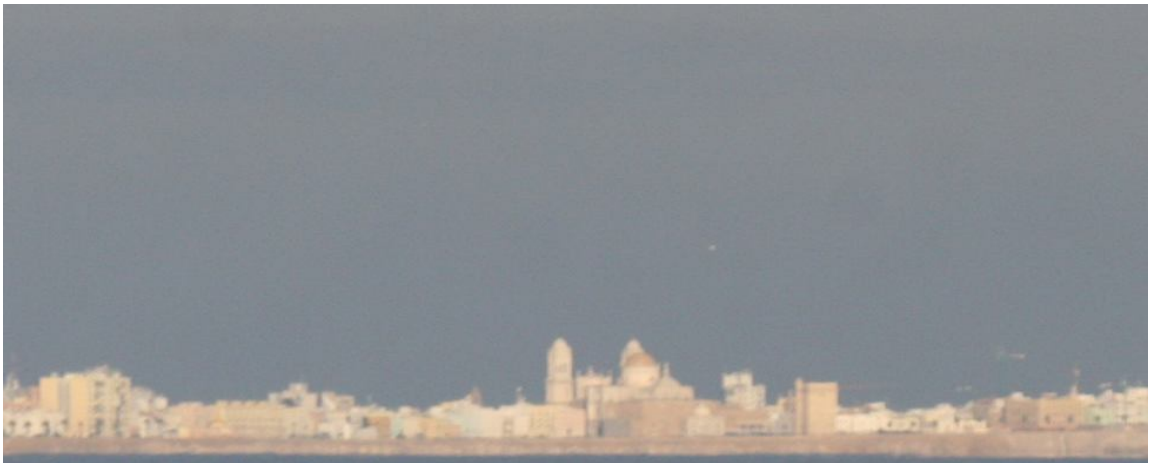

ABSTRACT BOOK

25th CONFERENCE OF THE EUROPEAN CETACEAN SOCIETY

LONG-TERM DATASETS ON MARINE MAMMALS: LEARNING FROM THE PAST TO MANAGE THE FUTURE

21st – 23rd MARCH 2011, CADIZ, SPAIN

ABSTRACT BOOK

25th CONFERENCE OF THE EUROPEAN CETACEAN SOCIETY

LONG-TERM DATASETS ON MARINE MAMMALS: LEARNING FROM THE PAST TO MANAGE THE FUTURE

21st – 23rd MARCH 2011, CÁDIZ/SPAIN

Abstract book: 25th Annual Conference of the European Cetacean Society

Cover photo: CIRCE

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CONTENT

25TH CONFERENCE OF THE EUROPEAN CETACEAN SOCIETY
21st – 23rd March 2011, Cadiz, Spain

THEME
Long-term datasets on marine mammals: learning from the past to manage the future

VENUE
Palacio de Congresos and Aulario la Bomba, Cadiz

ORGANIZERS
CIRCE (Conservation, Information and Research on Cetaceans), UCA (Universidad de Cádiz), CSIC–EBD (Consejo Superior de Investigaciones Científicas – Estación Biológica de Doñana), ECS (European Cetacean Society)

CONFERENCE ORGANIZING COMMITTEE
Renaud de Stephanis (Chair, EBD-CSIC); Jesus de la Fuente (IUSA-ULPGC); Philippe Verborgh (CIRCE); Pauline Gauffier (CIRCE); Ruth Esteban Pavo (CIRCE); Joan Giménez Verdugo (CIRCE); Laura Martín Días (UCA); Roland Lick (ECS).

PARTY COMMITTEE
Juan Manuel Salazar Sierra and Baldomero Medina

SCIENTIFIC COMMITTEE
Renaud de Stephanis (EBD-CSIC), Philippe Verborgh (CIRCE), Susana Garcia-Tiscar (CIRCE); Manuel Castellote (NOAA); Graham Pierce (IEO); Vincent Ridoux (University of La Rochelle, France), Cécile Vincent (University of La Rochelle, France), Ana Cañadas (Alnilam), Arne Bjørge (Institute of Marine Research), Simon Berrow (IWDG);

ABSTRACT REVIEWERS
Mario Acquarone, Natacha Aguilar, Pia Anderwald, Michel Andre, Javier Aznar, James Barnett, Giovanni Bearzi, Simon Berrow, Alexei Birkun, Arne Bjorge, Fabrizio Borsani, Cristina Brito, Paco Bustamante, Sarah Canning, Manuel Castellote, Florence Caurant, Jean-Benoit Charassin, Phil Clapham, Bruno Cozzi, Enrique Crespo, Boris Culik, Krishna Das, Renaud De Stephanis, Giovanni Di Guardo, Sarah Dolman, Greg Donovan, Peter Evans, Antonio Fernandez, Mercedes Fernandez, Ruth Fernandez Caterina Fortuna, Alexandros Frantzis, Alexandre Gannier, Manuel Garcia-Hartmann, Evgeny Gol'din, Pavel Gol'din, Ali Cemal Gucu, Jan Haelters, Ailsa Hall, Phil Hammond, Sara Heimlich, Rus Hoelzel, Aleta Hohn, Sascha Hooker, Vincent Janick, Thierry Jauniaux, Paul Jepson, Mark Johnson, Karl Kinze, Jérémy Kiszka, Jens Koblitz, Thijs Kuiken, Sophie Laran, Patricia Lastra Luque, Giancarlo Lauriano, Jennifer Learmonth, Christina Lockyer, Colin MacLeod, Ana Marçalo, Bernie McConnell, Sonia Mendes, Lee Miller, Patrick Miller, Paul Nachtigall, Giuseppe Notarbartolo di Sciara, Ayaka Ozturk, Aude Pacini, Simone Panigada, Iwona Pawliczka, Graham Pierce, Tony Raga, Marianne Rasmussen, Vincent Ridoux, Kevin Robinson, Emer Rogan, Begoña Santos, Ursula Siebert, Tiu Similïa, Benoit Simon-

Bouhet, Jerome Spitz, Jakob Tougaard, Nick Tregenza, Peter Tyack, Philippe Verborgh, Ursula Verfuss, Cecile Vincent, Mason Weinrich, Caroline Weir, Nicky Wiseman.

STUDENT VOLUNTEERS

Marianna Anichini, Jenny Bachmann, Suzanne Beck, Ambra Blasi, Eva Carpinelli, Celine Chang, Cristina Chico, Jamie Coleman, Andrea Mel Cosentino, Evgeniya Dolgova, Anneli Englund, Gosia Gazda, Gemma James, Carolina Jiménez Torres, Patrick Maher, Marta Moral, Carolin Paul, Alessandro Pierini, Ana Pinela, Patricia Rosero Ramírez, Maria Eugenia Santos Vega, Claudia Stauss, Ingrid Van Baarlen, Morgana Vighi, Dominique Weilermann, Zoe Woodward, Betty Zocholl

SPONSORS

ACCOBAMS (Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area), Oficina del Bicentenario de la Excma. Diputación de Cádiz, Servicio de Medio Ambiente de la Excma. Diputación de Cádiz, RAC-SPA (Regional Activity Center for Specially Protected Areas), SEC (Sociedad Española de Cetáceos), TURMARES (Turismo marítimo del Estrecho) Tarifa S.L., Parque Natural del Estrecho – Consejería de Medio Ambiente de la Junta de Andalucía.

COLLABORATORS

Patronato provincial de Turismo de la Excma. Diputación de Cádiz, Delegación municipal de Turismo del Excmo. Ayuntamiento de Cádiz.

ACKNOWLEDGEMENTS

Anton van Helden for the T-shirt design (p8).

CADIZ, Tourist information and Customs

THE CITY

BANKS & CURRENCY EXCHANGE

Normal banking hours are Mondays to Fridays from 8 – 8:30 to 14 – 14:30. Some banks open one afternoon per week or on Saturdays from 9 to 13.

Foreign currency can be exchanged in banks and in Bureaux de Change. The latter have longer opening hours.

CREDIT CARDS

Most hotels, restaurants and stores accept Visa, Mastercard and American Express.

SHOPPING

Most stores in Cadiz are open Mondays to Fridays 10 – 10:30 to 13:30 – 14:00 and 17 – 17:30 to 20:30 – 21. On Saturdays stores are open only in the morning and they close on Sundays and holidays.

COFFEE SHOPS, BARS AND RESTAURANTS

Most bars/restaurants in Cadiz are open Mondays to Sundays
Breakfast: from 07:00-8:00
Lunch: 12:00-12.30 to 16:30-1700
Dinner: 20:30- 21:00 to 00:30-02:00 h.

PHONE NUMBERS

To call Spain, you have to dial: + 34

HEALTHCARE SYSTEM

The healthcare system in Cadiz, as in the rest of Spain is funded by the central and regional governments. There are several public and private healthcare centres; the main hospital is: Puerta del Mar University Hospital, Avda. Ana de Viya, 21 Tel. 956 00 21 00

EMERGENCY

All types of emergency 112
Red Cross Ambulances 956 22 22 22
Fire Department 085
Civil Guard 956 22 11 00
Local Police 092
National Police 091
Maritime Rescue and Safety 900 20 22 02
Healthcare Emergencies 061

MOBILITY

Land

TAXIS

Radio Taxi Tel. 956 21 21 21 / 956 21 21 23
Independent Taxi Association of Cadiz Tel. 956 26 68 68

CITY BUSES
5 bus lines Tel. 956 28 38 04

BUSES
Transportes Generales Comes
Plaza de la Hispanidad, 1 Tels. 956 80 70 59 · 902 199 208 Routes: Province of Cadiz
Other routes: Seville, Malaga, Cordoba, Granada, Huelva, Jaen and Almeria

Dainco
Plaza de la Hispanidad, 1 Teléfono: 956 80 70 59 Routes: Extremadura, Leon, Zamora, Salamanca and Galice.

Viajes Socialtur (Los Amarillos)
Avda. Ramón de Carranza, 31 Tel.: 956 29 08 00 Routes: Province of Cadiz

Secorbus
Plaza Elio s/n Tel. 956 257415 Route: Madrid

Railway
RENFE
Plaza Sevilla, s/n Tel. 902 24 02 02 Routes: a) Metropolitan area b) Other: Seville, Cordoba, Jaen, Ciudad Real, Saragossa, Lerida, Barcelona and Tarragona. TALGO Altaria to Madrid. Shuttle to Seville, connection to AVE (high speed train)

Air
Jerez de la Frontera Airport 35 Km on A-4 Tel. 956 15 00 00
Seville Airport 120 Km on A-4 Tel. 956 77 30 26
Gibraltar Airport 150 Km on N-340 Tel. 956 77 30 26

Maritime
Acciona Trasmediterránea
Estación Marítima Muelle Alfonso XIII Tel. 902 45 46 45 Routes: Canary Islands

Motonave “Adriano III” (Vaporcito) Shuttle service between Cadiz and El Puerto de Santa Maria Tel. 629 46 80 14

Bahia de Cadiz Transport Consortium
Maritime Transport Service Tel. 956 012 100 Catamaran departures from the commercial dock of Cadiz to Rota and El Puerto de Santa Maria.

WIFI SPOTS
Plaza de la Catedral
Plaza de Mina
Plaza del Palillero
Plaza Ingeniero La Cierva
Telegrafía sin hilos
Parque Cinco Continentes

Loreto
Pala San Antonio

CULTURE

MUSEUMS

Museum of Cadiz Plaza de Mina s/n Tel. 956 21 22 81
Cathedral Museum and Archives Plaza Fray Félix, s/n Tel. 956 25 98 12
Parliament of Cadiz Museum C/ Santa Inés, 9 Tel. 956 22 17 88
Lithography Workshop-Museum Bóvedas de San Roque, s/n. Tel.: 956 28 26 63
Andalusian Underwater Archaeology Centre Avda. Duque de Nájera, 3 Tel.:956 226 034

EXHIBITION GALLERIES

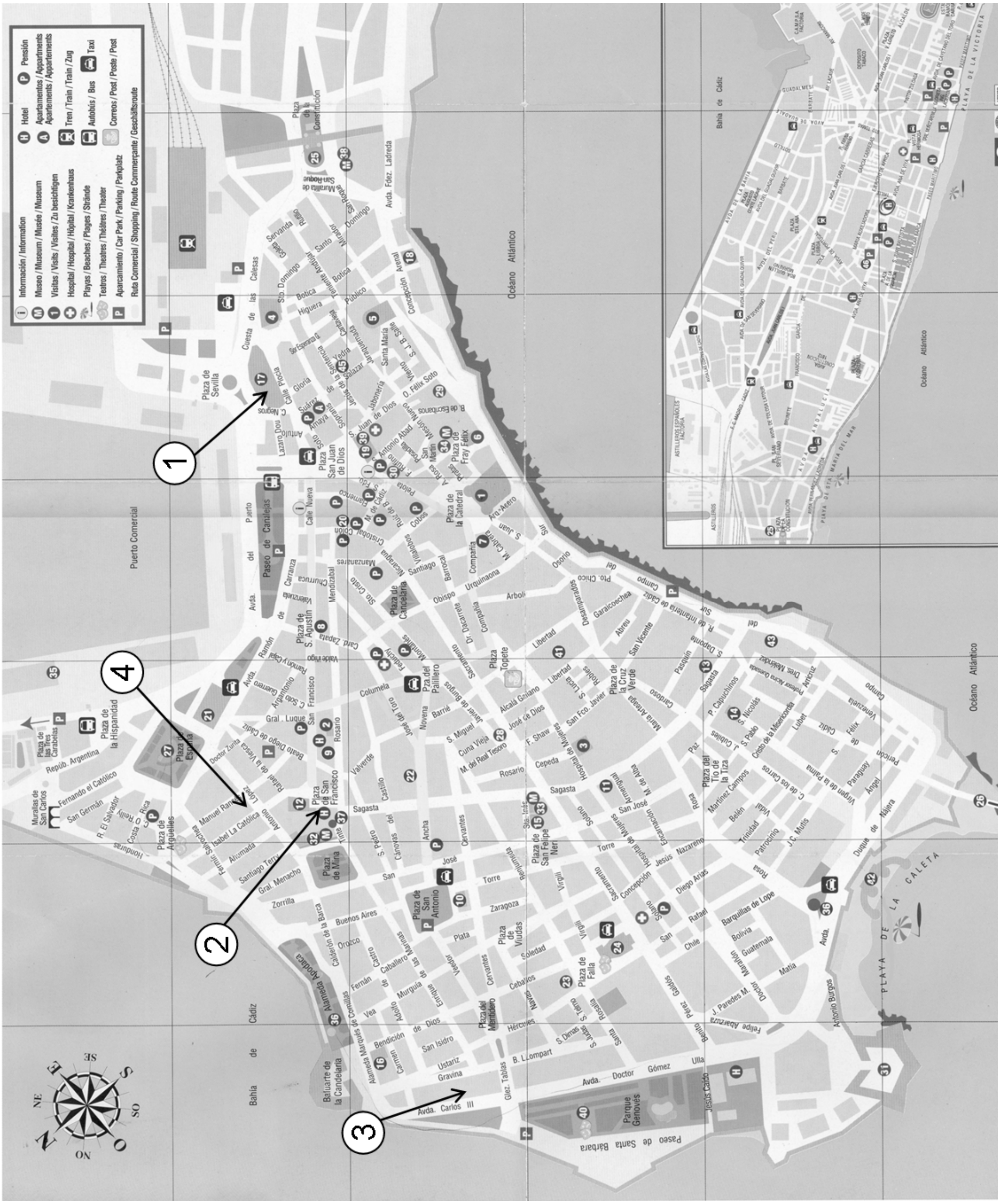
Palacio de Congresos y Exposiciones- Plocia, s/n Tel.: 956 29 10 17
Palillero- Plaza del Palillero, s/n Tel.: 956 22 65 16
Baluarte de la Candelaria- Alameda Marqués de Comillas, s/n Tel.: 956 22 24 74
Sala de Exposiciones- El Pópulo Plaza de San Martín, s/n Tel.: 956 28 06 97
Castillo de Santa Catalina- Antonio Burgos, s/n Tel.: 956 22 63 33
Palacio de la Diputación Provincial- Plaza de España, s/n Tel.: 956 24 01 00
Sala Rivadavia- Presidente Rivadavia, 3 Tel.: 956 22 47 22
Sala Pangea- Plaza de San Martín, 3 Tel.: 956 28 06 97
Sala Ágora 96- José del Toro, 11 Tel.: 956 21 25 88
Galería Benot- Avda. Ramón de Carranza, 10 Tel.: 956 22 86 81
Galería Rafael Gordon- Plocia, 4 Tel.: 956 22 86 81
IslahAbitada- Sacramento, 24 Tel.: 956 21 34 57
Sala Unicaza- San Francisco, 26 Tel.: 956 29 73 36
Sala Cajasur- Columela, 7 Tel.: 956 22 83 17
Sala Caja San Fernando- Avda. Ramón de Carranza, 26-27 Tel.: 956 29 01 60
Sala Paréntesis Aulario La Bomba- Paseo Carlos III Tel.: 956 01 58 00

PERFORMING ARTS

Gran Teatro Falla- Plaza de Falla, s/n. Tel. 956 22 08 34
Sala Cultural Central Lechera- Plaza de Argüelles, s/n Tel.: 956 22 06 28
Teatro José María Pemán- Parque Genovés, s/n Tel.: 956 22 35 34
Castillo de Santa Catalina- Antonio Burgos, s/n Tel.: 956 22 63 33
Café Teatro Pay-Pay- C/ Silencio Barrio del Pópulo

TOURIST SERVICES

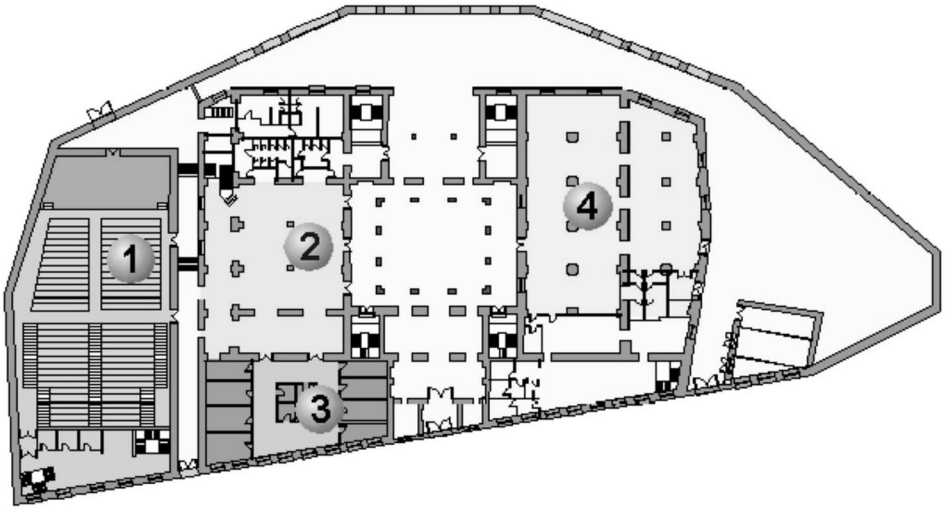
Torre Tavira (Dark room)- C/ Marqués del Real Tesoro nº10 Tel.: 956 21 29 10
Torre de Poniente- Cadiz Cathedral Tel. 956 25 17 88
Cádiz Virtual s. XVIII -Puertas de Tierra Tel. 956 25 26 81
Casa del Obispo- Plaza Fray Félix, 5 Tel. 956 26 47 34
Factoría de Salazones- C/ Sacramento esquina Barrié Tel. 956 00 94 00
Tour for Cadiz (touristic bus) Tel.: 956 26 01 72
Cadiz Tour City Sightseeing (touristic bus) Tel.: 902 10 10 81



1: <u>Main venue</u>: Palacio de Congresos - C/Plocia Tel.: 956 29 10 17
2: <u>Dinner & dancing</u>: Claustro del Convento de San Francisco - Plaza San Francisco
3: <u>Workshops and Ice-breaker</u>: Aulario la Bomba - Paseo Carlos III, 3 Tel.: 956 01 58 00
4: <u>Bar Magdala</u>: corner of Isabel La Católica and Antonio Lopez. Special discounts during the ECS to party every night!

