between contamination and biochemical responses. One of the planned applications of this developed *in vitro* system will be the assessment of interspecies differences in the mixed function oxidase activity (BPMO, EROD, PROD, Cyt.-1A1) activity induced by *in vitro* treatment of various contaminants (DDTs, PCBs, PAHs, etc.) added at different concentrations. The skin sample was stored in sterile medium MEM Eagle Earle's salts w/L-glutamine and Sodium Bicarbonate (Mascia Brunelli, Milan, Italy) + 10% gamma irradiated fetal calf serum (Mascia Brunelli) + 1% MEM Not Essential Aminoacids (NEAA) solution 100X (Mascia Brunelli) + 1% Penicillin/Streptomycin 100X (Mascia Brunelli) + 0.1% Amphotericin B 100X (Mascia Brunelli) at ambient temperature, and was processed within 24 h of collection. In the laboratory, each sample was washed with Earle's balanced salt solution (EBSS) (Mascia Brunelli) containing antibiotic (Penicillin/Streptomycin 100X (Mascia Brunelli) and antimycotic (Amphotericin B 100X (Mascia Brunelli)) solutions. All specimens were handled using sterile techniques. First, the collected tissue was cut into small pieces with curved surgical scissors, placed in 30 mm Petri dishes and incubated with Trypsin-EDTA solution 1X (Mascia Brunelli) for 15 min at 37°C. The biopsy fragments were washed again and then placed in Falcon 25 flasks, moistened with medium. After 24 h at 37°C in an incubator with 5% CO₂, the cultures were covered with 1 ml of medium. Half of the culture medium was replaced every 48 h with fresh medium. Successful cell cultures were obtained from: striped dolphin, bottlenose dolphin, common dolphin, risso's dolphin and fin whale. The first fibroblasts were observed after 7-21 days. Cultures reached 90% confluence in 15-20 days, then were trypsinized, washed and placed in Falcon 50 and 125 flasks, after two and three trypsinizations respectively. The samples grew for over 4 months, however, there were signs of senescence and increased resistance to trypsin treatment. Contamination by microorganisms is one of the main causes of limited cell viability or slow cell growth. Rapid proliferation of bacteria, yeasts and fungal spores produces an unfavourable environment for the growth of the mammalian cells both by depletion of the available nutrients or for the changes in the pH. The contamination may be introduced into a culture from several routes but principally is a dormant infection in the sampled specimens. In fact, the most persistent infection was an environmental *Candida* spp. The antimycotic (Amphotericin B 100X) in the medium was inactive against the fungus. Various unsuccessful attempts were made to stop the infection. The antimycotic Canesten 1% (Bayer) was also tried but the infection proliferated. Against bacterial infection, the cells were washed with Penicillin/Streptomycin 100X, and surprisingly, the fibroblasts continued to grow and the confluent layer did not seem to be damaged. We tested also Gentamicina but we notice that this antibiotic damaged the confluent layer.

Endocrine Disrupters. Several pollutants (called endocrine disrupters or ED) can alter endocrine systems, and represent "exogenous compounds that induce negative effects in fit organisms, or in their descendants, as a consequence of modifications in endocrine functions" (OECD 1997). Among these pollutants a category exists - that of estrogenic compounds (for example dioxin, furan and PCB congeners, certain PAHs and pesticides) - that interferes in particular with sexual hormones. Numerous studies focusing on modifications of spermatozoal concentration, genital tract malformations, fertility loss, sexual inversion in several vertebrate species, and modification of reproductive behaviours, put emphasis on the dramatic risks associated with these compounds.