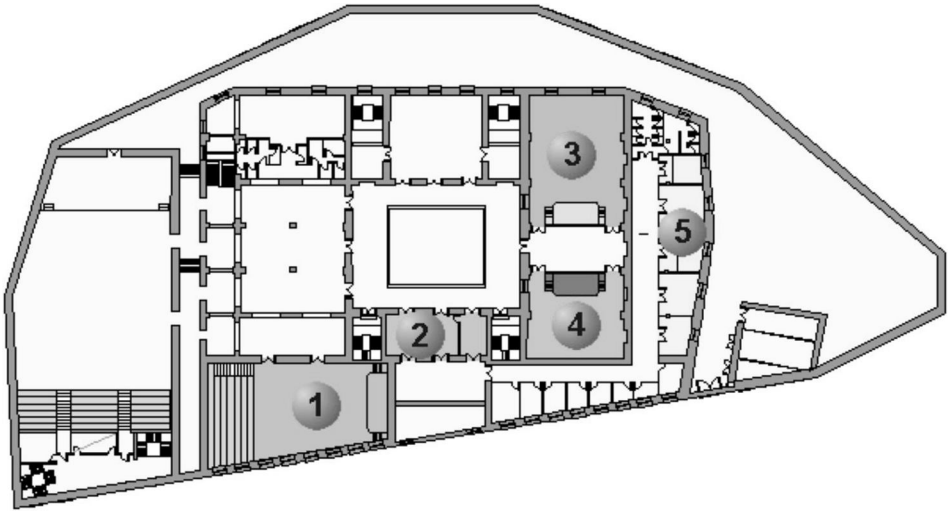
MAP: PALACIO DE CONGRESOS

GROUND LEVEL-Conference level



1) AUDITORIUM – **MAIN CONFERENCE ROOM**
2) EXPOSITION AREA – **POSTER ROOM 1**
3) SHOPS
4) RESTAURANT / BAR – **POSTER ROOM 2**

FIRST FLOOR



1) CONFERENCE ROOM 1
2) VIP ZONE
3) CONFERENCE ROOM 2
4) CONFERENCE ROOM 3
5) COMMISSION ROOM

T-shirt design: An original drawing by Anton van Helden whaleman@clear.net.nz

CONFERENCE PROGRAMME

Saturday 19th March 2011

WORKSHOPS

Venue: Aulario la Bomba - Paseo Carlos III, 3 (nº3 on map p6)

08:00-12:00 THE CASE FOR AND AGAINST DESTRUCTIVE SAMPLING.
Organiser: Simone Panigada panigada@inwind.it

12:30-21:00 ENVIRONMENTAL HISTORY OF MARINE MAMMALS.
Organiser: Cristina Brito cristina.brito@escolademar.pt

12:30-21:00 INTEREST AND FEASIBILITY OF A WEB-ACCESSED DATABASE FOR MARINE MAMMALS STRANDINGS AND NECROPSY DATA IN THE ASCOBANS REGION.
Organisers: Deaville R., Jepson P. and Jauniaux T. T.Jauniaux@ulg.ac.be

Sunday 20th March 2011

WORKSHOPS

Venue: Aulario la Bomba - Paseo Carlos III, 3 (nº3 on map p6)

08:00-12:30 STUDENT WORKSHOP: TOOLS FOR MARINE MAMMAL POPULATION STUDIES
Organiser: Conor Ryan miolmor@gmail.com

08:00-16:30 POLLUTION AND CETACEANS
Organisers: Mark Simmonds and Peter Evands peter.evans@bangor.ac.uk

08:00-16:30 PREY IDENTIFICATION IN MARINE MAMMAL DIETS
Organiser: Graham Pierce and Gema Hernandez g.j.pierce@abdn.ac.uk

08:00-16:30 FIN WHALES RESEARCH AND CONSERVATION IN THE MEDITERRANEAN SEA
Organisers: Pauline Gauffier, Simone Panigada, Manolo Castellote and Renaud de Stephanis. panigada@inwind.it

OFFICIALS

17:00-21:00 **REGISTRATION**
Venue: Aulario la Bomba - Paseo Carlos III, 3 (nº3 on map p6)

17:30-21:00 **ICE BREAKER**
Venue: Aulario la Bomba - Paseo Carlos III, 3 (nº3 on map p6)

21:00-03:00 **PARTY**
Venue: Bar Magdala, special discounts on drinks for ECS members, possible extension until 07:00 (nº4 on map p6)

Monday 21st March 2011

08:00-09:00 REGISTRATION
Venue: Palacio de Congresos - Calle Plocia (nº1 on map p6)

09:00 OPENING
Venue: Palacio de Congresos, Main Conference Room

INVITED TALK

09:30 UNDERSTANDING GREY SEAL DEMOGRAPHICS IN THE UK
Paddy Pomeroy, C. Duck, D. Thompson, J. Harwood L. Thomas, S. Smout, R. King

ECOLOGY

10:00 THE USE OF ECOLOGICAL TRACERS FOR DISCRIMINATING DOLPHIN POPULATION STRUCTURE: THE CASE OF THE SHORT-BEAKED COMMON DOLPHIN *DELPHINUS DELPHIS* IN EUROPEAN ATLANTIC WATERS

Florence Caurant, Paco Bustamant, Tiphaine Chouvelon, Virginie Lahaye Lahaye, Paula Mendez-Fernandez, Jennifer Learmonth, Graham Pierce, Emer Rogan, Jérôme Spitz, Vincent Ridoux

10:15 FEEDING ECOLOGY OF HARBOUR PORPOISES (*PHOCOENA PHOCOENA*) IN GERMAN WATERS

Anita Gilles, Heidi Andreasen, Michael J. Walton, Ursula Siebert

10:30 LONG-TERM ECOLOGICAL SEGREGATION AMONG THE NW IBERIAN PENINSULA ODONTOCETE SPECIES AS EVIDENCED USING ECOLOGICAL TRACERS

Paula Méndez, Paco Bustamante, Tiphaine Chouvelon, Marisa Ferreira, Angel Gonzalez, Alfredo Lopez, Graham Pierce, Fiona Read, Begoña Santos, Jérôme Spitz, José Vingada, Florence Caurant

10:45 USING ECOLOGICAL TRACERS TO HELP DIFFERENTIATE POPULATIONS: THE CASE OF BOTTLENOSE DOLPHINS IN IRELAND

Emer Rogan, Ailbhe Kavanagh, Brendan McHugh, Anneli Englund, Simon Ingram

11:00 TO EAT OR NOT TO EAT: RISK EFFECTS AND DUSKY DOLPHIN BIOENERGETICS

Mridula Srinivasan, William Grant, Todd Swannack, Jolly Rajan, Bernd Wursig

COFFEE BREAK 11:15 – 12:00

ECOLOGY (2)

12:00 **THE HABITAT UTILISATION AND BEHAVIOURAL ECOLOGY OF MINKE WHALES WITHIN THE NORTH ATLANTIC: A COMPARATIVE MULTI-SITE APPROACH**

Michael J. Tetley, Kevin Robinson, Ursula Tscherter, Hermann Bárðarson, Gay Mitchelson-Jacob

12:15 **DOES DISSOLVED OXYGEN PLAY A ROLE IN CUVIER'S BEAKED WHALE HABITAT SELECTION? A COMPARISON BETWEEN THREE STUDY AREAS IN THE WESTERN MEDITERRANEAN SEA.**

Caterina Lanfredi, Arianna Azzellino, Angela D'Amico, Marina Ampolo Rella, Michela Podestà, Gianni Pavan, Cristina Francia

12:30 **MIGRATION OF BALEEN WHALES IN RELATION TO THE NORTH ATLANTIC SPRING BLOOM**

Fleur Visser, Karin Louise Hartman, Graham J Pierce, Vasilis D Valavanis, Jef Huisman

LUNCH BREAK 12:45 – 15:00

BEHAVIOUR

15:00 **TESTING THE EFFECTS OF AN ACOUSTIC HARASSMENT DEVICE ON THE BEHAVIOUR OF HARBOUR PORPOISES (*PHOCOENA PHOCOENA*)**

Caroline Hoeschle, Miriam J. Brandt, Ansgar Diederichs, Klaus Betke, Georg Nehls

15:15 **EXTREME DIVE SYNCHRONY AND ACOUSTIC COORDINATION IN A PAIR OF LONG-FINNED PILOT WHALES (*GLOBICEPHALA MELAS*) IN THE WESTERN MEDITERRANEAN**

Peter L. Tyack, Alessandro Bocconcelli, Ana Cañadas, Leigh S. Hickmott, Nicholas MacFarlane, Laela Sayigh, J. A. Vázquez, Frants H. Jensen

15:30 **FORAGING BEHAVIOUR OF LONG-FINNED PILOT WHALES (*GLOBICEPHALA MELAS*) IN NORTHERN NORWAY**

Ricardo Antunes, Ana Catarina Alves, Petter Kvadsheim, Patrick J.O. Miller

15:45 **RESPONSES OF BOTTLENOSE DOLPHIN SOCIAL BEHAVIOUR TO CHANGING COMMERCIAL TRAWLING PRACTICES: PAST AND PRESENT**

Ina C. Ansmann, Guido J. Parra, B. Louise Chilvers, Janet M. Lanyon

COFFEE BREAK 16:00 – 16:45

POPULATION STUDIES (1)

16:45 **FURTHER ACOUSTIC INSIGHTS INTO THE MEDITERRANEAN FIN WHALE MIGRATION AND POPULATION IDENTITY**

Manuel Castellote, Carla Álvarez,Sophie Laran, Gabriella La Manna, Manel Gazo, Michele Manghi, Marc O. Lammers

17:00 **NORTH ATLANTIC FIN WHALE (*BALAENOPTERA PHYSALUS*) POPULATION STRUCTURE REVISITED: RESOLVING CONTRADICTIONS BETWEEN RESULTS FROM ALLOZYME AND NEUTRAL GENETIC MARKERS**

Morten Tange Olsen, Emmelie Lidh, Martine Bérubé, Christophe Pampoulie, Anna Daníelsdóttir, Gisli Vikingsson, Christian Ramp, Richard Sears, Per Palsbøll

17:15 **MITOGENOMIC STUDIES OF THE KILLER WHALE**

Andrew Foote, Thomas Gilbert, Phillip Morin

17:30 **ECOLOGY OF BOTTLENOSE DOLPHINS IN THE SOUTH OF THE IBERIAN PENINSULA**

Philippe Verborgh, Susana García-Tiscar, Renaud de Stephanis, Pauline Gauffier, Ruth Esteban, Cristina Chico, Carolina Jiménez Torres, João Nuno Gonçalves, Joana Castro, Angel Baltanás, Bruno Claro, Sergi Pérez, Ester Molina

POSTER SESSION

17:45 – 20:00 **POSTER SESSION I (UNEVEN NUMBERS)**
Venue: Palacio de Congresos, Poster Room 1 and 2

SOCIAL PROGRAMME

20:00 – 22:00 **AGM MEETING SPANISH CETACEAN SOCIETY (SEC)**
Venue: Palacio de Congresos, Main Conference Room

20:00 **GUIDED VISIT OF CADIZ**, see information at the entrance

21:00 - 03:00 **SPECIAL PARTY FOR THE 25 ANNIVERSARY OF THE ECS CONFERENCE**
Venue: Bar Magdala, special discounts on drinks for ECS members, possible extension until 07:00 (nº4 on map p6)

Tuesday 22nd March 2011

Venue: Palacio de Congresos, Main Conference Room

ACOUSTICS

09:00 **VOCAL MATCHING OF FREQUENCY-MODULATIONS OF SONAR SIGNALS BY LONG-FINNED PILOT WHALES (*GLOBICEPHALA MELAS*)**

Ana Catarina Alves, Ricardo Antunes, Frans-Peter Lam, Petter Kvadsheim, Patrick Miller

09:15 **LONG-TERM PASSIVE ACOUSTIC MONITORING OF THE MOVING PATTERNS OF CETACEANS IN THE ISTANBUL STRAIT**

Ayhan Dede, Ayaka Amaha Öztürk, Tomonari Akamatsu, Arda M. Tonay, Bayram Öztürk

09:30 **DO DOLPHINS USE CONTEXT-SPECIFIC SOCIAL SIGNALS IN THEIR COMMUNICATION? VOCALIZATIONS AND UNDERWATER BEHAVIOUR OF FREE-RANGING BOTTLENOSE DOLPHINS**

Bruno Diaz Lopez

09:45 **DIVERSITY OF BIPHONIC AND MONOPHONIC CALLS IN THE REPERTOIRES OF KILLER WHALES FROM BRITISH COLUMBIA AND KAMCHATKA**

Olga Filatova, John Ford, Volker Deecke, Alexandr Burdin, Erich Hoyt

10:00 **PASSIVE ACOUSTIC MONITORING OF BELUGA PRESENCE AND FEEDING IN CUMBERLAND SOUND**

Marianne Marcoux, Steven H. Ferguson, Yvan Simard, Bernard Leblanc, Eric Primeau, Aaron T. Fisk

10:15 **HARBOUR PORPOISES ARE DETERRED BY SIMULATED PILE DRIVING NOISE**

Jakob Tougaard, Line Anker Kyhn, Mats Amundin, Daniel Wennerberg, Carolina Bordin

10:30 **ACOUSTIC ECOLOGY OF MARINE MAMMALS IN THE ANTARCTIC COASTAL OCEAN**

Ilse Van Opzeeland, Sofie Van Parijs, Lars Kindermann, Olaf Boebel

COFFEE BREAK 10:45 – 11:30

INVITED TALK

11:30 **AN ACCIDENTAL LONG-TERM STUDY OF KILLER WHALES**

Rob William

CONSERVATION (1)

12:00 **USING LONG-TERM DATASETS TO ASSESS THE POTENTIAL RISK OF SHIP STRIKE TO CETACEANS IN THE ASCOBANS REGION**

Peter G H Evans, Mick E. Baines, Pia Anderwald, Paul D Jepson, Rob Deaville

12:15 **POPULATION STRUCTURE OF HARBOUR PORPOISES IN THE GREATER BALTIC REGION: EVIDENCE OF SEPARATION BASED ON GEOMETRIC MORPHOMETRIC COMPARISONS**

Anders Galatius, Carl Christian Kinze, Jonas Teilmann

12:30 **INVESTIGATING HARBOUR PORPOISE DISTRIBUTIONS IN THE INNER HEBRIDES USING A LONG TERM, OPPORTUNISTICALLY COLLECTED, DATASET: A CRITICAL ASSESSMENT OF THEIR UTILITY FOR INFORMING FUTURE MANAGEMENT.**

Olivia Harries, Jonathan Gordon, Len Thomas

12:45 **QUANTIFYING EFFECTS OF SONAR ON CETACEANS: OBSERVATIONS AND DOSE-RESPONSE RELATIONSHIPS OF AVOIDANCE OF SONAR BY FREE-RANGING KILLER WHALES (*ORCINUS ORCA*)**

Patrick J. O. Miller; Petter Kvadsheim, Frans-Peter A. Lam, Peter L. Tyack, Sanna Kuningas, Paul J. Wensveen, Ricardo N. Antunes, Ana Catarina Alves Lars Kleivane, Michael A. Ainslie

LUNCH BREAK 13:00 – 15:00

13:00 – 14:15 **ANNUAL STUDENT MEETING**
Venue: Palacio de Congresos, Main Conference Room

13:00 – 14:15 **MEETING OF NATIONAL CONTACT PERSONS (NCP)**
Venue: Palacio de Congresos, room to be determined

CONSERVATION (2)

15:00 **DURATION OF RAMMING PROCEDURE HAS A CLEAR EFFECT ON DISPLACEMENT OF HARBOUR PORPOISES**

Ansgar Diederichs, Miriam J. Brandt, Georg Nehls

15:15 **THE IMPORTANCE OF LONG-TERM DATASETS FOR CONSERVING THE IBERIAN HARBOUR PORPOISE POPULATION**

Fiona L. Read, Ángel F. González, Marisa Ferreira, Alfredo López, José Vingada, M. Begoña Santos, Graham J. Pierce

15:30 **TWO DECADES OF HEALTH ASSESSMENT OF HARBOUR PORPOISES FROM THE GERMAN NORTH SEA**

Ursula Siebert, Henrike Seibel, Kristina Lehnert, Ilka Hasselmeier, Sabine Mueller, Ellen Prenger-Berninghoff, Peter Wohlsein

15:45 **USING LONG-TERM DATASETS TO REALIGN THE BOSTON TRAFFIC SEPARATION SCHEME TO REDUCE THE RISK OF SHIP STRIKE TO RIGHT AND OTHER BALEEN WHALES**

Michael Thompson, Jake Levenson

COFFEE BREAK 16:00 – 16:45

POPULATION STUDIES (2)

16:45 **ADAPTED PHOTO AND VIDEO SURVEILLANCE METHODS ON STELLER SEA LION ROOKERIES FOR LONG TERM MONITORING PROGRAM**

Alexey Altukhov, Vladimir Burkanov

17:00 **THE UK CETACEAN STRANDINGS INVESTIGATION PROGRAMME- 20 YEARS OF RESEARCH INTO UK STRANDINGS**

Rob Deaville, John Baker, Jason Barley, Andrew Brownlow, James Barnett, Jim Chimonides, Nick Davison, Robin Law, Jan Loveridge, Bob Monies, Tony Patterson, Rod Penrose, Matthew Perkins, Robert Reid, Harry Ross, Vic Simpson; Stella Turk, Paul Jepson

17:15 **TESTING A POWERED PARAGLIDER FOR ABUNDANCE COUNTS AND PHOTOID OF COASTAL BELUGA (*DELPHINAPTERUS LEUCAS*) AGGREGATIONS IN THE WESTERN SEA OF OKHOTSK, RUSSIA**

Olga Shpak

17:30 **LONG TERM SITE FIDELITY AND ABUNDANCE OF BOTTLENOSE DOLPHINS USING THE SHANNON ESTUARY, WESTERN IRELAND**

Simon N. Ingram, Anneli M. Englund, Fábio G. Daura-Jorge,Emer Rogan

POSTER SESSION

17:45 – 20:00 **POSTER SESSION II (EVEN NUMBERS)**
Venue: Palacio de Congresos, Poster Room 1 and 2

SOCIAL PROGRAMME

20:00 – 22:00 **VIDEO SESSION**
Venue: Palacio de Congresos, Main Conference Room

22:00 – 03:00 **SPECIAL PARTY AT THE OCCASION OF CIRCE'S 10TH ANNIVERSARY**
Venue: Bar Magdala, special discounts on drinks, extension until 07:00 (nº4 on map p6)

Wednesday 23rd March 2011

Venue: Palacio de Congresos, Main Conference Room

NATURAL HISTORY

09:00 **IMAGING OF ODONTOCETE COCHLEA THROUGH SCANNING AND TRANSMISSION ELECTRON MICROSCOPY**

Maria Morell, Marc Lenoir, Thierry Jauniaux, Willy Dabin, Marisa Ferreira, Iranzu Maestre, Eduard Degollada, Chantal Cazevieille, José-Manuel Fortuño, Jean-Luc Puel, Michel André

09:15 **THE PORPOISE OF SURVEILLANCE: REVIEW OF 20 YEARS OF HARBOUR PORPOISE STRANDINGS IN THE UK**

Andrew Brownlow, John Baker, James Barnett, Jim Chimonides, Geoff Foster Nick Davison, Robert Deaville, Robin Law, Jan Loveridge, Bob Monies, Tony Patterson, Rod Penrose, Robert Reid, Vic Simpson, Stella Turk, and Paul D. Jepson

09:30 **A 20 YEAR REVIEW OF ACUTE AND CHRONIC GAS AND FAT EMBOLIC LESIONS IN UK-STRANDED CETACEANS: CETACEAN DECOMPRESSION SICKNESS?**

Paul D. Jepson, Rob Deaville, Yara Bernaldo de Quirós, Tony Patterson, Eva Sierra, Ann M. Pocknell, Ana Godinho, Harry M. Ross, Simona Saccini, John R. Baker, Manuel Arbelo, Robert J. Reid, Jesus de la Fuente, Adrian Colloff, Nick Davison, Rod Penrose, Matthew Perkins, Andrew A Cunningham, Antonio Fernandez

09:45 **POST-EPIZOOTIC CHRONIC ENCEPHALITIS DUE TO DOLPHIN MORBILLIVIRUS (DMV) AS A THREATENING DISEASE IN THE MEDITERRANEAN STRIPED DOLPHIN (STENELLA COERULOALBA)**

Mariano Domingo, Sara Soto, Toni Raga, Llliane Ganges, Enric Vidal, Rocio Gonzalez, Irene Zorrilla, Alberto Marco

10:00 **NEW EVIDENCE OF A RELATIONSHIP BETWEEN PCB AND THE CAUSE OF DEATH OF NORTH SEA HARBOUR PORPOISES**

Thierry Jauniaux, Krishna Das, Jan Haelters, Thierry Jacques, Jeremy Kiszka, Sylvain Pezeril, Valérie Stekke, Liesbeth Weijs, Freddy Coignoul

10:15 **FIRST INVESTIGATION OF INTER-SPECIES DIFFERENCES IN BIOMARKER RESPONSES AND POPS LEVELS IN TWO MYSTICETE SPECIES (*BALAENOPTERA PHYSALUS* AND *BALAENOPTERA EDENI*) OF GULF OF CALIFORNIA (MEXICO)**

M.Cristina Fossi, Jorge Urban, Silvia Maltese, Cristina Panti, Daniele Coppola, Silvia Casini, Lorenzo Rojas-Bracho, Begoña Jimenez, Juan Munoz, Letizia Marsili

COFFEE BREAK 10:30 – 11:15

INVITED TALK

11:15 **LONG-TERM CETACEAN RESEARCH IN THE ALBORAN SEA TO IMPROVE ECOLOGICAL UNDERSTANDING AND INFORM CONSERVATION**
Ana Cañadas

POPULATION STUDIES (3)

11:45 **A TPOD DETECTION FUNCTION OBTAINED BY VISUAL OBSERVATIONS MAY BE USED TO ASSESS PORPOISE DENSITY ACOUSTICALLY**
Line A. Kyhn, Jakob Tougaard, Thomas Len, Linda Rosager Duve, Joanna Steinback, Mats Amundin, Genevieve Desportes, Jonas Teilmann

12:00 **COMPARING ABUNDANCE AND TURNOVER OF BLAINVILLE'S BEAKED WHALES AT A NAVY RANGE AND A CONTROL SITE IN THE BAHAMAS**
Diane Claridge, Leigh Hickmott, Charlotte Dunn, John Durban

12:15 **LONG-TERM PHOTO-IDENTIFICATION STUDY OF FIN WHALES IN THE PELAGOS SANCTUARY (NW MEDITERRANEAN)**
Margherita Zanardelli Sabina Airoldi, Pierre Beaubrun, Martine Bérubé, J. Fabrizio Borsani, Alexandre Gannier, Christophe Guinet, Philip Hammond, Maddalena Jahoda, Giancarlo Lauriano, Giuseppe Notarbartolo di Sciara, Simone Panigada

LUNCH BREAK 12:30 – 14:45

POPULATION STUDIES (4)

14:45 **MONITORING CETACEANS POPULATIONS THROUGH AERIAL SURVEYS IN THE CENTRAL MEDITERRANEAN SEA**
Simone Panigada, Giancarlo Lauriano, Nino Pierantonio, Greg Donovan

15:00 **CONSTRUCTING THE NULL HYPOTHESIS FOR LONG TERM SERIES OF STRANDING DATA: TEMPORAL AND SPATIAL CONSIDERATIONS**
Helene Peltier, Olivier Van Canneyt, Willy Dabin, Pierre Daniel, Ghislain Doremus, Laurence Gonzalez, Vincent Ridoux

15:15 **MODELLING SPERM WHALE HABITAT PREFERENCE AROUND THE BALEARIC ISLANDS**
Enrico Pirotta, Jason Matthiopoulos, Luke Rendell

15:30 WHITE-BEAKED DOLPHINS IN THE BARENTS SEA: DISTRIBUTION AND SPATIAL ASSOCIATIONS WITH PREY

Johanna Fall, Mette Skern-Mauritzen, Anders Fernö

COFFEE BREAK 15:45 – 16:30

WORKSHOP REPORTS

16:30 – 17:30 REPORTS ON THE PROGRESS AND OUTCOMES OF THE WORKSHOPS HELD ON THE 19TH AND 20TH MARCH 2011

AGM

17:30 – 19:30 ANNUAL GENERAL MEETING

SOCIAL PROGRAMME

21:00 DINNER
Venue: Claustro del Convento de San Francisco - Plaza San Francisco

23:30 – 03:00 DANCING - OPEN BAR.
Venue: Claustro del Convento de San Francisco - Plaza San Francisco

03:00 – 07:00 SPECIAL CLOSURE PARTY
Venue: Bar Magdala, special discounts on drinks (nº4 on map p6)

Thursday 24th March 2011

EXCURSION

Whale watching trip in the Strait of Gibraltar (weather-dependent)
See information at the entrance.

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DESIGNING NATURA 2000 MARINE PROTECTED AREAS IN NORTHEASTERN SPAIN: THE USE OF PASSIVE ACOUSTIC RECORDERS AS A TOOL FOR LONG TERM MONITORING OF CETACEANS.

Carla A. Chicote, Manuel Castellote, Marc O. Lammers, Manel Gazo

A02

THE UNDERWATER ACOUSTIC ACTIVITY OF CAPTURED BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*): TWO KINDS OF THE COMMUNICATIVE SYSTEMS?

Alexandr Agafonov, Elena Panova Vladimir Baranov

A03

FROM OFFLINE RECORDINGS TO REAL-TIME ANALYSIS OF OCEAN NOISE AND ACOUSTICS EVENTS AT UNDERWATER OBSERVATORIES

Michel André, Mike van der Schaar, Serge Zaugg, Ludwig Houégnigan, Antonio M. Sánchez, Alex Mas

A04

VOCAL PRODUCTION BY FREE-RANGING BOTTLENOSE DOLPHIN MOTHER-INFANT PAIRS DURING FEEDING ACTIVITIES

Selma Bajraktarevic, Bruno Diaz Lopez, Virginia Sciacca

A05

PROBABILITY OF ACOUSTIC DETECTION OF BEAKED WHALES FROM DEEP AND SHALLOW HYDROPHONES.