BPMO activity in skin biopsy of marine mammals can be used as potential indicators of exposure to EDCs such as organochlorines. Since these top predators of the marine food-chain tend to accumulate high concentrations of anthropogenic contaminants (such as organochlorines and heavy metals), the development of nondestructive techniques for their hazard assessment, protection and conservation is strongly recommended (Fossi & Marsili 1997). The biomarker approach and residue analysis can be used in marine mammals in two different kinds of samples: stranded specimens and free-ranging specimens. We presented some examples of validation of the nondestructive approach in field studies with particular attention to research on Mediterranean cetaceans. Fossi and collaborators proposed, in 1992, the development of a nondestructive technique to evaluate the residue levels (organochlorines and heavy metals) and biochemical responses to xenobiotic compounds (BPMO) by skin biopsy in two species of Mediterranean cetaceans: the dolphin (*Stenella coeruleoalba*) and the whale (*Balaenoptera physalus*). The main results of this first study concerned in the detection of BPMO activity in cetacean skin biopsy samples. BPMO activity in striped dolphin was four times higher than in fin whale. The two species differed dramatically in levels of DDT (12 times) and PCBs (9 times) in subcutaneous blubber. The difference in organochlorine bioaccumulation and consequently in BPMO induction between the two species is probably related to their different positions in the marine food chain: high trophic level for the dolphin and lower trophic level for the whale. A particularly interesting result was obtained recently for *Balaenoptera physalus*: a significant statistical correlation was found between BPMO activity and organochlorine levels in male skin biopsy specimens Marsili *et al.*, 1998). Between organochlorine contaminants detected, PCBs, op'DDT and op'DDE are environmental estrogens, pp'DDE and pp'DDT antiandrogens. Generally, those xenoestrogens that have been identified using both *in vitro* and *in vivo* assays are capable of altering mammalian sex differentiation. Interestingly in fin whales male skin biopsy, PCB congeners and op'DDE for the xenoestrogens and pp'DDE for the antiandrogens, are significantly correlated ($p < 0.05$) with the BPMO activity (Spearman Rank Test for nonparametric distributions). These results suggest that BPMO induction may therefore

be an early warning sign of exposure to EDCs such as OCs and a potential alert of transgenerational effects, related to exposure of future generations via the placenta and milk (Fossi et al., 1999).

ICRAM is undertaking research and development of reliable and low-budget methods for detection, classification, localization and tracking of underwater biological sounds to support the Italian Public Administration in the formulation of baseline rules for managing Marine Protected Areas (MPAs). Species of *Cetacea* involved were: Fin whale, Striped dolphin, Sperm whale, Risso's dolphin, Long-finned pilot whale and, Cuvier's beaked whale. Fin- and Sperm whale sounds were collected automatically during Jan.-March 2000 on a continuous basis with the use of self-contained automatic sea-bottom deployed acoustic recorders ("Pop-up" buoys). (Clark *et al.*, in press.). An assessment of ambient noise in winter throughout the basin was made and its potential interaction with marine mammals were studied. Oceanographic models were coupled with *in loco* measurements of temperature, conductivity, density and nutrients to determine the environmental parameters related to the presence and movements of marine mammals. (Borsani, *et al.*, in prep.) Set of samples of *Meganyctiphanes norvegica* were analysed at Siena University to test for contaminants and enzymatic activities. A series of tests to validate scientific 120 kHz echosounder data (Mediterranean krill prospectings) with underwater video were carried out. A georeferenced database of all the data collected was set up. The goals of the programmes are pursued with the collaboration of a number of different research institutions, namely: Bioacoustics Research Program, Cornell University (New York, USA), Southwest Fisheries Science Center (SWFSC), National Marine Fisheries Service (La Jolla, USA), Woods Hole Oceanographic Institution (Woods Hole, USA), University of Siena

TRI. Studies and analysis carried out from TRI are summarised in the following table

Area	Species	Methodology	Data analysis	Results
Eastern Ionian Sea	Common dolphin	<i>Ad libitum</i> surveys	Relative sighting frequency, distribution	Relative sighting frequencies: 1.6 sight./100 km (Politi and Bearzi in press)
Eastern Ionian Sea	Bottlenose dolphin	<i>Ad libitum</i> surveys	Relative sighting frequency, distribution	Relative sighting frequencies: 0.7 sight./100 km (Politi <i>et al.</i> 1998)
Eastern Ionian Sea	Common dolphin	Behavioural sampling (focal group)	Behavioural ecology	Analysis in progress; preliminary results: obvious feeding activities near the surface on small pelagic fish; interactions with seabirds during surface feeding; possible competition for resources with tuna (Politi <i>et al.</i> 1998; Agazzi <i>et al.</i> in press)
Eastern Ionian Sea	Bottlenose dolphin	Behavioural sampling (focal group)	Behavioural ecology	Analysis in progress preliminary results: feeding activities apparently focusing on demersal prey; regular interactions with fishermen; occasional feeding in the proximity of the fishing farms; clear evidence of emaciation (Politi <i>et al.</i> 1998; Politi <i>et al.</i> 2000, Bearzi <i>et al.</i> in press)
Eastern Ionian Sea	Common dolphin	Fish scale collection during surface-feeding events	Dolphin feeding ecology and predator/prey interaction	Analysis in progress: preparation of a fish scale catalogue for the identification of fish scales sampled during common dolphin and other marine predator surface feeding activities (Agazzi <i>et al.</i> in press)
Ligurian Sea	Fin whale	Passive tracking	Behavioural patterns	Behaviour and interaction with humans of fin whale through passive tracking and respiration sampling (focal individual) - results in Jahoda <i>et al.</i> in press.
Ligurian Sea	Fin whale Sperm whale	<i>Ad libitum</i> surveys	Human interactions	Analyses in progress: analysis of the problem of collisions with boats through photo-identification studies, stranding networks and anecdotal records – preliminary results in Pesante <i>et al.</i> 2000.
Ligurian Sea	Striped dolphin	<i>Ad libitum</i> surveys and biopsy sampling	Genetic studies	Analyses in progress: DNA will be extracted from skin samples to evaluate hierarchical genetic structure of striped dolphins (Gaspari <i>et al.</i> in press)
Ligurian Sea	Striped dolphin, Risso's dolphin, Bottlenose dolphin, Long-finned pilot whale, Cuvier's beaked whale, Sperm whale	<i>Ad libitum</i> surveys	Habitat choice and preferences	Analyses in progress: habitat use of cetaceans along the continental slope, by correlating cetaceans presence with oceanographic parameters such as bathymetry and slope gradient (Azzellino <i>et al.</i> in press).

10. Literature cited

Agazzi, S., Bearzi, G. and Politi, E. In press. Common dolphin prey species in the eastern Ionian Sea: insight from fish