Marta Bayona Marques, Len Thomas, Mark Johnson, Natacha Aguilar de Soto

A06

COMPARISON OF HARBOUR PORPOISE (*PHOCOENA PHOCOENA*) AND DOLPHIN DETECTABILITY BETWEEN T-PODS AND C-PODS

Mary Coleman, Pia Anderwald, Anneli Englund, Emer Rogan

A07

DIFFERENCES IN SPERM WHALE AND PILOT WHALE REACTIONS TO PLAYBACK OF KILLER WHALE SOUNDS

Charlotte Curé, Ricardo Antunes, Ana Catarina Alves, Fleur Visser, Patrick J. O. Miller

A08

COMPARISON OF STATIC ACOUSTIC MONITORING DEVICES

Michael Dähne, Anja Gallus, Ursula Siebert, Harald Benke

A09

USING PASSIVE ACOUSTIC MONITORING TO DESCRIBE THE HABITAT USE OF BOTTLENOSE DOLPHIN (*TURSIOPS TRUNCATUS*) IN THE RIA DE AROUSA (NW SPAIN)

Juan José Dios, Luz Santos, Ángela Llavona, Alfredo López

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A COMPARISON OF THE DISCRETE CALL REPERTOIRES OF NORTHEAST ATLANTIC KILLER WHALES (*ORCINUS ORCA*)

Anne-Valerie Duc, Filipa I.P. Samarra, Volker B. Deecke, Patrick J.O Miller

A11

INVESTIGATING VARIATION IN WHISTLE STRUCTURE BETWEEN THREE PARAPATRIC BOTTLENOSE DOLPHIN COMMUNITIES IN IRISH COASTAL WATERS

Anneli Englund, Simon Ingram, Emer Rogan

A12

SEARCH TACTICS OF ECHOLOCATING MALE SPERM WHALES IN A BIMODAL FORAGING MODE

Andrea Fais, Mark Johnson, Natacha Aguilar, Peter Madsen

A13

MODELING THE PHENOLOGY OF THE HARBOUR PORPOISE (*PHOCOENA PHOCOENA*) IN THE GERMAN BIGHT USING DATA FROM STATIC ACOUSTIC MONITORING

Marco Gauger, Werner Piper

A14

FROM DATA BASE TO GENERAL IDEA HOW ECHOLOCATION WORKS- COMPARISON OF THREE GROUPS OF VERTEBRATES: CETACEANS, BATS AND BIRDS.

Malgorzata Gazda

A16

VARIABILITY OF THE FREQUENCY MODULATION SHAPE IN DISCRETE CALLS OF KAMCHATKAN FISH-EATING KILLER WHALES (*ORCINUS ORCA*).

Mikhail Guzeev, Tatyana Ivcovich, Olga Filatva, Alexander Burdin

A17

FROM T-PODS TO C-PODS - AN APPROACH TOWARDS DATA COMPARABILITY

Sophie Hansen, Ursula Verfuss, Anja Gallus, Kathrin Krügel, Jens Koblitz, Harald Benke

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FALSE POSITIVE TESTING OF CPOD DATA FROM CARDIGAN BAY - HUMANS VS. THE ALGORITHM!

Gemma James, Elisa Girola, Rhiannon Meier, Hanna Nuuttila, Betty Zocholl

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Evgeniya Kunchevskaya, Roman Belikov, Vsevolod Bel'kovich

A20

MONITORING COMMON BOTTLENOSE DOLPHINS AND ANTHROPOGENIC NOISE USING WIDEBAND ACOUSTIC BOTTOM RECORDERS, IN THE PELAGIE ISLANDS (SICILY - MEDITERRANEAN SEA)

Michele Manghi, Gabriella La Manna, Federica Lo Mascolo, Gianluca Sarà, Gianni Pavan

A21

VOCAL ACTIVITY OF SHORT-FINNED PILOT WHALES (*GLOBICEPHALA MACRORHYNCHUS*): WHO IS CALLING?

Jacobo Marrero, Frants.H Jensen, Natacha Aguilar de Soto, Mark Johnson, Peter.T Madsen

A22

AREA MARINE PROTECTED (AMP) AREAS FREE OF ACOUSTIC POLLUTION? CASE EXAMPLES OF NOISE FROM FISHING AND SHIPPING ACTIVITIES IN DEEP-WATER AREAS OF THE MEDITERRANEAN

Ricardo Sagarminaga, Ana Tejedor, Lucia Martina Martin, Albert López-Larrosa, Natacha Aguilar

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DENSITY ESTIMATION OF SMALL CETACEANS WITH STATIC ACOUSTIC DATA LOGGERS. PART 1: TRACKING HARBOUR PORPOISES IN A JUNGLE OF HYDROPHONES

Hanna Katariina Nuuttila, Elisa Girola, Gemma James, Lucy Buckingham, Len Thomas, Nick Tregenza

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Ludmila Osipova, Roman Belikov, Vsevolod Belkovich

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HOW DO HUMPBACK WHALES FIND EACH OTHER? MODELING SOUND LOCALIZATION IN WHALES

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A29

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DEVELOPMENT OF THE SATELLITE HYDROACOUSTIC BUOY FOR MONITORING AND IDENTIFICATION OF MARINE MAMMALS IN FRAME OF THE "OSEO – FASIE" FRENCH - RUSSIAN PROJECT

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DOES DEPLOYMENT DEPTH OF C-PODS AFFECT THE DETECTABILITY OF HARBOUR PORPOISES (*PHOCOENA PHOCOENA*)?

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BEHAVIOUR

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Daniele Zanoni, Marta Acosta Plata, Iva Kovacic

CONSERVATION/MANAGEMENT

C01

SYSTEMS FOR COASTAL DOLPHIN CONSERVATION IN THE LIGURIAN SEA (ARION)

Jessica Alessi Cristina Fiori, Maurizio Wurtz

C02

MODELLING TEMPORAL MARINE MAMMAL OCCURRENCE DURING OFFSHORE PIPELINE CONSTRUCTION IN NW IRELAND

Pia Anderwald, Fleur Visser, Mary Coleman, Anneli Englund, Mark Jessopp, Michelle Cronin

C03

DOES THE LEGACY OF 20TH CENTURY NAVAL WARFARE AFFECT MONITORING BASELINES FOR CETACEANS IN EUROPE?

Mick Baines Maren Reichelt

C04

ASSESSING LONG-RANGE MOVEMENTS OF MEDITERRANEAN SPERM WHALES THROUGH PHOTO-IDENTIFICATION

Eva Carpinelli, Pauline Gauffier, Renaud de Stephanis, Philippe Verborgh, Ruth Esteban, Ana Cañadas, Nino Pierantonio, Sabina Airoldi, Tim Lewis

C06

EFFECTS OF WHALE WATCHING ACTIVITY ON CETACEAN BEHAVIOUR WITHIN FEEDING GROUNDS IN ICELAND

Joshua Isaac Cummings, Edda Elísabet Magnúsdóttir, Marianne Helene Rasmussen

C08

MONITORING CETACEANS IN ANDALUSIA: A NECESSARY TOOL FOR MARINE MANAGEMENT

Manuel Fernández-Casado, Francisco Ruiz, Carolina Fernández, Carolina García, M. Carmen Arroyo, Gabriel Gómez, José Miguel Remón, Julio De la Rosa, Antonio de la Linde, Agustín Barrajón, Diego Moreno, Soledad Vivas, Eduardo Fernández

C09

USING LONG TERM DATA (1989-2008) TO MONITOR CETACEAN DIVERSITY IN THREE OFFSHORE AREA OF THE WESTERN MEDITERRANEAN SEA

Alexandre Gannier, Odile Gannier

C10

THE SIDE-SCAN SONAR: A NEW CONSERVATION TOOL TOWARDS THE PROTECTION OF THE ANTILLEAN MANATEE (*TRICHECHUS MANATUS MANATUS*) IN CARIBBEAN COSTA RICA

Manel Gazo, Rodrigo Villate, Sandra Andraka, MariLuz Parga, León Olivera-Gómez, Daniel González-Socoloske, Carlos Espinoza

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Evgeny Gol'din, Pavel Konoval'chuk

C12

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Laura Mannocci, Emmanuelle Augeraud-Véron, Christophe Barbraud, Willy Dabin, Jean-François Dupuy, Vincent Ridoux

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TOURISTS VIEWPOINT ON DOLPHIN SWIM TOURISM THAT INCORPORATE RESEARCH, EDUCATION AND CONSERVATION INTO ENCOUNTERS IN PONTA DO OURO, MOZAMBIQUE

Diana Rocha, Angie Gullan

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A TRANSFERABLE, SCALABLE MODEL OF RESEARCH EMPOWERMENT - ENGAGING LOCAL PEOPLE IN LONG TERM, COST-EFFECTIVE, SUSTAINABLE AND SYSTEMATIC RESEARCH INTO GREY SEALS (*HALICHOERUS GRYPUS*) IN SOUTHWEST ENGLAND TO INFORM THEIR CONSERVATION.

Sue Sayer, Bex Allen, Abby Crosby, Kate Hockley, Dan Jarvis, Derek Spooner

C17

PROJECTE NINAM, A PLATFORM FOR THE STUDY OF CETACEAN AND SEABIRDS IN NORTH CATALONIAN COAST.

Gemma Gonzalez-Potrony, Albert Lopez-Larrosa

C18

DESIGN AND FIELD-TEST OF PORPOISE ALERTING DEVICE (PAL)

Boris Culik, Simon Winkler

ABUNDANCE/DISTRIBUTION

D01

TESTING TWO DIFFERENT PHOTO IDENTIFICATION METHODS TO STUDY COMMON DOLPHINS (*DELPHINUS DELPHIS*) IN THE WESTERN MEDITERRANEAN

Marta Acosta, Ana Cañadas

D02

SPATIO-TEMPORAL VARIABILITIES IN CETACEAN PRESENCE AND DISTRIBUTION IN CENTRAL-WESTERN MEDITERRANEAN SEA

Antonella Arcangeli, Clara Monaco, Eugenio Internullo, Roberto Crosti, Federica Cionci, Ilaria Campana, Letterio Mario Tringali, Stefania Carcassi, Paola Tepsich, Aurelie Moulins; Elisa Muzi, Massimiliano Rosso, Anna Ruvolo

D03

ESTIMATING POPULATION SIZE AND SURVIVAL RATES OF BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) OF THE ALBORAN SEA USING MARK-RECAPTURE METHODS

Monica Arso Civil, Ana Cañadas, Philip Hammond

D04

A LONG-TERM OPPORTUNISTIC PHOTO-IDENTIFICATION STUDY OF WHITE-BEAKED DOLPHINS (*LAGENORHYNCHUS ALBIROSTRIS*) IN FAXAFLÓI AND SKJÁLFANDI BAYS, ICELAND

Chiara Giulia Bertulli, Edda Magnúsdóttir, Hermann Bárðarson, Michael James Tetley, Marianne Helene Rasmussen

D05

SIMULTANEOUS SURVEY OF BOTTLENOSE DOLPHIN (*TURSIOPS TRUNCATUS*) IN FIVE SPECIAL AREAS OF CONSERVATION IN CANARY ISLANDS.

Juliana Castrillón, Mercedes Reyes, Leire Ruiz, Enrique Pérez-Gil, Bernd Braderlau, Silvana Neves, Mónica Pérez-Gil, Marisa Tejedor, Antonella Servidio, Rafael Herrero, Teo Lucas, Erika Urquiola, Vidal Martin

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DISTRIBUTION OF HARBOUR PORPOISE (*PHOCOENA PHOCOENA*) IN THE SOUTH OF PORTUGAL

Joana Castro, João Nuno Gonçalves, Patrícia Alexandre, Renaud de Stephanis, Philippe Verborgh, Marina Laborde

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SURVIVAL RATE, ABUNDANCE AND RESIDENCY OF BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) IN THE STRAIT OF GIBRALTAR

Cristina Chico, Carolina Jiménez Torres, Sergi Peréz, Philippe Verborgh, Pauline Gauffier, Ruth Esteban, Joan Giménez, Mª Eugenia Santos, Renaud de Stephanis

D08

FIRST RESIGHTING OF KILLER WHALES (*ORCINUS ORCA*) OFF AZORES ARCHIPELAGO

Andrea Cosentino, Karin Louise Hartman

D09

HARBOUR PORPOISE DISTRIBUTION AROUND THE UK - RECORDS FROM AERIAL SURVEYS FOR WATERBIRDS

James Darke, Gareth Bradbury

D10

COASTAL COMMON BOTTLENOSE DOLPHINS'S FIRST RESIGHTINGS OFF SESIMBRA, PORTUGAL

Mª Belén Dorribo, Nina Vieira, Inés Carvalho, Cristina Brito

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Odile Gannier, Alexandre Gannier

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Marisa Tejedor, Vidal Martín, Mónica Pérez-Gil, Enrique Pérez-Gil, Leire Ruiz, Mercedes Reyes, Antonella Servidio, Juliana Castrillón, Bernd Brederlau, Silvana Neves

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SHIP STRIKES - THE BEHAVIOUR OF FIN WHALES (*BALAENOPTERA PHYSALUS*) IN PRESENCE OF FAST-FERRIES IN THE BAY OF BISCAY.

Ana Sofia Aniceto, Dylan Walker, Cock van Oosterhout, Michael Tetley

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BOTTLENOSE DOLPHINS MOVEMENTS IN RELATIONS WITH ANTHROPIC ACTIVITIES IN MAJORCA (BALEARIC ISLANDS).

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ALBACORE TUNA FISHERIES AND MEGAFAUNA BYCATCH: COMPARING DRIFT NETS AND PAIR TRAWLING USING FISHERIES RISK ASSESSMENT

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HIGH RISK AREA OF COLLISION : A MULTI-SPECIFIC APPROACH IN THE MEDITERRANEAN SEA BASED ON THE MODELISATION OF THE DISTRIBUTION AND PREFERENTIAL HABITAT

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STUDY ON THE CETACEANS-FISHERIES INTERACTIONS IN GALICIAN AND CANTABRIAN SEA WATERS (NORTHERN SPAIN) THROUGH FISHING TRIPS

Jose Antonio Garcia Jose Martinez-Cedeira, Xesús Morales, Alfredo López

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BEHAVIOURAL RESPONSES OF RISSO'S DOLPHIN, *GRAMPUS GRISEUS*, TO REMOTE BIOPSY SAMPLING.

Karin L. Hartman, Anja Wittich, Dália Neves, José M. N Azevedo

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Ana Marçalo, Diana Feijó, Marisa Ferreira, Hélder Araújo, Jorge Santos, Isabel Oliveira, Silvia Monteiro, Joana Miodinski, Yorgos Stratoudakis, José Vingada

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HOW MANY STRAND? OFFSHORE MARKING AND COASTAL RECAPTURE OF CETACEAN CARCASSES.

Jose Martinez-Cedeira, Xesus Morales, Jose Antonio Garcia, Antonio Parada, Pablo Covelo, Alfredo Lopez

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STUDYING THE INTERACTIONS BETWEEN CETACEANS AND FISHING IN GALICIA (NW SPAIN) THROUGH INTERVIEWS TO FISHERMEN.

Xesus Morales, Jose Martinez-Cedeira, Jose Antonio Garcia, Alfredo Lopez

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Maria Jose Tello Ruiz

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POSSIBLE CAUSES FOR A MASS STRANDING OF HARBOUR PORPOISE IN DANISH WATERS IN 2005

Andrew John Wright, Jonas Teilmann, Marie Maar, Christian Mohn

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THE USE OF COMPUTERIZED TOMOGRAPHY AND MAGNETIC RESONANCE IMAGING IN FORENSIC INVESTIGATION: NECROPSIES WITHOUT OPENING DOLPHINS?

Josep M. Alonso-Farré, Manuel Gonzalo-Orden, Daniel Barreiro, Andrés Barreiro, María Llarena-Reino, Eduard Degollada

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Manuel Arbelo, Eva Sierra, Vidal Martín, Marisa Tejedor, Yara Bernaldo de Quirós, Marisa Andrada, Antonio Fernández

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MORPHOLOGICAL IDENTIFICATION OF PARASITES FOUND IN THE STOMACH CONTENTS OF BYCAUGHT STRIPED DOLPHINS (*STENELLA COERULEOALBA*) FROM TURKISH EASTERN MEDITERRANEAN SEA COAST

Isil Aytemiz, Ayhan Dede, Erdem Danyer, Arda Tonay

M04

SYMPTOMS OF IMMUNOLOGICAL DECREASE IN BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) AND SHORT-FINNED PILOT WHALES (*GLOBICEPHALA MACRORHYNCHUS*) IN THE SOUTH WEST OF TENERIFE

María del Mar Cañado, Marcos González, Jacobo Marrero

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Nick Davison, Lorraine Perrett, Robin Law, Claire Dawson, Emma Stubberfield, Bob Monies Rob Deaville Paul Jepson

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APPROXIMATION TO THE PATHOLOGY AND CAUSES OF DEATH OF STRANDED CETACEANS IN THE SOUTHWESTERN COAST OF SPAIN (2001 - 2005)

Jesús De la Fuente, Librado Carrasco, Manuel Arbelo, Antonio Fernández

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CONSIST OF MICROFLORA OF THE UPPER RESPIRATORY TRACT OF THE BLACK SEA BOTTLENOSE DOLPHIN (TURSIOPS TRUNKATUS) IN CAPTIVITY CONDITION.

Tatyana Denisenko, Olga Sokolova, Elena Komogorova, Yuriy Mikhalev

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Kristina Lehnert, Sabine Müller, Henrike Seibel, Iwona Pawliczka(3), Ursula Siebert, Veronika Hellwig

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SEVERE THORACIC KYPHOSCOLIOSIS IN A SUBADULT COMMON DOLPHIN (*DELPHINUS DELPHIS*) BY-CAUGHT IN NORTHERN PORTUGAL

Maria Llarena-Reino, Marisa Ferreira, Isabel Oliveira, José V. Vingada, Josep M. Alonso-Farré

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SUN-INDUCED SKIN LESIONS AND ASSOCIATED RESPONSES IN CETACEANS

Laura M. Martinez-Levasseur, Diane Gendron, Rob Knell, Edel A. O'Toole; Manuraj Singh, Karina Acevedo-Whitehouse

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EVIDENCE OF EXTRAPINEAL MELATONIN PRODUCTION IN THE BOTTLENOSE DOLPHIN (*TURSIOPS TRUNCATUS*)

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Mark E. Hahn, Joy M. Lapseritis, Diana G. Franks, Sibel I. Karchner, Cristina Panti

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PARAMETRIC MODELING OF DOLPHIN DORSAL FIN

Vadim Pavlov, Nikolaj Pankov, Cecile Vincent, Bjarni Mikkelsen, Klaus Lucke

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ACUTE STRESS INDUCED CARDIOMYOPATHY IN CETACEANS STRANDED ALIVE: A HISTOPATHOLOGIC CHARACTERIZATION.

Simona Sacchini, Eva Sierra, Marisa Andrada, Jesús De la Fuente, Daniele Zucca, Pedro Herráez

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IS IT POSSIBLE TO SEX LONG-FINNED PILOT WHALES FROM PROPORTIONS OF THEIR DORSAL FIN?

Juan Manuel Salazar Sierra, Cris Montes Quirce, Philippe Verborgh, Yohan Jaget, Pauline Gauffier, Renaud de Stephanis, Ruth Esteban

M19

COMPLEX POLYSACCHARIDE INCLUSIONS IN SKELETAL MUSCLE OF STRANDED CETACEANS RESEMBLING EQUINE POLYSACCHARIDE STORAGE MYOPATHY: NECROPSY STUDY OF 148 SPECIMENS IN THE CANARY ISLANDS.

Eva Sierra, Antonio Espinosa de los Monteros, Antonio Fernández, Manuel Arbelo, Simona Saccini, Pedro Herráez

M20

THE PRODUCING AND THE USING THE ANTISERUM AGAINST THE IMMUNOGLOBULIN G OF THE STELLER SEA LION (EUMETOPIAS JUBATUS) IN ORDER TO CONDUCT IMMUNO-ECOLOGICAL INVESTIGATIONS OF MARINE MAMMALS.

Olga Sokolova, Irina Ezdakova Tatiana Chebotareva, Tatiana Denisenko

M21

HEALTH SURVEILLANCE ON CETACEANS STRANDED ALONG THE LIGURIAN SEA COAST OF ITALY*

Cristiana Tittarelli, Cristina Casalone, Alessandra Pautasso, Barbara Iulini, Guido Gnone, Claudia Gili, Giovanni Di Guardo, Fulvio Garibaldi, Carlo Ercolini, Walter Mignone

M22

BLOOD GAS AND SERUM ANALYSIS: A NEW APPROACH TO ESTIMATE SURVIVAL CHANCES OF HARBOR SEAL (PHOCA VITULINA) PUPS IN THE GERMAN NORTH SEA

Katharina Andrea Witte, Jörg Driver, Tanja Rosenberger, Sven Adler, Ursula Siebert

M23

MAJOR BEAK DEFORMITY IN AN ADULT COMMON DOLPHIN (*DELPHINUS DELPHIS*) ENTANGLED IN A LONG-LINE IN NORTHERN PORTUGAL

Marisa Ferreira, Josep M. Alonso-Farré, Daniel Barreiro, Maria Llarena-Reino, José Vingada

S01

POST-MORTEM INVESTIGATIONS ON CETACEANS FOUND STRANDED ALONG THE LIGURIAN SEA COAST OF ITALY (2007-2010)*

Barbara Iulini, Alessandra Pautasso, Cristiana Tittarelli, Maria Domenica Pintore, Laura Serracca, Fulvio Garibaldi, Carla Grattarola, Maria Goria, Maria Letizia Fioravanti, Katia Varello, Giovanni Di Guardo, Walter Mignone, Cristina Casalone

S02

THE ROLE OF PATHOLOGY IN DEFINING LIVE CETACEAN STRANDINGS RESPONSE IN THE UK

James Barnett, Robert Deaville, Andrew Brownlow, Bob Reid, Tony Patterson, Vic Simpson, John Baker, Paul Jepson

S03

SPERM WHALE MASS STRANDING IN ITALY: GAS AND FAT EMBOLI ANALYSES.

Yara Bernaldo de Quirós, Simona Sacchini, Oscar González-Díaz, Bárbara Muñoz, Pedro Saavedra, Sandro Mazzariol, Antonio Fernández

S04

CONCENTRATIONS OF HEAVY METALS, PAHS AND PCBS IN SEVEN MALE SPERM WHALES STRANDED IN THE ADRIATIC SEA (MEDITERRANEAN SEA)

Chiara Copat, Roberto Fallico, Margherita Ferrante, Giovanni Arena, Marzia Corona, Alfina Grasso, Gea Oliveri Conti, Irene Monaco, Letterio M. Tringali, Matteo Zuccarello, Salvatore Sciacca

S05

RISSO'S DOLPHIN STRANDINGS IN THE BRITISH ISLES

Sarah Dolman, Nicola Hodgins, Rob Deaville, Paul Jepson, John Baker, Rod Penrose, Bob Reid

S06

MONITORING THE HEALTH STATUS OF MARINE MAMMALS IN THE ANDALUSIAN COAST

Carolina Fernández, Carolina García, Manuel Fernández-Casado, Francisco Ruiz, M. Carmen Arroyo, Gabriel Gómez, José Miguel Remón, Julio De la Rosa, Antonio de la Linde, Agustín Barrajón, Diego Moreno, Soledad Vivas, Eduardo Fernández

S07

UK CETACEAN STRANDINGS INVESTIGATION PROGRAMME: 20 YEARS OF CONTAMINANT STUDIES

Robin Law, Philippe Bersuder, Jon Barber, Thi Bolam, Rob Deaville, Robert Reid, Paul Jepson

S08

A MULTIDISCIPLINARY INVESTIGION OF A SPERM WHALE (*PHYSETER MACROCEPHALUS*) MASS STRANDING IN ITALY

Sandro Mazzariol, Antonio Petrella, Pasquale Troiano, Giuseppe Leonzio, Maristella Giurisato, Federica Marcer, Salvatrice Vizzini, Stefania Gaspari, Gianni Pavan, Michela Podestà, Letizia Marsili, Maria Cristina Fossi, Nicola Zizzo, Chiara Copat, Alexandros Frantzis, Miranda Yara Beraldo de Quiros, Antonio Fernandez, Massimiliano Pennelli, Donato Traversa, Giovanni Di Guardo

S09

STRANDINGS OF CETACEANS IN THE PORTUGUESE SOUTHERN COAST (ALGARVE): EVALUATION OF THE PORTUGUESE STRANDING DATABASE AND CONTRIBUTIONS OF A RECENTLY IMPROVED STRANDING NETWORK.

Lidia Nicolau, Ana Marçalo, Marina Sequeira, Marisa Ferreira, José Vingada

S10

STOMACH CONTENTS OF BOTTLENOSE DOLPHIN STRANDED ALONG THE COASTS OF TUSCANY (NORTH WESTERN MEDITERRANEAN SEA)

Alessia Scuderi, Alessandro Voliani, Cecilia Mancusi, Cristina Pedà, Teresa Romeo

S11

CAN PRESS PROVIDE SOME INSIGHTS ON THE CETACEAN STRANDINGS ON THE TURKISH COASTS?

Reyhan Sönmez, Janset Kankus, Fethi Bengil, Harun Güçlüsoy

S12

CETACEAN STRANDINGS' PATTERNS ON THE PORTUGUESE COAST FROM 1979 TO 2009

Andreia Sousa, Marina Sequeira, Daniel Cleary, Cristina Brito

TALKS

INVITED SPEAKER

21st March 09:30

UNDERSTANDING GREY SEAL DEMOGRAPHICS IN THE UK

Paddy Pomeroy (1), C. Duck (1), D. Thompson (1), J. Harwood (2), L. Thomas (2), S. Smout (1), R. King (2)

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Over a third of the world's grey seals live around the UK, most of them in Scotland. During the last 20 years, UK Natural Environment Research Council's Sea Mammal Research Unit has conducted annual surveys of pup production, an index of population size, augmented by in-depth life-history studies of individuals at particular breeding colonies. Aerial photograph based estimates of grey seal pup production have increased, with pup production increasing by around 6% per annum.
However this overall trend masks a more complex story. Grey seals are colonial breeders and the number of pups born at colonies in some areas has increased substantially (UK east coast) while production at others has remained stable (Inner Hebrides) or declined (Outer Hebrides). Here I describe how individual-based studies inform population models, present the demographic evidence of population change and examine assumptions in models.

21st March 10:00

THE USE OF ECOLOGICAL TRACERS FOR DISCRIMINATING DOLPHIN POPULATION STRUCTURE: THE CASE OF THE SHORT-BEAKED COMMON DOLPHIN *DELPHINUS DELPHIS* IN EUROPEAN ATLANTIC WATERS

Florence Caurant (1), Paco Bustamant (1), Tiphaine Chouvelon (1), Virginie Lahaye Lahaye (1, 2), Paula Mendez-Fernandez (1, 3), Jennifer Learmonth (4), Graham Pierce (4), Emer Rogan (5), Jérôme Spitz (1, 6), Vincent Ridoux (1, 7)

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(3) Universidade do Minho, Department of Biology
(4) Oceanlab®, University of Aberdeen
(5) Department of Zoology, Ecology and Plant Science, University College Cork
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Recent genetic data concluded that common dolphins in the northeast Atlantic constitute a single panmictic population distributed at least from Scotland to Portugal and from the coast to oceanic habitats, leading to the definition of a single northeast Atlantic management unit. The objective of this work was to examine a series of ecological tracers of increasing integration periods (from days to lifetime) in order to better understand possible ecological structures within the northeast Atlantic stock that could suggest that demography would not be necessarily uniform across this vast region. In addition to stomach content data, ecological tracers include fatty acid composition in blubber, carbon and nitrogen isotopic ratios in muscle, cadmium in liver and in kidney. Stomach content analysis show that individuals from oceanic areas strongly differ from those from neritic areas. Fatty acid composition of the blubber separated individuals from Scotland and Ireland from those from France and Spain. Muscle $\delta^{13}C$ and $\delta^{15}N$ isotopic ratios differed significantly between areas and indicated two main groupings constituted of oceanic Bay of Biscay and oceanic Ireland on one side and Iberian Peninsula and neritic Bay of Biscay on the other side. Significant differences were shown in cadmium accumulation rates in the liver between oceanic Bay of Biscay and Ireland (neritic and oceanic) on one hand and neritic Bay of Biscay and Galicia on the other hand. Cadmium bioaccumulation rates in kidney showed significant differences between oceanic Bay of Biscay, Ireland and the Bay of Biscay-Galicia areas. These results suggest that animals from oceanic habitats, animals from northern neritic habitats and animals from southern neritic habitats would not generally have the same habitat use and potentially could constitute fairly distinct demographic sub-units that should be considered as an alternative stock structure hypothesis for a relevant management of this species in this large area.

21st March 10:15

FEEDING ECOLOGY OF HARBOUR PORPOISES (*PHOCOENA PHOCOENA*) IN GERMAN WATERS

Anita Gilles (1), Heidi Andreasen (2), Michael J. Walton (3), Ursula Siebert (1)

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Knowledge of the feeding ecology of top predators is essential in order to elucidate predator-prey dynamics as well as interactions with fisheries; *e.g.* the recovery of the North Sea herring stock has not yet been shown in porpoise diet studies. We investigated inter-annual as well as seasonal variation in the diet of harbour porpoises. We analysed the stomach content of porpoises in the German North and Baltic Sea and adjacent Danish waters using a long term data set (1994-2006). A total of 36 fish taxa could be identified in 120 stomachs. Otolith size was used to estimate the proportion by mass (M) of each species in the diet. Overall, the diet was dominated by goby (Gobiidae spp., 41%M), cod (23%M), sole (15%M), sandeel (Ammodytes spp., 5%M) and herring (4%M). A multivariate analysis revealed significant seasonal and between-year fluctuations in the relative importance of prey fishes: in spring, mainly sandeel, goby and herring contributed with high masses whereas cod was most important in summer. Goby and flatfish species appeared to be more important before 2001, whereas in the period 2002-2006 sandeel, herring and sprat contributed more to the diet. Additionally, the fairly new quantitative fatty acid signature analysis (QFASA) was used on blubber samples of 95 porpoises from the same area and period. QFASA results were different to those of stomach content analysis: QFASA predicted that mean diets consisted mainly of dab (26.6%M), sprat (22.2%M) and herring (15.9%M) in the North Sea. For the Baltic Sea, it was predicted that herring (18.3%M) and sprat (17%M) dominated the diet. As it is envisaged to expand the prey database, the QFASA results are preliminary, but they seem reasonable. This is one of the first study that used QFASA for a harbour porpoise diet study.

21st March 10:30

LONG-TERM ECOLOGICAL SEGREGATION AMONG THE NW IBERIAN PENINSULA ODONTOCETE SPECIES AS EVIDENCED USING ECOLOGICAL TRACERS

Paula Méndez (1, 2, 3), Paco Bustamante (1), Tiphaine Chouvelon (1), Marisa Ferreira (4), Angel Gonzalez (5), Alfredo Lopez (3), Graham Pierce (6), Fiona Read (5), Begoña Santos (7), Jérôme Spitz (1), José Vingada (4), Florence Caurant (1)

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(6) University of Aberdeen
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The waters off the Northwest of the Iberian Peninsula are characterised by high marine biodiversity and productivity, supported by the nutrients made available by seasonal upwelling. Sixteen species of cetaceans have been recorded in the area and niche partitioning could allow their coexistence. We analysed ecological tracers with different integration periods sampled from five odontocete species inhabiting this area: common dolphin (*Delphinus delphis*), harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*), striped dolphin (*Stenella coeruleoalba*) and long-finned pilot whale (*Globicephala melas*). Renal cadmium (with an integration time of years) has been shown to be a tracer of dietary and habitat segregation (diet based on cephalopods vs fish and oceanic habitat vs neritic). $\delta^{13}C$ and $\delta^{15}N$ signatures integrate information on habitat and trophic level over months (in muscle) and years (in teeth). Our results for $\delta^{13}C$ and $\delta^{15}N$ ratios in muscle suggest two significantly ($p < 0.01$) different groups: common dolphin and striped dolphins ($\delta^{13}C$ ranging from -18.49 to -16.03 and $\delta^{15}N$ from 9.84 to 13.63) and harbour porpoise, bottlenose dolphin and pilot whales ($\delta^{13}C$ from -17.55 to -15.74 and $\delta^{15}N$ from 11.01 to 17.12). Significant differences between both groups ($p < 0.01$) were also apparent in the cadmium bioaccumulated in the kidney and in the $\delta^{13}C$ and $\delta^{15}N$ ratios in teeth, with the striped dolphins exhibiting the highest levels of cadmium. These results suggest a long term habitat or dietary segregation among species. Striped and common dolphins feed on pelagic prey species in oceanic waters, whereas porpoises, bottlenose dolphins and pilot whales feed in more coastal and/or on demersal prey. Through this study, ecological tracers showed their ability to determine niche segregation among marine mammal species

21st March 10:45

USING ECOLOGICAL TRACERS TO HELP DIFFERENTIATE POPULATIONS: THE CASE OF BOTTLENOSE DOLPHINS IN IRELAND

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Recent genetic work on bottlenose dolphins along the west of Ireland has revealed at least two genetically distinct populations: the resident group from the Shannon estuary plus a small group from Cork Harbour (n = 6) and a more mobile coastal population. Fine scale structure in the two coastal populations is consistent with results from photo-identification studies, which suggests there is no overlap between these two adjacent populations. In the absence of physical barriers to gene flow, the question arises - why are these two populations separate and is feeding specialisation a contributing factor? To address this, stable isotopes of C, N and S were extracted from 46 dolphin biopsy samples from four sites (Cork, Mayo, Shannon and Connemara) during 2008 and 2009. ANOVA and post-hoc tests showed significant differences in ï ¤N between Cork and Mayo and Cork and Connemara, suggesting that there is a difference in the trophic position between animals feeding in these locations. Post-hoc tests for deltaS showed that the animals in Cork Harbour had significantly lower levels of deltaS (mean = 16.16) than all other areas. Highest deltaS values are expected from open water systems, consistent with the pattern of increasing S from Cork harbour (in the Celtic Sea) to the more Atlantic system of Connemara and Mayo, with the estuarine Shannon system in between. When samples were combined into the two putative populations: Cork-Shannon and Mayo-Connemara, only deltaN showed statistically significant differences (U-test, $P < 0.001$), possibly reflecting differences in trophic levels at a population scale. The variance in deltaN, which provides a comparable estimate of niche width, was considerably larger for Shannon-Cork than Connemara-Mayo, suggesting that the Shannon-Cork group are generalist feeders whereas the Connemara - Mayo animals may be more specialised feeders.

21st March 11:00

TO EAT OR NOT TO EAT: RISK EFFECTS AND DUSKY DOLPHIN BIOENERGETICS

Mridula Srinivasan (1), William Grant (1), Todd Swannack (1), Jolly Rajan (2), Bernd Wursig (3)

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To feed or not to feed is a problem that many animals regularly face in a dangerous habitat. Often prey strive to maintain a balance between seeking food and safety. Previous bioenergetics models have focused on population dynamics and prey foraging costs without an explicit consideration of predation risk changes, and the dynamic nature of predator-prey relationships. Off Kaikoura, New Zealand, dusky dolphins (*Lagenorhynchus obscurus*), an IUCN recognized data deficient species, presents a unique opportunity to study the presumed effects of killer whale (*Orcinus orca*) predation risk on dusky dolphin bioenergetics by social type, accounting for different energy needs. Previously, we had developed an individual-based spatially explicit model to capture the dynamic interaction between a prototypical killer whale and dusky dolphin off Kaikoura, and to analyze the evolutionary costs vs. benefits, *i.e.* number of killer whale encounters and time spent foraging for an adult dusky under various realistic threat scenarios. Here, we use long-term field-derived data and the model to 1) estimate and compare evolutionary costs vs. benefits of evolving anti-predator behavior for a lactating dusky mother with calf to a dusky without calf, and 2) estimate total energetic costs and foraging calories lost due to spatiotemporal differences in predation risk. Lactating mothers with calf suffer fewer killer whale encounters relative to an adult in the baseline scenario. Foraging costs rather than travel costs affect total energy costs estimated. Total energy costs increases by about 90 kcal/day for a dusky adult without calf at low predation risk. However, we estimate foraging calories lost at higher levels of predation risk is almost 5 times more for lactating mother with calf, which has obvious evolutionary implications. Continued research could greatly expand our understanding of indirect effects of predation risk on ecological communities and our ability to manage marine mammal populations and habitats.

21st March 12:00

THE HABITAT UTILISATION AND BEHAVIOURAL ECOLOGY OF MINKE WHALES WITHIN THE NORTH ATLANTIC: A COMPARATIVE MULTI-SITE APPROACH

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The minke whale (*Balaenoptera acutorostrata*) is both a widely distributed abundant and adaptable species of cetacean. Currently within the North Atlantic, the minke whale is a species of management importance. However our knowledge of the potential variation in the species' ecological niche, its habitat use and behavioural adaptation is relatively poor considering this distribution. The study presented indicates the importance of this knowledge through a comparative investigation of the regional habitat utilisation in three distinct study sites within the contiguous North Atlantic. These include the Moray Firth, Scotland, Skjálfandi Bay, Iceland and the St. Lawrence Estuary, Canada. Sighting's data analysed were collected within the period 2002-2008 between the months of May-September inclusive. Sightings were compared to a suite of eco-geographic co-variates, including bathymetric (depth, slope) and oceanographic (SST, chlorophyll-a concentration, fronts) features within a GIS and analysed using both univariate (Kruskal-Wallis) and multivariate (PCA) approaches. Results of the study determined that although similarities were observed in *B. acutorostrata* association to certain environmental parameters (*e.g.* bathymetry), significant variations were resolved in the habitat utilisation of sites when investigated across mean annual and monthly periods tested. In particular this variation was evident for the distribution of B.acutorostrata across spatio-temporal dynamic oceanographic parameters between the three areas of study. It is hypothesised that these regional adaptations in habitat use are necessary for both the utilisation of varying prey species, and also for the functional behavioural foraging strategies (*e.g.* opportunistic foraging, inter-specific association, active entrapment manoeuvres etc.) used within each habitat for the most optimal acquisition and aggregation of respective targeted prey. These findings, which assess and quantify the variation within distinct minke whale populations, are considered important for providing new information for both managers and those participating in other macro-scale analysis of this and other rorqual species within the North Atlantic.

21st March 12:15

DOES DISSOLVED OXYGEN PLAY A ROLE IN CUVIER'S BEAKED WHALE HABITAT SELECTION? A COMPARISON BETWEEN THREE STUDY AREAS IN THE WESTERN MEDITERRANEAN SEA.

Caterina Lanfredi (1), Arianna Azzellino (1), Angela D'Amico (2), Marina Ampolo Rella (3), Michela Podestà (4), Gianni Pavan (5), Cristina Francia (5)

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(2) Space and Naval Warfare Systems Center Pacific
(3) NATO Undersea Research Centre, Engineering and Technology Dept.
(4) Museum of Natural History of Milan, Milano, Italy
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Several summer research cruises have been conducted between 1999 and 2010 in the western Mediterranean Sea with the objective of improving the knowledge of Cuvier's beaked whales (*Ziphius cavirostris*) distribution as a function of oceanographic parameters. Temperature, salinity, sound velocity, dissolved oxygen, fluorescence and turbidity were measured as a function of depth using sensors installed on a CTD (Conductivity, Temperature, Depth) Rosette Frame deployed from the NATO R/V Alliance. In this study the correlation between Cuvier's beaked whale occurrence and oceanographic parameters are analyzed for three key areas: the Genoa canyon area in the Ligurian Sea, the waters surrounding Alboran island in the Alboran Sea and the Northwestern Tyrrhenian Sea. Beaked whale visual observations, acoustic detections and concurrent oceanographic data are analyzed for the NURC (Nato Undersea Research Centre) cruises Sirena 2002, and 2008 and for MED09 sea trials conducted in each of these areas respectively. A 3 x 3 kilometer grid was applied for each study area. The cells statistic of CTD data, extracted from a total of 57 oceanographic stations, and the sea bottom slope statistics were used as covariates in a stepwise logistic regression analysis to predict beaked whale presence/absence. In all the study areas, the species presence was found significantly ($P < 0.05$) correlated with features of the dissolved oxygen profiles (*e.g.* depth of maximum dissolved oxygen and the dissolved oxygen cell main statistics). All the models had a good overall accuracy, higher than 70%, suggesting dissolved oxygen features may play an important role in the habitat selection of the Cuvier's beaked whale in the Mediterranean Sea.

21st March 12:30

MIGRATION OF BALEEN WHALES IN RELATION TO THE NORTH ATLANTIC SPRING BLOOM

Fleur Visser (1), Karin Louise Hartman (2), Graham J Pierce (3), Vasilis D Valavanis (3), Jef Huisman (1)

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Each year, a large-scale phytoplankton spring bloom starts just north of the North Atlantic Subtropical Gyre (NASG), and then expands northwards across the entire North Atlantic. Here, we investigate to what extent the spring migration of baleen whales might be associated with the phytoplankton spring bloom, using five years of dedicated whale observations at the Azores in combination with satellite data of ocean chlorophyll (CHL). Peak abundances of blue whale (*Balaenoptera musculus*), sei whale (*B. borealis*) and fin whale (*B. physalus*) were recorded in April/May, and could be predicted with high precision (±1.2 weeks) from the timing of the onset of the spring bloom, with mean time lags of 13, 15 and 16 weeks respectively. Individual baleen whales were observed in Azorean waters during up to 17 days, and allocated most of their time to foraging and travelling behaviour. Baleen whales were not observed in autumn, during their southward migration, consistent with the low chlorophyll concentrations during summer and autumn. To our knowledge, this is the first time spatio-temporal synchrony between primary production and peak whale abundance has been documented for migratory baleen whales in the North Atlantic Ocean. Recent reports indicate that global warming is likely to expand the low-productivity areas of the subtropical gyres, which would suppress spring bloom development in Azorean waters. Our findings warn that this may change migratory patterns of baleen whales in this part of the North Atlantic and may reduce opportunities for the build-up of their energy reserves.

21st March 15:00

TESTING THE EFFECTS OF AN ACOUSTIC HARASSMENT DEVICE ON THE BEHAVIOUR OF HARBOUR PORPOISES (*PHOCOENA PHOCOENA*)

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Acoustic harassment devices (AHD) are regularly used to deter seals from fish farms. While seals can quickly habituate to such devices, previous studies found that the deterring effect on harbour porpoises may reach much further. This is an unwanted side effect in fisheries, but on the other hand AHDs may be an effective way to deter porpoises before the start of potentially harmful noise emissions from offshore pile driving. However, the spatial scale of deterrence effects of AHDs on porpoises is not sufficiently documented to ensure the prevention of hearing impairment.
Using a combination of visual observations and passive acoustic monitoring (C-PODs) we investigated the spatial effects of a Lofitech seal scarer on harbour porpoises. Sighting rates of porpoises significantly declined within the whole 1 km observation radius, and recordings of porpoise echolocation signals by C-PODs were significantly reduced out to a distance of 7 km, with the strongest effect at the nearest PODs and a weak one at further distances. Minimum observed approach distance during 28 hours of AHD activity was 700 m. A response study revealed clear avoidance reactions by porpoises out to the maximum studied distance of 2.6 km.
Results show that there is indeed a far reaching effect on porpoise behaviour. This raises concern about unwanted large scale habitat exclusion of porpoises in fisheries, where AHDs are used over long periods of time. On the other hand, the use of AHDs seems to be effective in reducing the number of harbour porpoises exposed to pile driving noise. However, our results also reveal that it is not sufficient to exclude all porpoises from potentially harmful sound. Findings are discussed in combination with received noise levels, which were also measured.

21st March 15:15

EXTREME DIVE SYNCHRONY AND ACOUSTIC COORDINATION IN A PAIR OF LONG-FINNED PILOT WHALES (*GLOBICEPHALA MELAS*) IN THE WESTERN MEDITERRANEAN

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Short-finned pilot whales (*Globicephala melas*) are deep-diving odontocetes believed to have a complex social structure with high degrees of philopatry. In an effort to learn more about the ecology, social structure and behaviour of long-finned pilot whales inhabiting the Western Mediterranean, we attached digital acoustic and movement logging DTAGs to 16 pilot whales during August and September 2010. Pre-tagging focal follows were conducted to select closely associated or nearest neighbour individuals for multiple tag deployments. Tag data and concurrent behavioural observations revealed a high degree of synchrony within groups of pilot whales. One pair of tagged subadult males were closely associated. Throughout the tagging period, these animals were continuously observed alongside each other, spending 90% of their non-foraging shallow dive time within 2m vertical distance, and surfacing near-simultaneously (median difference 1.8s compared to median shallow dive durations of 16.8s). The two whales completed 7 foraging dives that overlapped temporally (94% time shared) but with greater vertical separation and different maximum dive depths (mean difference 83m), showing that these highly synchronized whales separated spatially in the deeper parts of foraging dives but rejoined during the ascent. Exchanges of short and fast click series (rasps) were apparent during ascents, which suggests that these signals function in short-distance coordination. Only on one occasion did a tagged whale remain at the surface while the other tagged whale did a foraging dive. During this ascent, rasps were absent, but replaced by frequent tonal calls with a mean repetition rate of 0.4 calls/second and including call exchanges between the two tagged whales during the terminal part of the ascent. This study is the first to document highly synchronous surface and diving behaviour in long-finned pilot whales and suggests that separate acoustic mechanisms may be important for mediating group cohesion and coordination across different spatial scales.

21st March 15:30

FORAGING BEHAVIOUR OF LONG-FINNED PILOT WHALES (*GLOBICEPHALA MELAS*) IN NORTHERN NORWAY

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We investigated the baseline foraging behaviour of long-finned pilot whales in the Vestfjorden basin of Northern Norway as a component of a study assessing the behavioural effects of sonar. In May-June of 2008-2010 pilot whales in social groups (3-35 individuals) were sighted and 33 whales were instrumented with archival tags (DTAGs) with 149 hrs recorded. The position of the tagged animals was tracked from an observation vessel with sightings taken roughly every 2 min. Dive records indicated bouts of deep diving with production of echolocation clicks and buzzes, that were interspersed with long periods of shallow dives during which social sounds were more common. However, social sounds were often heard as a component of sounds produced during the bottom phase, including a stereotyped call that was often produced at the end of a click and buzz sequence. A total of 47 deep (73-617 m) dives had 170-702 s duration (bottom duration 1-372 s). Mean deep dive transit rates were 0.41-2.89 ms^{-1} during descent and 0.72-3.52 ms^{-1} during ascent, but instantaneous values were as high as 3.9 ms^{-1}. Accelerometer records indicated that whales glided during descent and stroked continuously during ascent. A total of 23 deep diving bouts lasted between 2.8 and 128.2 minutes containing between 1 and 8 deep dives. Deep dives consisted of U-shaped dives consistent with benthic foraging and shallower V-shaped dives. Simultaneous tag deployments indicated that asynchronous diving was common, including examples when two individuals dove together but one conducted a V-shaped dive while the other conducted a U-shaped dive. Foraging animals should benefit from area-restricted searching behaviour, but net horizontal speed of tagged animals did not differ between deep-diving bouts (1.1-2.5 ms^{-1}) and inter-bout periods (1.1-2.6 ms^{-1}). Horizontal movement of the group may instead represent a compromise between diving and non-diving group members.