- scales sampled during surface foraging. European Research on Cetaceans, 15.
- Azzellino, A., Airoidi, S., Gaspari, S., Patti, P. and Sturlese, A. In press. Physical habitat of cetaceans along the continental slope of the western Ligurian Sea. European Research on Cetaceans, 15.
- Barbieri, G., Bearzi, G. 2000. Behaviour of a solitary, "sociable" bottlenose dolphin in southern Italy. Pp. In European Research on Cetaceans, 14:107-109.
- Bearzi, G., Quondam, F. and Politi, E. In press. Bottlenose dolphins foraging alongside fish farm cages in eastern Ionian Sea coastal waters. European Research on Cetaceans, 15.
- Bruno, S., Politi, E. and Bearzi, G. In press. Social organisation of a common dolphin community in the eastern Ionian Sea: evidence of a fluid fission-fusion society. European Research on Cetaceans, 15.
- Corsolini S., Focardi S., Kannan K., Tanabe S., Borrell A., Tatsukawa R., 1995. Congener profile and toxicity assessment of polychlorinated biphenyls in dolphins, sharks and tuna fish from Italian coastal waters. *Mar. Environ Res.*, **40**: 33-53.
- Focardi S., Corsolini S., Aurigi S., Pecetti G., Sanchez-Hernandez J.C. 2000. *Appl. Organometall. Chem.* **14**, 48
- Centro Studi Cetacei, 1987. Cetacei spiaggiati lungo le coste italiane. I rendiconto 1986. *Atti Soc. Ital. Nat. Museo Civ. Stor. Nat. Milano*, 128 (3-4): 305-313.
- Centro Studi Cetacei, 1988. Cetacei spiaggiati lungo le coste italiane. II rendiconto 1987. *Atti Soc. Ital. Nat. Museo Civ. Stor. Nat. Milano*, 129 (4): 411-432.
- Centro Studi Cetacei, 1989. Cetacei spiaggiati lungo le coste italiane. III rendiconto 1988. *Atti Soc. Ital. Nat. Museo Civ. Stor. Nat. Milano*, 130 (21): 269-287.
- Centro Studi Cetacei, 1990. Cetacei spiaggiati lungo le coste italiane. IV rendiconto 1989. *Atti Soc. Ital. Nat. Museo Civ. Stor. Nat. Milano*, 131 (27): 413-432.
- Centro Studi Cetacei, 1991. Cetacei spiaggiati lungo le coste italiane. V rendiconto 1990. *Atti Soc. Ital. Nat. Museo Civ. Stor. Nat. Milano*, 132 (25): 337-355.
- Centro Studi Cetacei, 1992. Cetacei spiaggiati lungo le coste italiane. VI rendiconto 1991. *Atti Soc. Ital. Nat. Museo Civ. Stor. Nat. Milano*, 133 (19): 261-291.
- Centro Studi Cetacei, 1993. Cetacei spiaggiati lungo le coste italiane. VII rendiconto 1992. *Atti Soc. Ital. Nat. Museo Civ. Stor. Nat. Milano*, 134 (II):285-298.
- Centro Studi Cetacei, 1994. Cetacei spiaggiati lungo le coste italiane. VIII rendiconto 1993. *Atti Soc. Ital. Nat. Museo Civ. Stor. Nat. Milano*, 135 (II): 437-450.
- Centro Studi Cetacei, 1995. Cetacei spiaggiati lungo le coste italiane. IX rendiconto 1994. *Atti Soc. Ital. Nat. Museo Civ. Stor. Nat. Milano*, 136 (II): 205-216.
- Centro Studi Cetacei, 1996. Cetacei spaiggiati lungo le coste italiane. X rendiconto 1995. *Atti Soc. Ital. Nat. Museo Civ. Stor. Nat. Milano*, 137 (I-II): 135-147.
- Clark, C.W., Borsani, J.F., Notarbartolo di Sciara, G. In press. Vocal Activity of Fin Whales, *Balaenoptera physalus*, in the Ligurian Sea. *Marine Mammal Science*
- Fossi, M.C., Marsili, L., Leonzio, C., Notarbartolo di Sciara, G., Zanardelli, M. and Focardi, S. 1992. The use of non-destructive biomarker in Mediterranean cetaceans: preliminary data on MFO activity in skin biopsy. *Mar. Poll. Bull.*, **24**(9): 459-461.
- Fossi M.C. & Marsili L. 1997. The use of nondestructive biomarkers in the study of marine mammals. *Biomarkers*, **2**: 205-216.
- Fossi M.C, Casini S. & Marsili L. 1999. Nondestructive biomarkers of exposure to endocrine-disrupting chemicals in endangered species of wildlife. *Chemosphere*, **39**(8): 1273-1285.
- Gaspari, S., Airoidi, S. and Hoelzel, A.R. Molecular ecology of striped dolphins in the Mediterranean Sea (*Stenella coeruleoalba*). In press. European Research on Cetaceans, 15.
- Griest, W.H. and Caton, J.E. 1983. Extraction of polycyclic aromatic hydrocarbons for quantitative analysis. In: Handbook of polycyclic aromatic hydrocarbons. Ed. by Børseth, A., Marcel Dekker, INC.: 95-148.
- Hansen, K.J., Clemen, L.A., Ellefson, M.E. and Johnson, H.O. 2001. Compound-specific, quantitative characterization of organic fluorochemicals in biological matrices. *Environ. Sci. Technol.* (in press).
- Houlobek, I., Paasivirta, J., Maatela, P., Lahtiperä, M., Holoubková, I., Korínek, P., Boháček, Z. and Čáslavský, J. (1990). Comparison of extraction methods for polycyclic aromatic hydrocarbon determination in sediments. *Toxicol. Environ. Chem.*, **25**: 137-154.
- Jahoda, M., Lafortuna, C. L., Almirante, C., Azzellino, A., Panigada, S., Zanardelli, M. e Notarbartolo di Sciara, G. In press. Mediterranean Fin whale's (*Balaenoptera physalus*) response to disturbance assessed through passive tracking and timing of respiration. *Marine Mammal Science*.
- Lauriano G., Di Muccio S., Cardinali A., Notarbartolo di Sciara, G. In press. The interaction between bottlenose dolphin and small scale fisheries in the Asinara island national park (north-western Sardinia). *15th Annual Conference of European Cetacean Society*, Rome 6-10 May 2001
- Lauriano G. & Di Muccio S. In press. Inventario dei danni sul pescato di reti da posta nelle acque dell'isola dell'Asinara (nord ovest sardegna). 32° Congresso SIBM, Numana (AN) 4-9/6 2001.
- Marsili, L. and Focardi, S. 1996. Organochlorine levels in subcutaneous blubber biopsies of fin whales (*Balaenoptera*