21st March 15:45

RESPONSES OF BOTTLENOSE DOLPHIN SOCIAL BEHAVIOUR TO CHANGING COMMERCIAL TRAWLING PRACTICES: PAST AND PRESENT

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Human activities can influence animal behaviour through the modification of habitats, food availability and predation risk. Two distinct social communities of Bottlenose dolphins, *Tursiops aduncus*, were identified in south-eastern Moreton Bay, Australia, in the late 1990s: "trawler dolphins" that foraged on discarded by-catch of commercial prawn trawlers, and "non-trawler dolphins" that never foraged in association with trawlers. Members of the two communities almost never associated, despite overlapping home ranges. Since then, major changes in fisheries legislation have resulted in a complete ban of prawn trawling in south-eastern Moreton Bay. We use association analysis and social network metrics to characterise and compare patterns of sociality among bottlenose dolphins across two periods: 1997-1999 and 2008-2010. Our analysis reveals that the majority of former trawler dolphins have stayed in the south-eastern bay despite the cessation of trawling and consequent loss of their major food source. However, the social structure of the dolphins has undergone significant changes over the last decade. Their social network has become less differentiated and more compact (normalised mean degree increased from 9.72 to 15.64; average distance between actors decreased from 2.15 to 1.84), with more and stronger associations between individuals (mean and maximum half weight indices increased from 0.09 to 0.16 and 0.53 to 0.72 respectively). The original distinct partitioning into two communities ("trawler" and "non-trawler") does not exist anymore with former trawler and non-trawler dolphins now dispersed over the entire social network rather than clustering together as distinct entities. A former trawler dolphin identified in both studies has significantly increased his ego-network (direct associates) and even formed strong bonds with two former non-trawler males. This study not only shows that anthropogenic impacts can significantly influence the social behaviour of bottlenose dolphins, but also that these dolphins are adaptable and resilient to changes in their environment.

21st March 16:45

FURTHER ACOUSTIC INSIGHTS INTO THE MEDITERRANEAN FIN WHALE MIGRATION AND POPULATION IDENTITY

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Archival bottom-mounted audio recorders (EAR & RASP) have been deployed in different regions of the western Mediterranean Sea with the aim to better understand the movement patterns and subpopulation identity of fin whales, as a continuation of a study initiated in 2006. This report accounts for data collected in the Creus Canyon and Delta del Ebro (Catalonian basin) during 2009-2010, Provençal basin (off Nice) during 2009 and around the island of Lampedusa (Sicily basin) during 2006-2007.
A total of 1157 hours of sound recordings have been analyzed with Matlab based XBAT (Bioacoustics Research Program, Cornell) identifying more than 21624 fin whale song notes. In order to identify the subpopulation of singing whales, two acoustic parameters where measured in fin whale notes, time interval between consecutive notes and note frequency range. Results are consistent with the description of two subpopulations using the western Mediterranean basin and show first evidence of geographical and temporal overlap in their distribution range. The resident Mediterranean subpopulation, with note intervals of 15 sec and frequency ranges of 5 Hz, is detected primarily in early spring and fall in the Balearic basin, in accordance with its northbound-southbound migration, and later in spring and summer in the Provençal basin. Few songs (n=4) attributable to the wintering northeast North Atlantic (NENA)subpopulation, with note intervals of 13 sec and frequency ranges of 6,5 Hz, were detected in March in the Balearic basin concurrently with Mediterranean songs. However NENA fin whale songs were neither detected in the Provençal basin nor Lampedusa, although detections in Lampedusa are too scarce to be conclusive. These results illustrate winter dispersal by male NENA fin whales throughout the western Mediterranean Sea, and suggest that their movement patterns could follow the spring migration of Mediterranean conspecifics.

21st March 17:00

NORTH ATLANTIC FIN WHALE (*BALAENOPTERA PHYSALUS*) POPULATION STRUCTURE REVISITED: RESOLVING CONTRADICTIONS BETWEEN RESULTS FROM ALLOZYME AND NEUTRAL GENETIC MARKERS

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Modern whaling has had severe impacts on the abundance of North Atlantic fin whales. Although the population is currently increasing, its management status is still listed as uncertain by the IWC. This uncertainty largely results from an unclear understanding of population boundaries among breeding and feeding aggregations caused by conflicting results from genetic analyses. Specifically, analyses using allozyme markers have suggested high levels of genetic differentiation among North Atlantic fin whales, whereas analyses using neutral genetic markers suggested low levels of genetic differentiation. These contradicting results may have two explanations; i) the allozyme loci, which encode for cellular enzymes, may be under divergent natural selection; or ii) the allozyme dataset is biased by technical issues relating to differential treatment of samples during collection and storage across sampling regions. To address this issue we obtained tissue samples from a subset of the Icelandic fin whales originally included in the allozyme study and sequenced the genes corresponding to the most genetically divergent allozyme loci. Our rationale was that if selection indeed is responsible for the observed levels of allozyme genetic variation, direct sequencing should allow us to identify the corresponding mutations in the genes. The results indicate low levels of genetic structuring between fin whales from Iceland and the reference group from the Gulf of St. Lawrence (Canada), respectively, and did not support the explanation that the allozyme loci are under selection. These findings suggest that tissue samples should be treated with caution when subject to allozyme analyses, and if care is not taken, technical issues might result in biased estimates of genetic differentiation among populations.

21st March 17:15

MITOGENOMIC STUDIES OF THE KILLER WHALE

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Mitochondrial DNA (mtDNA) sequences are used extensively to infer the evolutionary and demographic history of taxa. However, previous studies on the killer whale (*Orcinus orca*) have used sequences from from just the D-loop, which is a highly variable region of the mitogenome approximately 1,000 base pairs in length. D-loop signatures provided poor phylogeographic resolution, which it has been suggested results from a rapid and recent expansion following a bottleneck during the last glacial maximum. Here, we present the findings from analyses using the complete mitogenome (16,390 base pairs) of a global dataset of 144 individual modern killer whales and comparison with a long-term dataset of Northeast Atlantic killer whale samples from throughout the Holocene. Phylogenetic analyses indicates lineage sorting of regional ecotypes and divergences were dated to before the last glacial maximum. Testing possible alternative hypotheses of geographic origins strongly suggests an 'out of the Pacific' origin with a subsequent allopatric phase for North Pacific ecotypes followed by secondary contact and a sympatric phase. Mitogenome-wide scans were also able to detect a recent loss of genetic diversity in the Northeast Atlantic not detectable using just D-loop sequences. Lastly, two selected non-synonymous amino acid changes that could influence overall metabolic performance were found; one in each of two ecotypes that inhabit the Antarctic pack ice. The improved phylogenetic resolution obtained by using mitogenome sequences may reflect saturation of the D-loop resulting in back mutations and homoplasy at mutational hotspots.

21st March 17:30

ECOLOGY OF BOTTLENOSE DOLPHINS IN THE SOUTH OF THE IBERIAN PENINSULA

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Bottlenose dolphins belong to the Annex II of the European Habitat Directive and are listed as Vulnerable in the Spanish Catalogue of Endangered Species, therefore they must benefit from special conservation measures. However, information is lacking in the South of the Iberian Peninsula where the species is considered as “Data Deficient” by ACCOBAMS. The aim of this study was to understand the ecology of bottlenose dolphins in the southwest of the Iberian Peninsula. A multidisciplinary approach was used, using a combination of photo-identification, stable isotopes analysis and transects from 1999 to 2010. More than 33000 km were sailed from the Strait of Gibraltar to Cape St Vincent. From 702 sightings of bottlenose dolphins, two photo-identification catalogues were produced, one in the Strait of Gibraltar containing 392 individuals and one in the Gulf of Cadiz with 354 individuals. No matching was found between the two catalogues and no spatial overlap was observed. In the Strait of Gibraltar, 297 (95%CI: 276-332) resident dolphins were observed in deep waters and over steep slopes in a restricted zone of less than 35 km wide. However, in the Gulf of Cadiz, 347 (95%CI: 264-503) animals remained in shallow waters of the continental shelf, but using the whole Gulf of Cadiz, travelling over more than 200 km. Significant differences in both Nitrogen and Carbon stable isotopes were observed between both areas (Kruskal-Wallis, N: $H=13.22$ $p=0.0214$, C: $H=11.75$ $p=0.0384$). These results suggest the existence of two isolated populations in the Southern Iberian Peninsula of highly mobile coastal dolphins in the Gulf of Cadiz and local oceanic dolphins in the Strait of Gibraltar. Each of these different populations, inhabiting separate ranges will necessitate the development of unique management plans, requiring the cooperation of Spain, Morocco, and Portugal.

22nd March 09:00

VOCAL MATCHING OF FREQUENCY-MODULATIONS OF SONAR SIGNALS BY LONG-FINNED PILOT WHALES (*GLOBICEPHALA MELAS*)

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To augment our knowledge on the impact of military sonar in cetaceans, behaviour and sound production of 5 long-finned pilot whale groups were recorded before during and after 12 (30-60 minute) sonar exposures conducted in Norway in 2008 and 2009. Whales were instrumented with DTAGs and were tracked visually throughout each experiment. Acoustic monitoring in the field and analysis of DTAG recordings seemed to indicate sequences in which pilot whales appeared to vocally match the sonar signal during exposures. Here we present a detailed analysis describing and testing our observations of vocal matching. The DTAG sound record was audited and the frequency contours of 2556 clearly-audible social calls were traced. Root-mean-squared differences were calculated between the frequency contour shape of social calls and 3 different sonar signal types (1-2 kHz hyperbolic upsweep, 1-2 kHz hyperbolic downsweep and a 6-7 kHz hyperbolic upsweep). A rotation test randomly moving the sonar exposure period was performed to evaluate the likelihood of matching calls being produced during sonar exposure by chance alone. The rotation test compared the median difference between all calls and the sonar signals as well as the 5% most similar (least different) calls within a sonar exposure block. Comparing the 5% least different calls in a block resulted in 7 (all sonar types) out of 12 exposures being significantly more similar to sonar signals, indicating that more similar calls to sonar were more likely to have been produced during the exposures than by chance. In 2 of these 7 exposures, a 6-7 kHz upsweep and 1-2 kHz downsweep, the median score of all calls were more similar to the sonar than expected by chance; indicating that during these exposures there was a substantial shift on the overall call repertoire toward signals with similar frequency modulation as the sonar signals.

22nd March 09:15

LONG-TERM PASSIVE ACOUSTIC MONITORING OF THE MOVING PATTERNS OF CETACEANS IN THE ISTANBUL STRAIT

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The Istanbul Strait is a part of Turkish Straits System, connecting the Aegean Sea and the Black Sea. There are three cetacean species in the Strait, namely harbor porpoise (*Phocoena phocoena*), common dolphin (*Delphinus delphis*), bottlenose dolphin (*Tursiops truncatus*). To monitor the moving patterns of the cetaceans, fixed stereo passive acoustic monitoring system (A-tag) was deployed in the middle of the Strait from July 2009 to September 2010. Totally 27996 click trains were detected. Presence, direction and species of phonating cetaceans measured acoustically were also matched with visual observations during the daytime. Identification of harbor porpoises out of delphinids (common dolphins and bottlenose dolphins) could be possible by comparing two different band intensities of the sonar signals.

Most click trains were detected during the night time. Diurnal presence pattern was prominent in March and April. In March, harbour porpoises were dominant while delphinids were dominant in April. For the rest of the year, harbor porpoises were rarely detected.

In spring, the cetaceans localized within specific direction from the fixed point. In contrast, they were found in all directions in the rest of the year. They were moving slower in spring and faster in other seasons. In addition, short range sonar (Inter-Click Intervals (ICI) less than 50 ms) was commonly detected in spring. In the rest of the year, they were searching wide variety of distances (ICI up to 150 ms). All these findings suggest that they were feeding or socializing in spring and mostly travelling in the other seasons.

It is well known that the pelagic fish such as sprats and bluefish starts their migration from the Aegean Sea to the Black Sea in spring. This study implies that the cetaceans use the middle part of the strait for feeding on the pelagic fish which have just started their migration.

22nd March 09:30

DO DOLPHINS USE CONTEXT-SPECIFIC SOCIAL SIGNALS IN THEIR COMMUNICATION? VOCALIZATIONS AND UNDERWATER BEHAVIOUR OF FREE-RANGING BOTTLENOSE DOLPHINS

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Very little is known about how free-ranging bottlenose dolphins (*Tursiops truncatus*) use social signals in different behaviours and few data exist for context specificity of vocalizations. This study focuses on the association between social signals and specific underwater behaviours. Data were collected as part of a long-term study along the north-eastern coast of Sardinia (Italy), in which acoustic recordings and underwater behavioral observations were made. Over the 6-year study period (2005-2010) corresponding to 54 hours of dolphin observations and simultaneous recordings, 22771 vocalizations (8017 tonal and 14769 burts-pulsed sounds) were detected. The acoustic repertoire observed in this study was extremely diverse with different types of tonal and burst pulsed sounds. Multivariate analysis, showing that vocal emission increased in those activities involving socializing, confirmed that activity and social signals production were related. These findings further support the hypotheses that specific vocal signals (*i.e.* chirps) may be good predictors of behavioural state and viceversa. In addition, it was possible to observe that the gender affects the vocal production of bottlenose dolphins. Thus, underwater observations suggested that burst-pulsed sounds longer than 200ms were used with the intent to “settle-rank” conflicts and avoid competition between group members. These sounds could be employed to avoid physical conflict, and may also represent a significant energy saving in situations of high excitement (such as during competition for the same piece of food). This study provides additional contextual information about the potential use as communication signals in this extremely vocal mammalian species.

22nd March 09:45

DIVERSITY OF BIPHONIC AND MONOPHONIC CALLS IN THE REPERTOIRES OF KILLER WHALES FROM BRITISH COLUMBIA AND KAMCHATKA

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Some killer whale sounds include an overlapping high-frequency component usually referred to as biphonation. Biphonic calls are suggested to be long-range signals used as pod markers, and monophonic calls are thought to be close-range intra-group contact signals, which should obviously influence the diversity of these categories. In this study we estimated the diversity of biphonic and monophonic calls in the repertoires of two killer whale populations: Northern Resident population from the Northeast Pacific (British Columbia, Canada) and resident population from the Northwest Pacific (Kamchatka, Russia). We extracted frequency contours from call spectrograms using an algorithm in MATLAB. We used one call per each call type. In total, 59 calls from Kamchatka population (31 biphonic and 28 monophonic) and 33 calls from British Columbia population (22 biphonic and 11 monophonic) were used in this analysis. Categorization of calls was performed using MATLAB algorithm that incorporates dynamic time-warping and an adaptive resonance theory neural network. The algorithm has divided biphonic and monophonic calls from Kamchatka into 6 and 17 categories respectively (mean calls per category: biphonic 5.17, monophonic 1.65), and biphonic and monophonic calls from Canada into 9 and 10 categories respectively (mean calls per category: biphonic 2.44, monophonic 1.1). Mean amount of calls per category differed significantly between Kamchatka biphonic and monophonic calls (Mann-Whitney test, $p=0.04$) and between British Columbia biphonic and monophonic calls (Mann-Whitney test, $p=0.003$). There were no significant differences in the mean number of calls per category between Kamchatka and British Columbia biphonic calls, and between Kamchatka and British Columbia monophonic calls. We conclude that monophonic calls are more diverse than biphonic calls in both populations. Since these populations do not contact, this similarity obviously result from the specific functions of monophonic and biphonic calls rather than cultural transmission between populations.

22nd March 10:00

PASSIVE ACOUSTIC MONITORING OF BELUGA PRESENCE AND FEEDING IN CUMBERLAND SOUND

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With the accelerated exploration and development in the Arctic, increased monitoring of marine mammal populations is needed. Cumberland Sound (Nunavut, Canada) is a diverse Arctic ecosystem and is home to a threatened population of belugas (Delphinapterus leucas). Emerging fisheries for turbot and char, two potential prey species for belugas, are expanding in the sound. There is a need for research examining the usage of Cumberland Sound by belugas and their relationship with turbot and char. In a preliminary study, we attempted to detect the presence of belugas as well as their feeding events using passive acoustic methods. We used a combination of a digital recorder (AURAL) and a click detector (C-POD) over 21 days in Clearwater Fjord, within Cumberland Sound, August 2010. Belugas emit echolocation trains of clicks to navigate and locate their prey. They produce buzzes, a rapid train of clicks with inter-click intervals smaller than 20 ms, that are believed to correspond to closing on a prey. We quantified the temporal pattern of click trains and buzzes as detected by the C-POD throughout the study period. Almost all the click trains detected by the C-POD were associated with beluga calls on the AURAL audio files (98% of random sample of 50 click trains). From the click series, belugas preferably visited the fjord at noon and at high tide. Future steps for this project include the validation of the C-POD as beluga click detector, assessment of false alarm rates, determination of the detection range of the instrument, and deployment of a network of C-PODs year-round in Cumberland Sound to monitor beluga time-space frequentation pattern.

22nd March 10:15

HARBOUR PORPOISES ARE DETERRED BY SIMULATED PILE DRIVING NOISE

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Many studies have shown that harbour porpoises react to loud underwater sound, including impact noise from pile driving of large diameter monopiles, such as those used as foundations for offshore wind turbines. Previous studies showed that fewer echolocation clicks are recorded following pile drivings, but it remains unclear whether the porpoises vacated the area around the construction site or remained in the area, but with an altered acoustic behaviour.
To address this question a controlled exposure study was conducted. Pile driving sounds were played back at reduced levels (about 180 dB re. 1 uPa peak-peak at 1 m) from underwater loudspeakers (Lubell 9162) located close to shore at Fyns Hoved, Great Belt, Denmark. The swimming behaviour of porpoises was tracked visually by a theodolite from a nearby clifftop. Porpoises were tracked continuously for long periods and playback occurred as 2-hour blocks with one pile driving sound being played back every second. Playback occurred from one of two identical loudspeakers, separated by about 200 m and without observers being aware whether the sound was on or not, to avoid observer bias. A maximum of 2 playback blocks occurred per day.
Results show that porpoises avoided a zone with a distance of c. 200m around the loudspeakers when these were transmitting. Received levels of sound at this distance was around 140 dB re. 1 uPa (peak-peak). This threshold level for reactions is consistent with the results from the real pile drivings. Thus, even though the source levels in the controlled exposure study was 50-60 dB lower than a real pile driving and hence the size of the impact area greatly reduced, the thresholds for reaction are consistent. This gives confidence to concluding that porpoises likely react in a similar way to real pile drivings, *i.e.* by vacating the area.

22nd March 10:30

ACOUSTIC ECOLOGY OF MARINE MAMMALS IN THE ANTARCTIC COASTAL OCEAN

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ABSTRACT
Acoustic data collection in polar areas which are (periodically) inaccessible to humans is often limited. However, long term recordings can provide important insights into the acoustic ecology of marine mammals inhabiting these remote regions. The PerenniAL Acoustic Observatory in the Antarctic Ocean (PALAOA) was constructed to obtain real-time, year-round broadband underwater acoustic data from the Antarctic coastal ocean. The PALAOA-observatory is located at 70º31'S 8º13'W, on the Ekström ice shelf, Eastern Weddell Sea. Recordings contain vocalizations of four Antarctic pinnipeds (Weddell, *Leptonychotes weddellii*, leopard, *Hydrurga leptonyx*, Ross, *Ommatophoca rossii* and crabeater seal, *Lobodon carcinophaga*) and various cetacean species. We investigated seasonal patterns in acoustic repertoire size, composition and call activity and interpret the findings in the context of species-specific acoustic ecology. For pinnipeds, vocal behaviour differed between species, reflecting varying mating strategies and behavioural functions. Humpback whales (*Megaptera novaeangliae*) were acoustically present over 9 months, reflecting the potential importance of coastal areas, such as the area off PALAOA, for animals wintering on the feeding grounds.

22nd March 11:30

AN ACCIDENTAL LONG-TERM STUDY OF KILLER WHALES

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Every manager and conservation biologist knows the value of long-term studies, but few agencies are able to make long-term funding commitments. In 1995, my colleagues and I initiated what we intended to be a 2-year study to measure behavioural responses of killer whales to whalewatching boats. Sixteen years and countless funding proposals later, the simple data forms we developed are still being used. Meanwhile, the study population was listed as Threatened under Canada's Species at Risk Act, and the study area was included in designated Critical Habitat. Each year, funding for the study is cobbled together from a tenuous contract to provide on-the-water environmental education services, complemented with targeted research grants to provide added scientific value. The resulting long-term dataset has been used to evaluate responses of killer whales to changing environmental conditions and fluctuating prey availability; reconstruct the whales' social network, and integrate sociality into models to predict the effects of a live-capture fishery; estimate energetic requirements of free-ranging killer whales, and the bioenergetic costs of human activities; model the effects of sociality and aggregations on the vulnerability of the whales to oil spill; describe the whales' use of critical habitat; and to explore the efficacy of a Marine Protected Area to mitigate impacts of human activities. During our study, responsibility for data collection has passed among five groups, including two for-profit environmental consulting companies and three non-profits. Some transitions were smoother than others, but two lessons emerge. First, no agency ever made a long-term commitment to funding our research, but continuity was facilitated by piggybacking the science on a well-established (albeit itself underfunded) environmental education program that has strong local support. Secondly, while the agencies and institutions involved in data collection have changed through time, the same core group of people volunteered time to archive the data and ensure continuity of field methods. The resulting university-NGO partnership, with its cost-sharing arrangement between education and research, is more powerful than either group could achieve on its own. This collaborative approach has allowed us to study a threatened population in critical habitat for 16 years, and produced a solid record of output, despite a highly uncertain, year-by-year funding structure.

22nd March 12:00

USING LONG-TERM DATASETS TO ASSESS THE POTENTIAL RISK OF SHIP STRIKE TO CETACEANS IN THE ASCOBANS REGION

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Northwest Europe contains some of the busiest waterways in the world. Post-mortem examinations of cetaceans stranded in the UK from 1990-2010 revealed physical trauma due to vessel strike as the probable cause of death in 10-20% of baleen whales (fin & minke whale) and 4-6% of smaller odontocetes (harbour porpoise, common, white-beaked and Risso's dolphins, and Sowerby's beaked whale), suggesting this is a widespread and significant conservation issue. In order to reach a better understanding of the risk posed by shipping to cetaceans within the ASCOBANS Agreement Area, two alternative approaches to plotting vessel densities were examined, and then compared with information on the relative densities of various cetacean taxa. Shipping was plotted using AIS (Automatic Identification Systems) and VOS (Voluntary Observing Ships Scheme). Each had its advantages and limitations. Because the VOS program is voluntary, some commercial shipping traffic is not captured by these data, and this may particularly underestimate high traffic locations. AIS receivers on the other hand have finite range, which may vary with atmospheric conditions. In optimal conditions they can detect vessels 200 nm away, but for many land-based stations, it is much less. This was tested further in waters around the British Isles. Despite the limitations of each method, both reveal similar patterns of variation in shipping density, with high traffic locations generally matching our knowledge from other information sources. Relative densities of cetaceans were derived from a 20-year international data set of dedicated surveys, with numbers per unit effort (corrected for sea state) plotted on a grid cell basis by season for different cetacean groupings. Areas of relative high risk of lethal ship strike (modeled as vessel speeds >10 knots), identified by this study, included specific parts of the Bay of Biscay and European shelf edge (SW Channel Approaches and NW of Spain).

22nd March 12:15

POPULATION STRUCTURE OF HARBOUR PORPOISES IN THE GREATER BALTIC REGION: EVIDENCE OF SEPARATION BASED ON GEOMETRIC MORPHOMETRIC COMPARISONS

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The harbour porpoise is seriously depleted in the Baltic Sea. It is usually assumed that Baltic porpoises form a separate population unit although there is little available evidence to support this. Here, a 3D geometric morphometric approach was employed to test a number of hypotheses regarding population structure of the harbour porpoise in the greater Baltic region. Porpoise skulls from Denmark, Sweden, Finland, Germany and Poland were measured with a suite of three-dimensional landmarks. Statistical analyses revealed highly significant shape differences between porpoises from the North Sea, Belt Sea and the inner Baltic Sea. A comparison of the directionalities of the shape vectors between these units found differences that cannot be attributed to a general, continual shape trend going from the North Sea to the inner Baltic Sea. The directionalities of the vectors indicate a morphological adaptation to the specific sub-areas. *E.g.*, in the Belt Sea porpoises, there may be a greater reliance on benthic and demersal prey. Such adaptation may be a result of the topographic peculiarities of the area with variable topography and shallow waters. The present results show that isolation by distance alone is an unlikely explanation for the differences found within the greater Baltic region and thus further support previously reported molecular indications of a separate population within the Baltic.

22nd March 12:30

INVESTIGATING HARBOUR PORPOISE DISTRIBUTIONS IN THE INNER HEBRIDES USING A LONG TERM, OPPORTUNISTICALLY COLLECTED, DATASET: A CRITICAL ASSESSMENT OF THEIR UTILITY FOR INFORMING FUTURE MANAGEMENT.

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Whale watching operations are potentially a valuable opportunity to collect fine scale data on cetacean distributions. These long-lived animals require long-term studies but systematic long-term research is an expensive commitment that has proven unattractive to funding bodies. Data collected opportunistically from whale watching vessels can provide extensive temporal and spatial distribution information for relatively little cost, enabling long term investigation of spatial and temporal distribution. However, spatial and temporal survey effort within the data is typically uneven and biased, and such problems must be dealt with if data are to be analysed successfully.

Data collected from a whale-watching platform over a seventeen year period (1992-2009) were analysed to assess whether platforms of opportunity can contribute to the data required for conservation and management. Harbour porpoise relative densities and distributions were investigated in the southern Inner Hebrides in respect to oceanographic and physiographic variables and methods were employed to remove some of the inherent biases.

Although harbour porpoise distribution changed over the seventeen year period, consistent “hotspots” were identified. This suggests a need for a dynamic approach to conservation and management schemes regarding harbour porpoise, with particular reference to defining static protective boundaries around the consistently utilised areas.

The sequential, fine scale, data analysed here provided a temporal insight into spatial distribution that short-term studies do not achieve. Furthermore, the prospect of collecting data from whale watching operations in a manner that allows it to be used to inform conservation and management is particularly relevant given the expansion of whale watching and the low level of funding available for monitoring in Europe.

22nd March 12:45

QUANTIFYING EFFECTS OF SONAR ON CETACEANS: OBSERVATIONS AND DOSE-RESPONSE RELATIONSHIPS OF AVOIDANCE OF SONAR BY FREE-RANGING KILLER WHALES (*ORCINUS ORCA*)

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Assessment of the environmental impact of sonar activities is hindered by a lack of dose-response studies needed to enable prediction of the acoustic thresholds at which free-ranging whales react to sonars. To test what received levels of sonar trigger avoidance reactions in killer whales, we conducted 8 experimental exposures with 4 groups tagged with Dtags. Each group was tracked during gradually-increasing exposures to 1-2kHz or 6-7kHz sonar signals. Killer whales increased speed and changed travel direction to avoid the sonar source during 6 of the 8 exposures. Cessation of feeding was associated with avoidance in two groups, and we observed separation of a dependent calf from its group during an exposure within a narrow fjord. Response thresholds from 94 to 164 dB re 1 μPa received sound pressure level were fit to a logistic dose-response function, which gave a predicted 50% response at 134 dB using all 8 exposures, or 128 dB using the first exposure for each group. Based upon published hearing thresholds of killer whales, the sensation level of a 6-7kHz sonar signal would be 30 dB higher than that of a 1-2kHz sonar signal at the same sound pressure level. However, weighting received levels of the sonar signals by the killer whale hearing curve failed to make the dose-response function steeper. Our dose-response results indicate that sonar exercises may cause avoidance over a large enough area to have potential biological consequences and to impact whale-watching operations. We observed that the number of whales sighted decreased dramatically after the start of a naval exercise, with no whales seen for 3 days, but whales have been sighted during other sonar exercises. Avoidance by killer whales began at received levels statistically-significantly below response thresholds assumed by the current regulatory standard in the USA.

22nd March 15:00

DURATION OF RAMMING PROCEDURE HAS A CLEAR EFFECT ON DISPLACEMENT OF HARBOUR PORPOISES

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In 2009 the first German offshore wind farm “alpha ventus” was built approximately 45km north of the island of Borkum in 30m water depth. The wind farm consists of 12 turbines of which 6 were built on tripod foundations and 6 on jacket foundations, which all had to be rammed into the sea floor. Noise emissions from offshore pile driving may injure marine mammals in the vicinity and cause large-scale disturbance and habitat displacement.
We studied the effect of these pile driving activities on harbour porpoises using acoustic dataloggers (T-PODs) that record harbour porpoise echolocation signals and were deployed at different distances to the construction site.
We found a clear impact of pile driving on harbour porpoise click recordings. Analysis of relative porpoise activity measured as porpoise positive minutes per hour and waitingtime between consecutive porpoise recordings further revealed a clear difference between the two types of foundations. After the few on average more than five hour lasting piling periods for the tripod foundations animals stayed away from the impact area for a longer time period than after the only one hour lasting piling periods of the jacket foundations. Further the displacement of porpoises during the long lasting ramming periods reached up to greater distances.
Consequences of this finding on further development of offshore wind farm constructions in the German Bight will be discussed.

22nd March 15:15

THE IMPORTANCE OF LONG-TERM DATASETS FOR CONSERVING THE IBERIAN HARBOUR PORPOISE POPULATION

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The Iberian harbour porpoise *Phocoena phocoena* is a genetically isolated population of around 2600 individuals (SCANS-II). The north-west Iberian Peninsula (Galicia, north-west Spain and northern Portugal) is one of the world's main fishing areas and around half the porpoise strandings in the area show evidence of fisheries interactions (*e.g.* net marks) although no life history data nor mortality rates currently exist. Age, maturity and pregnancy data (determined using standard methods) were used to construct life tables and estimate overall mortality and reproductive rates for stranded and by-caught porpoises from the NW Iberian Peninsula 1990-2010. Very few animals over 10 years old were recorded. Iberian porpoises reach sexual maturity around 5 years old and are considerably larger but appear to have a lower longevity than other studied populations. Life table results suggest a 15% annual mortality in the population. No sex-related differences in mortality rates were observed although by-caught porpoises appear on average to die younger than other porpoises. Assuming the data are representative of the living population, approximately 7.5% of the population dies annually due to fisheries interactions, greatly exceeding the recommended 1.7% limit set by ASCOBANS and potentially threatening the viability of the population. The data is currently being examined for evidence of changes over time in age at sexual maturity and pregnancy rates, which could be responses to high mortality. The present study emphasises the importance of long-term data sets for monitoring trends in life history parameters and by-catch rates of small, isolated populations.

22nd March 15:30

TWO DECADES OF HEALTH ASSESSMENT OF HARBOUR PORPOISES FROM THE GERMAN NORTH SEA

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The harbour porpoise is the most common cetacean in the German North Sea according to sightings and strandings. The German Exclusive Economic Zone is an area where a large number of anthropogenic activities take place. The management of those activities along with protection measures requires the understanding of their effects. It can be expected that the health status of harbour porpoises is influenced negatively on different levels by continuous activities.
Since 1990 harbour porpoises stranded on German North Sea coasts of Schleswig-Holstein have been recorded and delivered for further investigations to the FTZ in Büsum, Germany. A detailed post mortem examination was performed according to ECS guidelines. The carcasses were weighed and measured, and teeth were extracted for age determination by counting the annual growth layer groups. Histological, microbiological, parasitological, and immunohistochemical investigations were performed. With regard to all findings the cause of death was determined.
More than 1910 harbour porpoises were found between 1990 and 2010 along the North Sea coastline of Schleswig-Holstein. Until end of October 2010 about 340 porpoises were suitable for complete pathological investigations. Main pathological findings were parasitic infections of the respiratory system, the digestive tract and liver, bronchopneumonia, gastroenteritis, hepatitis and lymphadenitis. In neonates foetal atelectasis occurred frequently. The most common cause of death was bronchopneumonia, septicaemia and perinatal death. Bacterial infections were mainly caused by beta-haemolytic streptococci and Escherichia coli. By-caught animals were rarely found.
In comparision to animals from Arctic waters harbour porpoises from the German North Sea show a higher incidence of infectious diseases indicating that animals may be under higher continuous pressure level.

22nd March 15:45

USING LONG-TERM DATASETS TO REALIGN THE BOSTON TRAFFIC SEPARATION SCHEME TO REDUCE THE RISK OF SHIP STRIKE TO RIGHT AND OTHER BALEEN WHALES

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Ship strike is a leading mortality factor for North Atlantic right and other endangered baleen whales. The Stellwagen Bank National Marine Sanctuary (SBNMS) is heavily used by endangered whales and a major shipping route, the Boston Traffic Separation Scheme (BTSS), crosses the Sanctuary. As a result, the area is a potential "hot spot" for collisions. To reduce collision risk we (1) plotted the distribution and relative abundance of right and other baleen whales within the Sanctuary and adjacent waters, (2) identified high use whale areas, (3) reconfigured the then existing BTSS path through the Sanctuary to spatially separate whales and ships, and (4) calculated the possible risk reduction. Multi-year, non-standardized whale sightings were collected from commercial whale watching vessels and provided by the Provincetown Center for Coastal Studies and the Whale Center of New England (n =255,767; 1979 - 2004; season ~April - October). Additional right whale data were provided by the North Atlantic Right Whale Database curated at the University of Rhode Island (total n = 8,504; 1844 - 2005 years, all seasons). ARCGIS was used to plot whale sightings and identify high use whale areas. We considered various reconfigured TSSs to minimize the number of whales and impacts to industry. As compared to the then existing TSS, the reconfigured TSS is a 12º northerly rotation of the western end and a narrowing of 1 nm (from 5 nm to 4 nm). Baleen whale sightings in the BTSS were reduced by 81% and right whale sightings by 58%. Industry transit times increased 9 - 22 minutes for vessels traveling between 10 and 25 knots, and the number of turns remained the same. The proposal to shift the BTSS was accepted by the United Nation's International Maritime Organization

22nd March 16:45

ADAPTED PHOTO AND VIDEO SURVEILLANCE METHODS ON STELLER SEA LION ROOKERIES FOR LONG TERM MONITORING PROGRAM

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Visual observations are a common method of collecting data on marine mammal rookeries and haul outs. But it has some restrictions. First of all – it's impossible to carry out observation on more than one event or object simultaneously. The second restriction deals with data collection, as it has several steps such as event observation, mental event analyzing, data recording into the field book and, finally, data entering into database. All these steps may produce errors and data loss. During this research we had two main objectives. The first one to develop a suitable method to record multiple events on the rookery at the same time. We developed autonomy panoramic photo cameras with high resolution to identify animals, and panoramic video cameras with low resolution to record all events on rookeries. Each photo camera takes a picture every 30 minutes, and at the same time each video camera every second takes frame. This allows reducing archive size. The second objective is to develop methods of a primary data process to analyze a huge amount of photos and videos. The first step - consists of analyses of high resolution panoramic pictures for animal identification and location. The second step - extracts behavioral information from video records using the data from the pictures. We found out that combined photo and video recording allows collecting behavior patterns of animals simultaneously at one time. A speed up replay video allows to search and record into data base different important information, such as copulation and birth duration, exact time of arrival and/or departure etc. The possibility of repeated review allows us to correct and complement behavior information. The autonomy system could be used on rookeries with a difficult observer access.

22nd March 17:00

THE UK CETACEAN STRANDINGS INVESTIGATION PROGRAMME- 20 YEARS OF RESEARCH INTO UK STRANDINGS

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The collaborative UK Cetacean Strandings Investigation Programme (CSIP) has been funded by UK government since 1990, to provide a systematic and coordinated approach to the surveillance of cetacean strandings around the UK coast and to the investigation of causes of death. In the 20 year period between 1990 and 2009, the CSIP received reports of 9494 cetaceans and investigated 2774 through systematic necropsy. Eighteen species were necropsied comprising; Phocoenidae (n=1729); Delphinidae (n=939); Balaenopteridae (n=46); Ziphiidae (n=40); Physeteridae (n=16); and Kogiidae (n=4). Common causes of death in necropsied Phocoenidae included infectious disease (n=387), physical trauma resulting from inter-species aggression (n=309), starvation (n=247) and by-catch (n=288). In contrast, common causes of death in necropsied Delphinidae included by-catch (n=302) and live stranding (n=230). More unusual and novel findings such as gas embolism (n=14) were also found, particularly in deep diving species. As well as helping ensure that the UK complies with a number of national and international agreements and obligations, the data generated by this programme facilitate the investigation of spatial and temporal trends in new and existing diseases, causes of mortality and exposure to environmental pollutants largely inaccessible by other methods. For example, the detection of brominated diphenyl ethers (BDEs) in increasing concentrations in UK-stranded harbour porpoises in the late 1990s led to EU-risk assessments and a subsequent EU-ban of these compounds (particularly the penta-mix). Together with the extensive national marine mammal tissue archive held by the CSIP, data on UK strandings has helped support a broad range of collaborative research that have led to a high number of research publications. More recently, data collected through the project has been made publicly available for the first time, through a web accessed database. The research conducted by the CSIP has helped to advance knowledge about cetaceans, educate the public and inform Government policy.

22nd March 17:15

TESTING A POWERED PARAGLIDER FOR ABUNDANCE COUNTS AND PHOTOID OF COASTAL BELUGA (*DELPHINAPTERUS LEUCAS*) AGGREGATIONS IN THE WESTERN SEA OF OKHOTSK, RUSSIA

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In summer, Okhotsk Sea belugas concentrate in shallow waters and estuarine areas. Aerial abundance surveys are expensive and in some places of Russian Far East are impossible due to logistics. Boat survey data are less reliable: belugas often travel in tight formations, and some animals, especially calves, cannot be seen from a boat; whales are scared of engines and seldom allow an approach closer than 100-200m. PhotoID for this reason is also limited if not impossible. We tested a powered paraglider (paramotor) with a double-seat trike and one with a lighter construction (double-seat foot launch) for abundance counts and photoID of belugas summering along Chkalova and Baydukova Islands in Sakhalinsky Bay. The team consisted of a pilot and an observer/photographer. We used a Nikon D700 camera with a 80-200mm/f2.8 lens. A motor-boat with rescue equipment followed 500m behind. Flying speeds varied from 20 to 70 km/h depending on wind direction. Maximum "working" wind speed was 8m/sec. The launch/landing area was a gravel-and-grass surface of the island or wet sandy beach. The paramotor flew track-lines for beluga abundance counts and circles over beluga groups for photography at GPS-controlled altitudes of 30, 50, 100, 200, and 300m. When possible, counts from the boat were also made. We made 9 flights over 4 continuous days for a total of 8 hours. The abundance estimate from the paramotor was up to 10 times higher than the estimate from the boat. Photos taken from 30-50m altitude were usable for photoID. Minimum altitude that did not disturb belugas was 100m when they were feeding, and $\geq$200m - when traveling. We consider both constructions of the paramotor a promising tool for abundance/age class/photoID studies of coastal cetacean herds and, probably pinnipeds on haul-outs, but we prefer the trike which is more suitable for photography.

22nd March 17:30

LONG TERM SITE FIDELITY AND ABUNDANCE OF BOTTLENOSE DOLPHINS USING THE SHANNON ESTUARY, WESTERN IRELAND

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The outer Shannon Estuary represents the only cSAC for bottlenose dolphins designated in Irish waters. Tursiops are widespread throughout Irish west-coast waters but animals using the Shannon appear to belong to a reproductively isolated population unit with no evidence of mixing with adjacent coastal groups. The vulnerability of small isolated coastal populations such as this makes sustained and precise monitoring a priority for conservation management. Long term photo-identification monitoring of dolphins using the Shannon cSAC began in 1996 and here we present analysis of a 12 year dataset. Using identical survey and analysis methods, abundance estimates were calculated using Pollocks robust design model for data from 8 years of a 12 year database (1996, 1997, 1998, 2001, 2002, 2003, 2006, 2008). These estimates indicated that the numbers of seasonally resident dolphins using the estuary are stable at around 113 ± 16 cv = 0.14 (1997) to 140 ± 12 cv = 0.08 (2006). High estimate precision (low cv) maximises the sensitivity of monitoring surveys to detect population change and at least 10 surveys per annum are required in this case to provide adequate sensitivity (cv < 0.15). Photo-id data show that dolphins have a high degree of site fidelity in the Shannon with 26% of 95 adults with permanent marks sighted in the Estuary over a period of at least ten years. Calf survival was difficult to assess due to many mothers and their calves lacking sufficient marks for inter-annual recognition.

23rd March 09:00

IMAGING OF ODONTOCETE COCHLEA THROUGH SCANNING AND TRANSMISSION ELECTRON MICROSCOPY

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The morphological study of the Odontocete organ of Corti as well as possible alterations associated to sound exposure represent a key conservation issue to assess the effects of acoustic pollution on marine ecosystems. In addition, since odontocetes produce species-specific acoustic signals, morphological differences in the cochlea are expected to be detected among species. Through the collaboration with stranding networks and rehabilitation centres from several European countries that followed an ear extraction and fixation protocol (defined at the Necropsy Workshop 2009 in LiÃ¨ge, Belgium), 117 ears from 13 species of Odontocetes that stranded in the Mediterranean Sea, North Atlantic and North Sea were processed. Due to technical and experimental constraints, all the cochlea were chemically fixed post-mortem, at least 6 hours after death. Here, we present scanning (SEM) and transmission (TEM) electron microscopy images of several cochlea structures of *Delphinus delphis*, *Phocoena phocoena*, *Stenella coeruleoalba* and Hyperoodon ampullatus. Using SEM, these structures include hair cell stereociliary bundles and outer hair cell (OHC) stereocilia imprints in the tectorial membrane. We focused on hair cells, supporting cells and spiral ganglion neurons through TEM. Typical characteristics of high-frequency hearing species like Horseshoe Bat's were observed: small size of OHCs, high development of OHC cuticular plate and supporting cell cytoskeleton, robust cup formation of the Deiters cell body which houses the bottom of the OHC and short and thick basilar membrane. By contrast with the rapid decomposition process of the sensory epithelium after death, spiral ganglion neurons and tectorial membrane appeared to be more resistant to post-mortem autolysis. Interestingly, the tectorial membrane structure still remains in acceptable condition for analysis when the cochlea was fixed more than 20h post-mortem. The analysis of the stereocilia imprints on the tectorial membrane is allowing gaining insights in odontocete hair cell stereocilia organization and detecting possible ultrastructural alterations.

23rd March 09:15

THE PORPOISE OF SURVEILLANCE: REVIEW OF 20 YEARS OF HARBOUR PORPOISE STRANDINGS IN THE UK

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For the past 20 years the UK Cetacean Strandings Investigation Programme (CSIP) has collated, analysed and reported data on 9494 cetaceans stranded on or around the British Isles. Of these, 2,774 (29.2%) have been necropsied by veterinary pathologists in order to establish a specific cause of death. From this rich dataset, covering 20 cetacean species, it has been hoped to assess the levels and trends of many factors affecting the life and death of the UK's cetacean population. These include a quantification of the burden of disease, identification of causes and patterns of trauma, and assessment of feeding ability. Harbour porpoise (*Phocoena phocoena*) account for the greatest number of cetacean strandings each year and comprise 50% of the total number reported. Between 1990 and 2009 the CSIP received reports of 4742 harbour porpoise from around the UK. Of these, 1729 animals (36%) were retrieved for necropsy. Robust assessment of disease burden in this species potentially allows for indication of disease in sympatric cetacean populations, where data are more scarce and analysis complicated by factors such as reporting bias, over-dispersion or small sample size. Here we present a summary of this long term harbour porpoise dataset and highlight some of the patterns and conclusions it has been possible to draw about the health of, and threats to, cetacean populations around the UK coastline.

23rd March 09:30

A 20 YEAR REVIEW OF ACUTE AND CHRONIC GAS AND FAT EMBOLIC LESIONS IN UK-STRANDED CETACEANS: CETACEAN DECOMPRESSION SICKNESS?

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In the UK, 14/2774 stranded or by-caught cetaceans necropsied between 1990 and 2009 had acute or acute and chronic gas embolic lesions comprising 5/541 short-beaked common dolphins (*Delphinus delphis*), 5/31 Risso's dolphins (*Grampus griseus*), 2/1729 harbour porpoises (*Phocoena phocoena*), 1/22 Sowerby's beaked whales (*Mesoplodon bidens*) and 1/1 Blainville's beaked whale (*Mesoplodon densirostris*). The most striking lesions in these cases were gas-filled fibrous cavitary lesions (0.2-6.0 cm diameter) in the liver in common dolphins (n=5), Risso's dolphins (n=5), harbour porpoises (n=2) and the Blainville's beaked whale and massive gas distension of the spleen in Risso's dolphin (n=1). Histopathological examination showed acute lesions such as haemorrhage, fibrin thrombi and acute coagulative necrosis associated with intra-vascular gas bubbles (typically 50-750 µm diameter) and chronic lesions such as variable degrees of peri-cavitary fibrosis. Multiple mass stranding events (MSEs) predominantly involving beaked whales have been linked to naval exercises (using high-intensity mid-frequency sonars). In Spain at least two sonar-induced MSEs had acute micro-haemorrhages in widely disseminated lipid-rich tissues and appearance of gas and fat emboli. Fat emboli were also determined in both UK and Spanish cases by Oil-Red-O and osmium post-fixation techniques. A type of cetacean decompression sickness (DCS) is the most likely pathogenetic mechanism for gas and fat emboli formation, possibly involving acoustically induced behavioural changes to dive profiles causing excessive nitrogen supersaturation on ascent. Acute and chronic gas and fat embolic lesions likely represent different stages of the same pathogenetic (DCS) mechanism and may share similar causal factors

23rd March 09:45

POST-EPIZOOTIC CHRONIC ENCEPHALITIS DUE TO DOLPHIN MORBILLIVIRUS (DMV) AS A THREATENING DISEASE IN THE MEDITERRANEAN STRIPED DOLPHIN (*STENELLA COERULOALBA*)

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In 1990 an epizootic of dolphin morbillivirus (DMV) was observed in the Mediterranean striped dolphin (*Stenella coeruleoalba*). Between 1991-1994 five dolphins from Catalonia showed a DMV infection confined to the brain. No new cases were observed until 2007 when the epizootic reappeared at a milder scale. From January 2008 to November 2010 samples of 117 striped dolphins coming from Catalonia, Valencia and Andalusia were studied by means of H/E, DMV immunohistochemistry or RT-PCR for DMV.
DMV immunopositivity was found in 34/117 (29%) dolphins, restricted to the CNS. Typical lesions of DMVinfection were not observed in the lungs or lymphoid organs in any case. Immunohistochemical stained also failed to detec DMV antigen. Dolphins showed non-suppurative meningoencephalitis with inclusion bodies. Lesions were localized mainly in thalamus, basal nuclei and cerebral cortex. Distribution of DMV immunolabelling was very variable, with some animal showing scarce cells stained, and others severe lesions and strong immunostaining. There were cases with intense DMV-staining and few inflammatory lesions. In three dolphins investigated by RT-PCR, DMV was found in the three cases only in the brain, confirming the exclusive nervous localization of the virus.
This study shows that after the 2007 epizootic (and similarly to the 1990 epizootic), several striped dolphins have shown a DMV infection restricted to the CNS, but the consequences for the population are apparently much severe in the 2007 DMV epizootic (cause of death-stranding in 29% of the striped dolphins investigated). Our hypothesis is that these cases are latent chronic, CNS-restricted infections originated in the epizootic outbreak, reactivated during the ensuing years. These cases bear great similarity with rare morbilliviral induced disease in humans (SSPE) and dogs (ODE). SSPE occurs after reactivation of a previous Measles Virus (MV) infection. In SSPE cases, latency is believed to be associated to defective MV.