- physalus*) and striped dolphins (*Stenella coeruleoalba*) from the Mediterranean Sea. *Envir. Poll.*, 91(1): 1-9.
- Marsili, L., Fossi, M.C., Casini, S., Savelli, C., Jimenez, B., Junin, M. and Castello, H. 1997. Fingerprint of polycyclic aromatic hydrocarbons in two populations of southern sea lions (*Otaria flavescens*). *Chemosphere*, 34(4) : 759-770.
- Marsili, L., Fossi, M.C., Notarbartolo di Sciarra, G., Zanardelli, M., Nani B. and Panigada S. 1998. Relationship between organochlorine contaminants and mixed function oxidase activity in skin biopsy specimens of Mediterranean fin whales (*Balaenoptera physalus*). *Chemosphere*, **37(8)**: 1501-1510.
- Marsili L., Fossi M.C., Neri G., Casini S., Bearzi G., Politi E., Zanardelli M & Panigada S. 2000. Skin biopsies for cell cultures from mediterranean free-ranging cetaceans. *Mar. Envir. Res.*, **50(1-5)**: 649-652
- Panigada, S., G. Notarbartolo di Sciarra, M. Zanardelli, S. Airoidi, J.F. Borsani, M. Jahoda, G. Pesante & E. Revelli. In press. Distribution and occurrence of fin whales in the Ligurian Sea between 1990-99. *European Research on Cetaceans*, 15.
- Pesante, G., Zanardelli, M., Panigada, S. 2000. Evidence of man-made injuries on Mediterranean fin whales. *European Research on Cetaceans*, 14:192-193
- Politi, E., Airoidi, S., Natoli, A., Frantzis, A. 1998. Unexpected prevalence of common dolphins over sympatric bottlenose dolphins in Eastern Ionian Sea inshore waters. *The World Marine Mammal Science Conference*, Monaco, 20-24 January 1998.
- Politi, E., Bearzi, G., Airoidi, S. 2000. Evidence for malnutrition in bottlenose dolphins photoidentified in the eastern Ionian Sea. *European Research on Cetaceans*, 14:234-236.
- Politi, E. and Bearzi, G. In press. Evidence of rarefaction for a coastal common dolphin community in the eastern Ionian Sea. *European Research on Cetaceans*, 15.
- Kannan K, Senthilkumar K., Loganathan B.G., Takahashi S., Odell D.K., Tanabe S. *Environ. Sci. Technol.* 31, 296 (1997). Kurelec, B., Britvic, S., Rijavec, M., Muller, W.E.G. and Zahn, R.K. 1977. Benzo(a)pyrene monooxygenase induction in marine fish - molecular response to oil pollution. *Mar. Biol.*, 44: 211-216.