23rd March 10:00

NEW EVIDENCE OF A RELATIONSHIP BETWEEN PCB AND THE CAUSE OF DEATH OF NORTH SEA HARBOUR PORPOISES

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Since 1990, the Marine Animals Research & Intervention Network (MARIN) investigates the marine mammals that strand on the coastline of Belgium and northern France. One aim of this work is to determine the cause of death, including pathological and toxicological factors and the biology of the animals. In harbor porpoises (*Phocoena phocoena*), death appeared to be caused by infectious diseases (37% of stranded animals), characterized by severe parasitosis and pneumonia, and trauma (23%), mostly due to bycatch in fishing gear. For about 40% of the stranded animals no cause of death could be determined or ascribed to another cause such as a tumor, starvation or still-born.

Most porpoise strandings occurred in winter, with a peak in by-catches in March and April. More males stranded (57%) than females (42%) and more juveniles (77%) than adults (23%). Most of the bycaught animals were juveniles. Compared to the bycaught porpoises, the animals that had died of an infectious process had a thinner blubber layer (emaciation) and the histological investigation showed a marked lymphoid depletion (spleen, thymus and lymph nodes). The total PCB concentration was determined in the blubber of selected individuals. The concentration was higher in males (61,73 ± 44,09 µg/g lip) than females (15,24 ± 12,64 µg/g lip) and higher in adults (66,20 ± 44,02 µg/g lip) than juveniles (15,46 ± 10,37 µg/g lip). The age variation is explained by the process of biomagnification while the sex variation is explained by the mother-calf PCBs transfer during the gestation and the lactation. Finally, the animals that had died of infectious disease (49,91 ± 43,16 µg/g lip) were more contaminated than by-caught porpoises. (12,35 ± 4,12 µg/g lip). Similar associations between PCB concentration and cause of death was reported for porpoises stranded on the coastlines of the United-Kingdom and Germany

23rd March 10:15

FIRST INVESTIGATION OF INTER-SPECIES DIFFERENCES IN BIOMARKER RESPONSES AND POPS LEVELS IN TWO MYSTICETE SPECIES (*BALAENOPTERA PHYSALUS* AND *BALAENOPTERA EDENI*) OF GULF OF CALIFORNIA (MEXICO)

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The main objective of this project was to investigate, for the first time, the inter-species differences in biomarker responses and POP levels in two mysticete species (fin whale (*Balaenoptera physalus*) and Bryde's whale (*Balaenoptera edeni*) of Gulf of California (Mexico) using skin biopsy as diagnostic tool. A suite of sensitive non-lethal biomarkers was applied, for the first time, to the mysticete unexplored species Bryde's whale to evaluate the toxicological status of this cetacean in the Gulf of California. We applied a "multi-trial-biomarker-tool", combining protein biomarkers (western blot of CYP1A1, CYP2B) and gene expression biomarkers (qRT-PCR of CYP1A1, ER, AhR, E2F-1) with analysis of OCs and PBDEs. This "multi-trial-diagnostic-tool", applied to skin biopsies, underlined differences in contaminant levels and biomarker responses between the two mysticete species of Gulf of California. Higher levels of OCs and PBDEs were detected in the zooplankton-eating species (fin whale) in comparison to the fish-eating species (Bryde's whale); on the opposite, higher levels of CYP1A1 and CYP2B were detected in the fish-eating species suggesting a higher detoxification ability in the Bryde's whale. These data suggest a peculiar evolutionary process of the two isoforms of CYP in the fish-eating species Bryde's whale, that showed levels of both cytochromes similar to the odontocete species resident in Sea of Cortez.

23rd March 11:15

LONG-TERM CETACEAN RESEARCH IN THE ALBORAN SEA TO IMPROVE ECOLOGICAL UNDERSTANDING AND INFORM CONSERVATION

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The Alborán Sea is a dynamic transition zone between the Mediterranean Sea and the Atlantic Ocean. It harbours a highly-diverse cetacean assemblage including deep-diving whales and epi-pelagic dolphins. Its strategic importance for man is also clear. One of the main pieces of information needed both to assess the conservation status of a species and to put the threats to it into context is knowing how many animals are in the population or area of interest, and how these numbers evolve over time (trends). Alnitak initiated a long-term research programme on cetaceans in this area in 1992, which has continued until 2010, yielding a 19 year dataset. This dataset includes 83,161 km on searching effort yielding 5,009 sightings of 9 species of cetaceans, being the most encountered ones the common and striped dolphins (1,375 and 1,922 sightings respectively) followed by bottlenose dolphins and long-finned pilot whales (509 and 661 sightings respectively). This presentation will highlight (a) the importance of the study area to cetacean populations; (b) the new ecological information obtained on the abundance and habitat use of common, striped, bottlenose and Risso's dolphins, long-finned pilot whales, beaked whales and sperm whales; (c) the application of these results to conservation: *e.g.* proposals of Marine Protected Areas, Conservation Plans; and (d) the opportunity that this research programme provides to investigate changes in distribution, abundance and other population parameters in the context of a changing environment. In this latter context, the Alborán Sea has experienced marked changes in climatic and oceanographic conditions during the two decades of this research programme, and this dataset offers a unique opportunity to investigate and quantify changes in distribution, habitat use, abundance, survival and reproductive rates of some species of cetacean in the western Mediterranean in relation to variation in the physical and biological environment and human activities.

23rd March 11:45

A TPOD DETECTION FUNCTION OBTAINED BY VISUAL OBSERVATIONS MAY BE USED TO ASSESS PORPOISE DENSITY ACOUSTICALLY

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Monitoring abundance and population changes of small odontocetes, like the harbour porpoise, is notoriously difficult and labour intensive. There is a need to develop alternative methods to the traditional visual line transect surveys, especially for low density areas. Rigorous application of methods from distance sampling theory to passive acoustic monitoring provides the tools needed for obtaining estimates of absolute animal densities.
Here we made a detection function for TPODs by tracking harbour porpoises visually while concurrently recording them with static acoustic dataloggers (T-PODs). The data were analysed in a mark-recapture approach, where a visual sighting constituted a "mark" and a simultaneous acoustic detection a "recapture". As a distance could be assigned to each visual observation the probability of acoustic detection with increasing distance from the T-POD could be estimated, *i.e.* the so-called detection function was obtained. Effective detection radius of T-PODs ranged from 22 to 104 m and depended on TPOD type, T-POD sensitivity and train classification settings. By applying the mean group size observed, a realistic density estimate was obtained from T-POD recordings and corresponded to density derived from the visual observations. This study was regarded as a feasibility test with the goal to obtain a detection function. With more dataloggers and adequate design of survey layout a density estimate would be obtainable for a larger area. Passive acoustic methods enable efficient monitoring even under poor weather conditions where traditional visual survey methods are not applicable. In addition passive acoustic monitoring provides continuous monitoring in time in contrast to the snap-shots of visual surveys. This study provides a methodology suitable for monitoring in areas with densities too low for visual surveys to be practically feasible, for example harbour porpoises in the Baltic proper and the vaquita in the Gulf of California.

23rd March 12:00

COMPARING ABUNDANCE AND TURNOVER OF BLAINVILLE'S BEAKED WHALES AT A NAVY RANGE AND A CONTROL SITE IN THE BAHAMAS

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Abundance estimates of beaked whales on and around navy ranges are important for understanding and mitigating the effects of military sonars. Unfortunately, direct visual counts of beaked whales are difficult due to their long-foraging dives and short surfacing intervals. However, beaked whales possess individually-distinctive natural markings which are long-lasting, enabling populations to be monitored using photo-identification techniques. In this study we compared abundance and turnover of Blainville's beaked whales (*Mesoplodon densirostris*) in two areas of equal size (~500 km^2) on and outside a navy range in the Bahamas. We fit mark-recapture models to photo-identification data collected during 6 years (2005-2010) at the US Navy's Atlantic Undersea Test and Evaluation Center (AUTEC), where mid-frequency active sonars are used regularly; and off the SW coast of Abaco Island (~170 km away), a control study site where navy sonar is not used regularly. Open- and closed-population Bayesian mark-recapture models were used to estimate abundance and infer turnover in these areas at different temporal scales. The closed population model, accounting for temporal and individual variability in capture probabilities, estimated that approximately 68 whales (posterior median; 95% probability intervals 60-79) used the AUTEC study area over the entire study period, compared to 77 (95% PI = 72-83) using the SW Abaco "control" area. An open population model accounting for mortalities and temporary emigration, estimated an average annual abundance of 52 whales at AUTEC (95% PI = 42-62) and 56 whales at SW Abaco (95% PI = 45-67). In both areas, estimated abundance was higher over the entire study period than the average annual abundance implying turnover of individual whales. Abundance was comparable between the two areas, yet slightly higher at the control site, providing key baseline data for future monitoring in both areas and demonstrating the value of using photo-identification.

23rd March 12:15

LONG-TERM PHOTO-IDENTIFICATION STUDY OF FIN WHALES IN THE PELAGOS SANCTUARY (NW MEDITERRANEAN)

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Long-term photo-identification was used to assess presence and site fidelity of fin whales in the Pelagos Sanctuary. Data were collected during dedicated cruises on eighteen consecutive summers (1990-2007). A total of 435 individuals was identified, 74 (17%) of which were resighted at least once during the study period: 47 resightings occurred on different years, 19 within the same season and 8 both in the same season and in different years. Individuals were resighted up to 6 times in different years with a maximum interval of 17 years. The number of resightings within-season ranged from 1 to 4, varying from 1 to 90 days, indicating that at least some whales spend the entire summer in the Ligurian Sea feeding ground. To provide abundance estimates and survival rate, photo-id catalogues from French Institutes (99 identified individuals, 29 resightings) were merged with our catalogue. The best abundance estimate was for years 1993-1994 and 1994-1995, with 1,070 and 1,133 animals, respectively (95% CI 598-1,969; CV 30%). A Jolly-Seber open population model was used to estimate abundance (n=980, 95% CI 670-1,437), apparent survival rate (0.877, SE=0.04) and rate of population change (0.988, SE=0.03). The apparent survival rate is unexpectedly low and the rate of change may indicate a declining population; further research is needed to clarify these results. Genetic analyses of remotely collected skin biopsies allowed gender determination of 156 whales, 90 females (58%) and 66 males (42%), suggesting possible sexual segregation in the Pelagos Sanctuary (P=0.0547). Twenty individuals presented evidence of vessel collision, a well documented cause of death for Mediterranean fin whales, underlining that only few animals survive a strike. These results, confirming the existence of a persistent site-fidelity to this feeding ground, represent a powerful tool for conservation efforts of this unique population in the Sanctuary area and in the entire Mediterranean.

23rd March 14:45

MONITORING CETACEANS POPULATIONS THROUGH AERIAL SURVEYS IN THE CENTRAL MEDITERRANEAN SEA

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Monitoring abundance and distribution is essential in any conservation strategy, but is often ignored in many regions, including much of the Mediterranean. It is a priority of the Italian Ministry of the Environment, who funded a series of aerial surveys around Italy, to provide significant baseline information on cetaceans distribution and abundance. The covered areas included the Pelagos Sanctuary, the Central Tyrrhenian, the Corsica and Sardinia Seas, and the Ionian Sea and the Gulf of Taranto. Some 171 parallel transects 15km apart were flown in spring and summer 2010, in a total area of 333,598 km^2. A total of 515 cetacean sightings were made: striped dolphins (n=414), fin whales (59), common bottlenose dolphins (16), Risso's dolphins (13), sperm whales (5), pilot whales (5), Cuvier's beaked whales (3). This paper provides distance sampling estimates of density and abundance for striped dolphins and fin whales. The resultant best estimates of abundance of striped dolphins were 88,650 (CV=14%; 95% CI=67,022-117,301) in the Tyrrhenian, Corsica and Sardinia Seas, and 30,500 (CV=21%; 95% CI=20,215-45,866) in the Ionian Sea and the Gulf of Taranto. The estimated abundance of fin whales was 426 (CV=18%; 95% CI=298-609) in the former area; no fin whales were sighted in the latter. A crude comparison with data from past shipboard surveys suggests an appreciable decrease in fin whale density in the Pelagos Sanctuary area over the last decade, reiterating the need for a major synoptic basinwide survey, as well as regular monitoring surveys. The low CVs and CIs reconfirm the effectiveness of aerial surveys in estimating abundance of certain cetacean species in suitable areas/circumstances and may provide a model for other areas of the Mediterranean. These surveys provide baseline data to develop efficient long-term systematic monitoring programmes, as required by a number of national and international frameworks.

23rd March 15:00

CONSTRUCTING THE NULL HYPOTHESIS FOR LONG TERM SERIES OF STRANDING DATA: TEMPORAL AND SPATIAL CONSIDERATIONS

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Marine mammal ecological indicators for monitoring strategies are expected to combine three major characteristics: ecological significance, statistical credibility and cost-effectiveness. Strategies based on stranding network rank high in cost-effectiveness, but their ecological significance and statistical credibility are disputed. Our present goal is to improve the value of stranding data as part of a monitoring strategy by constructing the spatial and temporal null hypothesis for stranding records. The null hypothesis is defined as: small cetacean distribution and mortality are uniform in space and constant in time. We used the Météo-France drift model MOTHY to map stranding probabilities and predict stranding patterns of small cetacean carcasses under H0 across the North Sea, the Channel and the Bay of Biscay, for the period 1990-2009. Carcasses originating from the shelf of the Bay of Biscay, the Channel and the eastern North Sea are more likely to be found stranded than carcasses from the oceanic Bay of Biscay and the western North Sea. If we set an arbitrary value of 1 expected stranding.km-1.year-1 along the UK North Sea coast, values in the other regions are predicted to be 7.3 along the Danish and Norwegian coasts, 4.2 in the Bay of Biscay, 2.9 along the French Channel coast, 2.1 along the southern North Sea coasts and 1.9 along the UK Channel coastline. Weak seasonal patterns were predicted and differed between regions. We were able to compare these predicted patterns with observed common dolphin *Delphinus delphis* stranding data along the Bay of Biscay. Observed numbers were significantly 38% lower than predicted before 1997 and 43% higher afterwards. Perspectives include extending comparisons of predicted stranding patterns under H0 with strandings observed in all range States for several species in a collaborative approach. The use of a null hypothesis will greatly improve the statistical credibility of stranding data analysis.

23rd March 15:15

MODELLING SPERM WHALE HABITAT PREFERENCE AROUND THE BALEARIC ISLANDS

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Sperm whale ecology around the Balearic archipelago is poorly known, although the area is deemed potentially critical for the entire Mediterranean basin, both as a feeding and a breeding ground. This study provides a detailed evaluation of the species distribution and habitat use achieved via a novel analytical framework that combines acoustic and tracking data. During dedicated research cruises (2003-2008), the area was acoustically monitored through regularly timed listening stations. On-effort boat locations were classified either as “presences”, if in acoustic contact with the animals, or “absences”. Sperm whales were encountered 56 times and tracked for periods up to three days. Logistic Generalized Additive Models were used to model the probability of presence in each point as a function of proxy environmental variables. Generalized Estimating Equations were also employed to account for autocorrelation, so that all the points within each follow or searching transect could be used. Both topographical and remotely-sensed covariates were tested as potential predictors, at multiple scales to capture lagged effects in time or space. An ad hoc procedure for model selection was applied to the entire dataset and to two subsets defined by grouping behaviour (singletons versus groups). The results suggest that sperm whales do not use the region uniformly and topography (depth and aspect, rather than slope) plays a key role in shaping their distribution. Moreover, single individuals were restricted to a smaller area and showed a partial habitat segregation from groups (possibly defined by water temperature), that might reflect different needs or intraspecific competition. Model predictive power, assessed through confusion matrices, supported the validity of the analytical approach. By shedding light on sperm whale habitat preference in such a critical area, this study represents an important step for the implementation of specific conservation measures for the Mediterranean stock, classified as “Endangered” by the IUCN.

23rd March 15:30

WHITE-BEAKED DOLPHINS IN THE BARENTS SEA: DISTRIBUTION AND SPATIAL ASSOCIATIONS WITH PREY

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In line with optimal foraging theory, the spatial distribution and relative abundance of a predator should match the distribution and abundance of its prey. The purpose of this study was to look for such associations between white-beaked dolphins (*Lagenorhynchus albirostris*) and potential prey in the western Barents Sea. Data on dolphin and prey (fish) distributions were collected from 2003-2009 on the Norwegian-Russian Joint Ecosystem Survey of the Barents Sea in late summer. Spatial associations between dolphins, prey and habitat (temperature, fronts, depth and slope) were analysed at two spatial scales: 1. at ecosystem scale, by analysing spatial associations between averaged distributions across years in a principal component analysis, and 2. at mesoscale, by analysing spatial associations within 50 km grid cells in a Generalised Additive Model. No clear associations were found on ecosystem scale, whereas the dolphins were positively associated with blue whiting (*Micromesistius poutassou*) at mesoscale. The dolphins were also associated with cod (*Gadus morhua*) south of the polar front and with 0-group capelin (*Mallotus villosus*) in years of low capelin abundance. No associations were found with their assumed prime prey, the capelin. The physical variables were important for explaining the deviance in all models, but the lack of associations on ecosystem scale and in/north of the polar front suggests that white-beaked dolphins in the Barents Sea are generalists in late summer, both in terms of habitat use and prey preferences.

POSTER ABSTRACTS

ACOUSTICS

A01

DESIGNING NATURA 2000 MARINE PROTECTED AREAS IN NORTHEASTERN SPAIN: THE USE OF PASSIVE ACOUSTIC RECORDERS AS A TOOL FOR LONG TERM MONITORING OF CETACEANS.

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The project LIFE+ INDEMARES "Inventory and designation of marine Natura 2000 areas in the Spanish sea" (2009-2013) aims to contribute to the protection and sustainable use of marine biodiversity through identification of valuable areas for Natura 2000 Network. As part of this initiative, a passive acoustic monitoring study was conducted to improve the knowledge of seasonal presence and population identity of fin whales (*Balaenoptera physalus*) and sperm whales (*Physeter macrocephalus*) in the northern Spanish Mediterranean Sea. A deep water Ecological Acoustic Recorder (OSI-Hawaii) was deployed during September-November 2009 and March-May 2010 in the Creus Canyon and Delta Ebro-Columbretes, two designated INDEMARES areas. A total of 132 days were monitored obtaining 760 recorded hours. Data analysis resulted in 20249 fin whale 20Hz song notes, with a peak in September (8730 notes) at Creus Canyon and a peak in March (341 notes) at Delta Ebro-Columbretes. The fin whale population identity analysis showed that most of the detected individuals belonged to the Mediterranean population, except in few cases, where acoustic detections were attributed to a northeast North Atlantic population pattern. This is the first description of an overlapping of the two populations in the Mediterranean Sea and suggests an entry of northeast North Atlantic fin whales during the winter season in Mediterranean waters. Also, it consolidates the return migration pattern of Mediterranean whales from feeding grounds in the Liguran Sea, along the northen Spanish Mediterranean coast, during autumn. One brief sperm whale detection accounted for the overall sampling period. The detection did not include codas, impeding any population identification, but included creaks attributed to feeding behavior and confirming with the visual sightings the ecological importance of the Creus Canyon area. These results emphasize the importance of the long term acoustic monitoring for cetaceans in marine areas of the Natura 2000 network.

A02

THE UNDERWATER ACOUSTIC ACTIVITY OF CAPTURED BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*): TWO KINDS OF THE COMMUNICATIVE SYSTEMS?

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The underwater acoustic activity of bottlenose dolphins has always aroused the interest of researchers because of its wealth and variety. There are three categories of sounds uttering by dolphins: 1) series of wide-range pulses (clicks) using for echolocation, 2) tonal signals (whistles), and 3) modulated pulse-tone (burst-pulse) sounds. Categories 2 and 3 are traditionally interpreted as communicative signals. The overwhelming majority of contemporary investigations devote to whistles. Pulse-tone signals including their structure and functional role are not yet sufficiently explored.

In 2009-2010 we realized multipurpose researches in the underwater acoustic signalization of captured bottlenose dolphins. The analysis of multi-hour acoustic recordings showed whistles making up 42,8% while pulse-tone signals 57,2% of the vocal repertoire (without echolocation clicks). In spite of the seeming diversity of whistles, these may be reduced to several types. Most of them (make up 50% to 90% of the whistles repertoire in different behavioral situations) are personal "signature-whistles". In this way, it is doubtful that the whistles have a deep semantic load. These signals are used mainly for the designation of the spatial or social position of individuals.

On the other hand, the modulated pulse-tone sounds are more interesting from the standpoint of information potentials. The modulation of contours in pulse-tone signals is strongly pronounced. They have a compound inner structure that may be decomposed into simple elements. Some of these elements function as independent signals. In general, the category of pulse-tone sounds seems to be a complex structural system, suitable for encoding rather diverse forms of information. The intensity of uttering's sometimes can increase up to 1000 sign\hour while the production of whistles on the contrary, is considerably decreased during such periods.

Thus, the bottlenose dolphins use two systems of sounds for communication, which are different in their structure and functions.