11. Publications

11.1 Published or 'In Press' papers only

- Bearzi, G. 2001. First report of a common dolphin (*Delphinus delphis*) death following penetration of a biopsy dart. *Journal of Cetacean Research and Management*, 2(3): 217-221.
- Fossi M.C., Marsili L., Neri G., Casini S., Bearzi G., Politi E., Zanardelli M. & Panigada S. 2000. Skin biopsy of Mediterranean cetaceans for the investigation of interspecies susceptibility to xenobiotic contaminants. *Marine Environmental Research Special Issue*, **50(1-5)**: 643-647.
- Fossi M.C., Casini S., Marsili L., Ancora S., Ausili A. & Notarbartolo Di Sciarra G. 2000. Biomarkers as diagnostic and prognostic tools for assessing effects of endocrine disruptors among top predators in the Mediterranean ecosystem. *e.hormone 2000*, New Orleans, USA, 15-18 October 2000.
- Fossi Mc, S. Casini, L. Marsili 2000. Ecotoxicological risk of marine top predators to endocrine disruptors. *UNU International Symposium on Endocrine Disruptors Compounds*. Kuala Lumpur, 2000, Malesia.
- Fossi M.C., Casini S., Marsili L., Ancora S., Mori G., Neri G., Ausili A., Romeo T., Moscatelli A. & Notarbartolo Di Sciarra G. 2000. Biomarkers di esposizione ed effetto per composti estrogenici in predatori terminali del Mediterraneo. "2° *Convegno Nazionale delle Scienze del Mare*, Genova, 22-25 Ottobre 2000: **54**
- Fossi M.C., Marsili L., Neri G., Bearzi G. & Notarbartolo Di Sciarra G. 2001. Are the mediterranean cetaceans exposed to the toxicological risk of endocrine disruptors? *Conference of European Cetacean Society*, Roma 2001.
- Fossi M.C., Marsili L. & Notarbartolo Di Sciarra G. Non-destructive biomarkers in the ecotoxicological study of mediterranean cetaceans. *The Journal of Cetacean Research and Management*, submitted.
- Fossi M.C., Casini S., Marsili L., Ancora S., Mori G., Neri G., Ausili A., Romeo T., Moscatelli A. & Notarbartolo Di Sciarra G. Biomarkers of exposure and effects for assessing toxicological risk of endocrine disruptors in top predators of the Mediterranean Sea. *Annals of the New York Academy of Sciences*, submitted.
- Garibaldi, F., Orsi Relini, L. 2000. Abbonanza estiva, struttura di taglia e nicchia alimentare della verdesca, *Prionace glauca*, nel santuario pelagico. del Mar Ligure. *Biol. Mar. Medit.*, 7(1): 324-333.
- Jahoda, M., Lafortuna, C. L., Almirante, C., Azzellino, A., Panigada, S., Zanardelli, M. e Notarbartolo di Sciarra, G. In press. Mediterranean Fin whale's (*Balaenoptera physalus*) response to disturbance assessed through passive tracking and timing of respirator. *Marine Mammal Science*.
- Marsili L., Fossi M.C., Neri G., Airoidi S., Bearzi G. & Panigada S. 2000. Skin biopsies for cell cultures from mediterranean free-ranging cetaceans. *14th Annual Conference of European Cetacean Society*, Cork, 2-5 April 2000: **50**.
- Marsili L., Fossi M.C., Focardi S. & Notarbartolo Di Sciarra G. 2000. Idrocarburi policiclici aromatici (IPA) in cetacei campionati nell'area Mediterranea del "Santuario delle Balene". *2° Convegno Nazionale delle Scienze del Mare*, Genova, 22-25 Ottobre 2000: **227**.
- Marsili L., D'agostino A., Neri G. & Fossi M.C. 2001. An theoretical model to evaluate the risk to organochlorine compounds (OCs) in mediterranean striped dolphin (*Stenella coeruleoalba*). *Conference of European Cetacean*

Society, Roma 2001.

- Marsili L., Caruso A., Fossi M.C., Zanardelli M., Politi E. & Focardi S. 2001. Polycyclic aromatic hydrocarbons (PAHs) in subcutaneous biopsies of Mediterranean cetaceans. *Chemosphere*, **44/2**: 147-154.
- Marsili L., Fossi M.C., Neri G., Casini S., Airoidi S., Bearzi G. & Panigada S. Skin biopsies for cell cultures from Mediterranean free-ranging cetaceans. *European Research on Cetaceans 2000 Proceedings*, submitted.
- Orsi Relini, L. 2000. The Cetacean Sanctuary in the Ligurian Sea: a further reason. *Biol. Mar. Medit.*, **7(3)**: 117-126.
- Orsi Relini, L., Cima, C., Palandri, G., Garibaldi, F., Relini, M., Torchia, G. 2000. Population parameters of the Mediterranean striped dolphin (*Stenella coeruleoalba*) derived by stranding data. *European Research on Cetaceans*, **14**: 254-258.
- Orsi Relini, L., Palandri, G., Garibaldi, F., Cima, C., Relini, M., Torchia, G. 2001. Where are the Mediterranean fin whales born? 15th Annual Conference of the European Cetacean Society, Rome, 3-6 May 2001.
- Orsi Relini, L., Cima, C., Palandri, G., Garibaldi, F. in press. The striped dolphins, *Stenella coeruleoalba*, of the Ligurian pelagic Sanctuary: main biological characteristics. *Rapp. Comm. int. Mer Médit.*, **36**.
- Pavan, G., Hayward, T., Borsani J. F., Priano M., Manghi M., Fossati C., Gordon J., 2000. Time Pattern Of Sperm Whale Cods Recorded in the Mediterranean Sea 1985–1996. *J.Acoust.Soc.Am*, **107 (6)**: 3487-3495.
- Pavan G., 2000. Current research projects. *Projets de recherche en cours. Bulletin ACCOBAMS*, **3**, december 2000:32-33.
- Teloni V., Zimmer W.M.X., Fossati C., Manghi M., Pavan G., Priano M., 2000. Variability of temporal and spectral click characteristics of sperm whales (*Physeter macrocephalus*). *European Research on Cetaceans*, **14**: 91-95.

11.2 Unpublished literature

- SIRENA '00. CDROM published by Saclantcent. CD-41. Technical reports of the "Centro Interdisciplinare di Bioacustica e Ricerche Ambientali"
- Agazzi, S., Bearzi, G. and Politi, E. 2001. Common dolphin prey species in the eastern Ionian Sea: insight from fish scales sampled during surface foraging. *European Research on Cetaceans*, **15**.
- Azzellino, A., Airoidi, S., Gaspari, S., Patti, P. and Sturlese, A. 2001. Physical habitat of cetaceans along the continental slope of the western Ligurian Sea. *European Research on Cetaceans*, **15**.
- Barbieri, G., Bearzi, G. 2000. Behaviour of a solitary, "sociable" bottlenose dolphin in southern Italy. *European Research on Cetaceans*, **14**:107-109.
- Bearzi, G., Politi, E., Fortuna, C., Mel, L., Notarbartolo di Sciarra, G. 2000. An overview of cetacean sighting data from the northern Adriatic Sea: 1987-1999. *European Research on Cetaceans* **14**, 356-361.
- Bearzi, G., Quondam, F. and Politi, E. 2001. Bottlenose dolphins foraging alongside fish farm cages in eastern Ionian Sea coastal waters. *European Research on Cetaceans*, **15**.
- Bruno, S., Politi, E. and Bearzi, G. 2001. Social organisation of a common dolphin community in the eastern Ionian Sea: evidence of a fluid fission-fusion society. *European Research on Cetaceans*, **15**.
- Fortuna, C.M., Wilson, B., Wiemann, A., Riva, L., Gaspari, S., Matesic, M., Oehen, S., Pribanic, S. 2001. How many dolphins are we studying and is our study area big enough? *European Research on Cetaceans* **14**, 370-373.
- Gaspari, S., Airoidi, S. and Hoelzel, A.R. Molecular ecology of striped dolphins in the Mediterranean Sea (*Stenella coeruleoalba*). 2001. *European Research on Cetaceans*, **15**.
- Holcer, D., Fortuna, C.M. 2000. Cetaceans in the Croatian part of Adriatic Sea. Co-ordination/training Workshop on the Monitoring of Cetacean Stranding in Mediterranean, United Nations Environment Programme (UNEP), Mediterranean Action Plan (MAP), Regional Activity Centre for Specially Protected Areas (RAC/SPA). In press.
- Mackelworth, P.C., Fortuna, C.M., Holcer, D. In press. Is Croatia ready for its first marine reserve dedicated to the protection of cetaceans? *European Research on Cetaceans* **15**.
- Natoli, A., Canadas, A., Vaquero, C., Politi, E., Fernandez-Piqueras, J., Hoelzel A.R. In press. phylogeography of Mediterranean and North Atlantic common dolphin populations. *European Research on Cetaceans*, **15**.
- Picciulin, M., Francese, M., Fortuna, C.M., Zucca, P., Spoto, M. In press. Monitoring the presence of cetacea in the North Adriatic Sea: hypotheses of a resident population of bottlenose dolphin in the Gulf of Trieste/Grado Lagoon and a multidisciplinary approach to test it. *European Research on Cetaceans* **15**.
- Politi, E., Bearzi, G., Airoidi, S. 2000. Evidence for malnutrition in bottlenose dolphins photoidentified in the eastern Ionian Sea. *European Research on Cetaceans*, **14**:234-236.
- Politi, E. and Bearzi, G. In press. Evidence of rarefaction for a coastal common dolphin community in the eastern Ionian Sea. *European Research on Cetaceans*, **15**.