A03

FROM OFFLINE RECORDINGS TO REAL-TIME ANALYSIS OF OCEAN NOISE AND ACOUSTICS EVENTS AT UNDERWATER OBSERVATORIES

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Passive acoustic monitoring has the potential to be implemented continuously and over long time periods, resulting in large and representative datasets. However, this inevitably leads to a high rate of audio data acquisition that could be problematic when the data needs to be transmitted, stored or analyzed. For observatories with a limited power supply, transmission, storage or additional data processing (*e.g.* automated classification, data compression) have to be optimized, which may imply the loss of potentially interesting information. For cabled observatories where power and communication are not an issue, limitations arise with storage. In any case, the need for immediate mitigation actions when facing acoustic events that could result harmful to individuals or populations, and the necessity of long-term monitoring of noise, calls for the development of a robust technique able to provide both historical statistical data on noise and alarms on specific acoustic events: *i.e.* a fully automated real-time detection and classification system that would be able to provide this information while minimizing technical costs. The approach proposed here divides the recording bandwidth in frequency bands that cover the acoustic niche of most species and secondly applies to these bands a series of detectors and classifiers (as well as localization and tracking algorithms), that also allow to assess the short-, medium- and long-term contribution of noise sources in these acoustic niches. The Laboratory of Applied Bioacoustics (LAB) of the Technical University of Catalonia has developed and implemented at several underwater observatories in Europe (ESONET, European Sea-Floor Observatories Network of Excellence) and Canada (NEPTUNE, NorthEast Pacific Time-Series Undersea Networked Experiments) an automated real-time DCL system that has proven to be reliable and efficient. The live audio data stream as well as the output of the statistical analysis can be accessed online at http://listentothedeep.com

A04

VOCAL PRODUCTION BY FREE-RANGING BOTTLENOSE DOLPHIN MOTHER-INFANT PAIRS DURING FEEDING ACTIVITIES

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Common bottlenose dolphins (*Tursiops truncatus*) produce different acoustic emissions, including a diverse repertoire of both tonal and burst pulsed sounds used for communicative purposes. In this study we examine the vocal production of free-ranging bottlenose dolphin mother-infant pairs, during feeding activities, to gain insight into the functional significance of vocalizations. The study area (North-eastern coast of Sardinia, Italy) provides a unique opportunity to study vocal production of free-ranging bottlenose dolphins because on a year-round, daily basis, resident individuals tend to follow predictable spatial patterns foraging onshore. Results are based on focal observations and simultaneous recordings of resident females and their calves from 2007 to 2010. During 18 sightings with behavioural observations and simultaneous recordings of the mother-calf pairs alone, 102 tonal and 351 burst-pulsed sounds were detected. The acoustic repertoire observed in these pairs was extremely diverse, with a higher production rate of whistles and some types of burts-pulsed sounds. Whistle emission of mother-calf pairs was significantly higher than dyads formed exclusively by adults. The results of this study verify that tonal sounds (particularly whistles) play an important role in the communication between mother and calf. Past studies have suggested that the production of repeated whistles by bottlenose dolphins may indicate the use of stereotyped signature whistles. Thus, the use of tonal vocalizations as contact calls between mother and calf supports the individual recognition hypothesis. Highly individualized signature whistles may be particularly useful in mother-calf pairs in which mothers maintain consistent, long term associations with their calves.

A05

PROBABILITY OF ACOUSTIC DETECTION OF BEAKED WHALES FROM DEEP AND SHALLOW HYDROPHONES.

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Mass strandings of beaked whales coincident with naval exercises or seismic activities suggest that these species may be especially vulnerable to acoustic pollution. However, mitigation efforts are thwarted by the low probability of visual detection of beaked whales which spend most of their time underwater. Acoustic detection is a promising method to assess if ziphids are present in an area, but studied beaked whales are vocally active less than 25% of the time and only when deeper than 200m in foraging dives. This may result in a lower probability of acoustic detection at shallow hydrophones in towed arrays, as compared to deeper sonobuoys due to a combination of increased ambient noise near the surface and downwards refraction of upwelling sound. Here we compare the probability of detecting beaked whales clicks with DMON autonomous hydrophones suspended below drifting buoys at 20 and 200m depth. The study was performed off El Hierro, in the Canary Islands, where year-round coastal populations of ziphiids provide an ideal experimental site. The DMONs were programmed to record sound continuously (120 kHz sampling-rate, 55 kHz bandwidth) while running a matched-filter click detector. A total of 75 buoy deployments were performed in spring 2010, resulting in 532 hours of recordings and some 270.000 click detections. The deployment area was within the visual field of a shore station manned by 4 observers and ziphiids were seen in the area on all days. We used a double platform approach to estimate the probability of detecting individual clicks at the shallow and deep hydrophones. We conclude that detection probability is not strongly dependent on depth over the 200m range tested implying that there may be potentially little performance loss in using shallow hydrophones to detect beaked whales.

A06

COMPARISON OF HARBOUR PORPOISE (*PHOCOENA PHOCOENA*) AND DOLPHIN DETECTABILITY BETWEEN T-PODS AND C-PODS

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Static acoustic monitoring with T-PODs has been conducted in Broadhaven Bay, Co. Mayo, Ireland, since 2002 in connection with the installation of a gas pipeline. C-PODs were introduced in 2009, necessitating calibrations between the different acoustic units. T- and C-PODs were calibrated in the sea during the 2010 field season. An in-situ calibration of two Version 3 T-PODs was conducted for 11 days in August. Following this two T-POD/C-POD pairs were moored at two locations ca. 8km apart for 35 days, and four C-PODs were deployed together for a 17 day calibration period in October.
T-PODs were set to log both dolphins and porpoises. Standard C-POD settings were applied. Data were downloaded and exported as hourly Detection Positive Minutes (DPM) with TPOD.exe v8.24 and CPOD.exe v1.054.

After Bonferroni-correction, there was no significant difference between the detectability of either dolphins (Wilcoxon test: $Z = -0.411$, $p = 0.681$) or porpoises ($Z = -2.008$, $p = 0.045$) between T-PODS. The detectability of dolphins did not differ between the four C-POD units (Friedman test: $Chisq = 3.561$, $p = 0.313$). However, three C-POD pairs (50%) showed a significant difference in harbour porpoise detectability (Wilcoxon test: $-4.102 < Z < -2.884$; $p < 0.004$).
The T-POD/C-POD comparisons showed significant differences in harbour porpoise detectability at both locations ($Z = -4.794$ and -6.419, respectively; $p < 0.001$), while dolphin detectability differed only in one location between units ($Z = -7.310$, $p < 0.001$).

While both types of PODs showed consistency in dolphin detectability, T-PODs were more consistent in detecting porpoises than C-PODs. Paired unit deployments confirmed the necessity to be cautious interpreting T-POD/C-POD datasets as differences between units are evident from this data set.

A07

DIFFERENCES IN SPERM WHALE AND PILOT WHALE REACTIONS TO PLAYBACK OF KILLER WHALE SOUNDS

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Killer whales (*Orcinus orca*) have been observed to predate upon a number of cetacean species, though fish-eating killer whale ecotypes likely pose no threat to cetaceans. Little is known about the behavior of cetaceans when they detect killer whale presence. In this study we tested the hypothesis that cetaceans' behavior is altered by detection of killer whale vocalizations. We performed experiments in Norwegian waters where long-finned pilot whales (*Globicephala melas*) and sperm whales (*Physeter macrocephalus*) cohabit with killer whales. In order to simulate killer whale presence, we performed underwater playback experiments broadcasting killer whale vocalizations and we assessed the behavioral responses of the targeted animals. We tested 5 sperm whales encountered off Andenes (Norway) and 5 long-finned pilot whales encountered inside the Vestfjord basin. Behavioural data were collected using D-TAGs that were attached to the tested animals prior to sound playback exposure. Tracking of tagged animals and additional behavioral data such as social group size were collected by observers from an independent observation vessel. To assess whether playback of killer whale sounds induced behavioral changes in both studied species, we compared behavioral data collected before sound exposure to those collected during sound exposure. Our most striking results showed that in sperm whales, killer whale sounds elicited an interruption in the descent phase of diving and a return to the surface (4/5 experiments). For pilot whales, killer whale vocalizations strongly attracted animals which diverted their course towards the speaker (4/5 experiments) and induced a decrease in inter-group spacing. The striking differences in how both species reacted to playback may represent species differences in anti-predator strategies, or that the playback to pilot whales did not indicate a predation risk. Our work shows that playback experiments using natural vocalizations may be an efficient method to investigate behavioral characteristics of interspecific interactions among cetaceans.

A08

COMPARISON OF STATIC ACOUSTIC MONITORING DEVICES

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Static acoustic monitoring (SAM) has been used to monitor harbour porpoise populations in some parts of the North and Baltic Sea continuously for nearly a decade. Recently, in addition to the often used T-PODs, other monitoring devices such as the porpoise click logger (PCL), the A-Tag and the T-POD successor C-POD became available. As T-PODs are already outdated and are not produced anymore, questions regarding the comparability of data gathered with different devices arise especially for long-term datasets. Answering these questions is essential, as data has already been gathered and loss of equipment may lead to a change of devices within a study.
The recently established project “COSAMM - Comparison Of Static Acoustic Monitoring Methods for harbour porpoises and other odontocete species” is comparing the different devices under a variety of acoustic and processing aspects. The main objective is the comparison of devices in a test tank and during field trials to evaluate the performance of the different loggers. We will furthermore try to estimate how well the different processing algorithms work. Future work will also include hydrophone array recording to define a common basis for all loggers. The poster is intended to present the ideas of the project and to establish a discussion basis for current SAM-users, so that the needs of other scientist can be considered in this project.

A09

USING PASSIVE ACOUSTIC MONITORING TO DESCRIBE THE HABITAT USE OF BOTTLENOSE DOLPHIN (*TURSIOPS TRUNCATUS*) IN THE RIA DE AROUSA (NW SPAIN)

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The Galician coast (NW Spain) represents an area of great importance for the cetaceans. The studies developed during more than 15 years shows the existence of numerous areas of interest, such as the Ria de Arousa for the conservation of the bottlenose dolphin (*Tursiops truncatus*) population. In order to determine how this species use this area it is necessary to use new tools, like passive acoustic monitoring. Two C-POD's were used and situated in two different locations (Area 1& Area 2) near to A Illa de Arousa, along 6 periods that were held between November 2008 and September 2009. Sampling was carried out during 134 days in the Area 1 and 130 days in the Area 2, obtaining positive registers of cetaceans in 38,8% of the days of sampling in the first one, and in 40% of total days of sampling in the second one. Regarding the use of the area, in Area 1exists a clear preference for daytime period (80,36%), and in contrast Area 2 has a certain preference for night period (56,03%). There is not a clear seasonal pattern or a tidal period preference. Percentage of fast click trains (PRF>100), associated to feeding activity, is very low (4%) in Area 1, and practically non-existent in Area 2 (2%). Passive acoustic monitoring, using C-POD, proved to be an effective technique to obtain a detailed description of the habitat use of bottlenose dolphins, and a fundamental tool for the management and conservation of this species.

A10

A COMPARISON OF THE DISCRETE CALL REPERTOIRES OF NORTHEAST ATLANTIC KILLER WHALES (*ORCINUS ORCA*)

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It has been previously suggested that Icelandic and Norwegian herring-eating killer whales have been in contact in the past, when the herring stocks both populations feed upon shared the same feeding grounds. Although photo-identification data suggest that the Icelandic and the Norwegian herring-feeding killer whales are not currently in contact, behavioural studies have shown that they use similar foraging and feeding strategies. In this study we are building a catalogue of the call types of the Icelandic population from ~64 hours of underwater recordings off two locations in Southwest Iceland. The recordings were made using sound recording tags attached using suction cups (Dtags), a 4-element vertical hydrophone array and a 2-element towed hydrophone array. Here, we compare the call types of the Southwest Icelandic catalogue to the previously described vocal repertoire of killer whales from East Iceland. Then we compare these sounds with calls of killer whales from Norway and Shetland which have been documented in previous studies or recorded by ourselves. Similarities between these repertoires may reflect the ecological similarities of different populations of herring-feeding killer whales as well as genetic and/or past social relationships.

A11

INVESTIGATING VARIATION IN WHISTLE STRUCTURE BETWEEN THREE PARAPATRIC BOTTLENOSE DOLPHIN COMMUNITIES IN IRISH COASTAL WATERS

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Bottlenose dolphins (*Tursiops truncatus*) show evidence of community structuring in Irish coastal waters. We investigate how this might be reflected in their vocal repertoire. Recordings were made from three communities: a seasonally resident population of 140 in the Shannon Estuary (mid-west coast), an apparently separate but adjacent and mobile community in Connemara (north-west coast) numbering 170 and a group of six individuals regularly using Cork Harbour (south coast) since 2007. The Shannon population appears genetically isolated from adjacent coastal areas, except regarding the group in Cork, indicating ongoing gene flow or recent dispersal between these areas. Photo-identification have confirmed that coastally ranging dolphins, including Connemara animals have large home ranges, while estuarine animals are only observed close to the Shannon. A total of 3,012 whistles were recorded at a sampling rate of 96kHz. 140 good quality whistles were randomly selected from each community and frequency contours extracted in Matlab. Six acoustic parameters were calculated and run through discriminant function analysis, resulting in accurate prediction of sampling community in 48.8% of the cases. Whistle types were shared between communities, illustrated through a neural network approach (ARTwarp) where whistles were classified into categories based on a vigilance factor (Deecke and Janik, 2006). At 96% vigilance, 420 whistles generated 185 categories of which 29% contained whistles from more than one community and 9% contained whistles from all three communities. ANOVA revealed variation between the communities in maximum, minimum, start and end frequency (log transformed). Post-hoc analysis indicated significant differences in all four parameters between Shannon and Connemara and between Cork and Connemara while minimum frequency was the only parameter significantly different between Shannon and Cork. The results indicate a greater similarity in whistle characteristics between more closely related communities demonstrating that relatedness may play an important role in divergence of vocalisation behaviour.

A12

SEARCH TACTICS OF ECHOLOCATING MALE SPERM WHALES IN A BIMODAL FORAGING MODE

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When searching for food, echolocating bats and toothed whales modulate their acoustic sampling rate according to the distance over which they expect to find prey or obstacles. Both taxa use a low clicking rate while searching for prey, but change to fast clicking (called a buzz or creak) when attempting to capture prey. Acoustic recording tags on echolocating whales provide continuous measures of the depth of the whale, its clicking rate, and, via echoes returning to the whale, its distance to the sea-floor. Combining these data with the depths at which feeding buzzes are produced, provides an indication of where prey are encountered and presents an opportunity to study search tactics as a function of resource location. Male sperm whales off northern Norway forage over a wide depth range and display a dynamic foraging behaviour switching between shallow and deep dives, but it is unknown what factors influence the selection of the target food layer in each foraging dive. Here we use multi-sensor acoustic tags (DTAG) to compare the dynamic foraging tactics of male sperm whales to those of females in warmer waters for which shallow foraging is very rare. We show that male sperm whales, in contrast to females, echolocate during the ascent phase of dives without attempts to capture prey, suggesting that ascents are used to locate the food layer for the next dive. Males also start clicking earlier and click at higher rates in shallow dives than in deep dives indicating a shorter sonar inspection range. These results suggest that male sperm whales may decide on what food layer to target prior to diving on the basis of information acquired in the previous dives. The clicking rate of an echolocating predator may then be a useful indicator of how prey resources are distributed in the water column.

A13

MODELING THE PHENOLOGY OF THE HARBOUR PORPOISE (*PHOCOENA PHOCOENA*) IN THE GERMAN BIGHT USING DATA FROM STATIC ACOUSTIC MONITORING

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Static acoustic monitoring has increasingly been used in studying harbour porpoises, *Phocoena phocoena*, and other odontocetes (C-POD). This methodology has the advantage of continuous data collection in remote locations despite bad weather conditions. This is balanced for example by pseudo-quantitative data which are displaying often poisson or zero-inflated poisson distributions, impeding traditional data analysis. They are mostly analysed as detection positive intervals per time. By comparing different time intervals the importance of a certain location for a given population can be explained.
In this study we modelled the phenology of harbour porpoises in the German Bight. We accounted for temporal autocorrelation in the data by modelling the autoregressive process for every time series at each position. Descriptive variables considered were measured at the C-POD (temperature, background noise), remotely sensed variables, data of cyclic nature (day/ night rhythm, lunar phase), descriptive data (latitude, longitude, depth, distance to land) and the ID of the C-POD as a factor. Modelling approaches considering zero-inflated poisson data and spatial autocorrelation have been carried out. The performance of these modelling approaches has been analysed by measuring bias and precision in comparison to other often used approaches (Generalized Additive Models and Ordinary Least Square). The activity of harbour porpoises is highly seasonal. Accounting for zero-inflated distribution and spatial information reduced bias and added exploratory information.

A14

FROM DATA BASE TO GENERAL IDEA HOW ECHOLOCATION WORKS- COMPARISON OF THREE GROUPS OF VERTEBRATES: CETACEANS, BATS AND BIRDS.

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Echolocation is an interesting evolutionary problem, which could be considered from different points of view, from physiology, ecology finally neuroanatomy. Echolocation is used by animals to orientate but sometimes it is considered as a way to communicate. It is observed in three different groups of vertebrates: cetaceans, bats and birds. Despite of similarities in mechanism, there are significant differences between species, populations and individuals connected with *e.g.* geography and behaviour. The main aim of project was to compare echolocation mechanisms in these three groups of animals and make some general statements. It is small resume of contemporary knowledge of echolocation, using the data collected through years by different researchers, in various regions on different species. Research on echolocation finds practical application in technology, it is planned to improve sonars, find the way to use ultrasounds in medicine and wireless communication. Better understanding of echolocation in future would result in better endangered species protection. Scientists need to understand the reason of mass stranding- there are some hypothesis it could be connected with some disabilities in echolocation process. Only by analysing long term data we could manage to create full and accurate image of echolocation.

A16

VARIABILITY OF THE FREQUENCY MODULATION SHAPE IN DISCRETE CALLS OF KAMCHATKAN FISH-EATING KILLER WHALES (*ORCINUS ORCA*).

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Most killer whale calls can be divided into discrete call types. Every pod of killer whales uses the same repertoire of discrete calls. Different pods can share some call types, though the structure of the same call type can differ between pods. However, some variability of call structure also occur within pods. In this research we tried to compare variability of several parameters of the frequency modulation shape for two discrete call types produced by killer whales from the east coast of Kamchatka peninsula (Russian Far East). For comparison of different calls we used two parameters of the frequency modulation shape. The first parameter was calculated as a frequency difference in each point divided by the number of points. This parameter represented the average difference between the contours and reflected the difference in the frequency modulation shape. The second parameter was the difference in the average frequency between the two calls. For the comparison we used 25 sounds from the two call types (K5, K20) recorded from each pod. We found out that these call types are highly different in frequency modulation shape (the average between call types 0,25 kHz at average frequency modulation magnitude 0,65 kHz), and slightly differ in average frequency (+/- 25 %). Comparison of calls within types showed that the frequency modulation shape is much more constant, for K20 call type this value was 0,05 kHz at average frequency modulation magnitude 0,4 kHz, for K5 value was 0,09 kHz at frequency modulation magnitude 0,8 kHz. However, average frequency for the first call type varied in range of +/-50 %, and for the second in range of +/-15 %. It is possible that such variability of calls is used for individual recognition between killer whales within pod, or have semantic sense.

A17

FROM T-PODS TO C-PODS - AN APPROACH TOWARDS DATA COMPARABILITY

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Since 2002, the German Oceanographic Museum (GOM) is conducting static acoustic monitoring (SAM) of harbor porpoises using T-PODs (porpoise click detectors) in the Baltic Sea. The results showed a seasonal and geographical pattern revealing migration behavior that recurred annually. The acquisition of these acoustic data highlighted that, despite the dramatic decline of the population, the harbor porpoise does still occur in the entire German Baltic Sea. Since 2009, the C-POD, the digital successor of the T-POD, replaces the T-POD. The production of the latter was stopped. Future monitoring projects such as the currently initiated SAMBAH (Static Acoustic Monitoring of the Baltic Harbor Porpoise) project is now using C-PODs. For its static acoustic monitoring, the GOM eventually has to switch from T-PODs to C-PODs, for being able to replace lost or damaged devices currently used, as well as for being able to provide SAMBAH data gathered in German waters. The major concern is the comparability of data sets obtained by those two acoustic devices: the GOM has eight years of SAM-data collected with T-PODs, and has to continue with C-PODs. As it is not yet possible to directly compare the results obtained by T-PODs and C-PODs (due to different data acquisition methods), simultaneous acquisition of T-POD and C-POD data will help to investigate if and how data are comparable. For this comparison, we deployed on each of the selected monitoring positions of the ongoing SAM project of the GOM, a T-POD and a C-POD at the same time. The so gathered data will be compared using a linear regression analysis for revealing any comparability and a correction factor to be used for matching future SAM-data obtained by C-PODs with already existing data gathered with T-PODs.

A18

FALSE POSITIVE TESTING OF CPOD DATA FROM CARDIGAN BAY - HUMANS VS. THE ALGORITHM!

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CPOD.exe is a software program used to analyze acoustic data collected by C-PODs (static acoustic monitoring devices). Data is categorized dependent on the probability that a series of clicks are of cetacean origin, with the use of an algorithm which analyses the acoustic characteristics of clicks (Chelonia Ltd). A species class is then assigned to each click train. In this study a C-POD grid was deployed within Cardigan Bay between February-May 2010 and three C-PODs were chosen, at random, to allow investigation of potential rates of false positive train classifications by the CPOD.exe algorithm (v.1.055). Click characteristics such as frequency, click rate, and bandwidth were examined in detail from a subsample of 100 trains from each C-POD, for both the Bottlenose Dolphin *Tursiops truncatus* and the Harbour Porpoise *Phocoena phocoena*. The false positive rates obtained varied widely, dependent on the C-POD analysed. False positive rates of 0%, 2% and 21% were obtained for the "porpoise" species class sample, from the three C-PODs, while rates of 11%, 12% and 14% were reported for the "dolphin" data. In attempts to investigate observer bias when classifying false positive classes, three observers independently examined click characteristics from a smaller subset of trains. Humans classified <20% of "porpoise" class trains, and 12% of "dolphin" class trains, as "false positives" or "trains of unsure origin", although human opinions on the number of questionable trains in the data differed for porpoise by 3%. Preliminary results suggest that while visual observers frequently assessed the same train as of "unsure origin", difficulty remains in detecting false positive classifications with certainty, due in part to the variable nature of cetacean click trains. Validation of false positives through visual observation trials will also enable enhancement of the software's algorithm.

A19

POSSIBLE ACOUSTICAL AND BEHAVIOR CORRELATIONS OF WHITE WHALES (*DELPHINAPTERUS LEUCAS*) IN REPRODUCTIVE HERD OF SOLOVECKIY ISLAND.

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The acoustic channel plays an important role in communications of beluga whales. The purpose of researches was an establishment of correlation between the acoustic signaling and behavior. The material was collected in reproductive congestions at Solovetsky Island in the White Sea in July-August 2007. Overall count of ethology observations is 60 hours, acoustic records is 15 hours. For the analysis we used 45 fragments of records with 2 minutes' duration. We have divided behavioral activity into 3-types: rest/sleep, quiet swimming, social communication. Sounds of beluga whales were record by hydrophone, analysis of signals were conducted by program Adobe Audition-1.5. Signals have been divided into several groups: tonal signals (high-frequency whistles and whistles) pulse tone (tone with high and low-frequency of following of impulses), echolocation series. We estimated a share of various categories of signals, the general frequency of occurrence of signals (signal/mines) and relative frequency (signal/mines/individual). Mann-Whitney U-test has revealed distinctions in frequency of occurrence and a share of different categories of signals depending on a behavioral context. The general level of the acoustic signal system was the highest during social interactions, reaching 61 signals in a minute. Similar results have been received earlier on Solovetsky and Myagostrov beluga whales. The share of peeps, averaging about 25% of the general vocalization, was above during situations a dream/sleep and quiet swimming that can be acknowledgement before the stated hypothesis about a contact role of these signals. Level of low-frequency pulse tones is higher during social interactions. Echolocation series, as well as in research of beluga whales of area of islands Roganka-Golii-Sosnowiec can be seen during rest and quiet swimming more often that can testify to use of these signals by beluga whales for tracking one after another. It is possible that revealed tendencies are stable and general for the

A20

MONITORING COMMON BOTTLENOSE DOLPHINS AND ANTHROPOGENIC NOISE USING WIDEBAND ACOUSTIC BOTTOM RECORDERS, IN THE PELAGIE ISLANDS (SICILY - MEDITERRANEAN SEA)

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Common bottlenose dolphin (*Tursiops truncatus*) is the most frequent species of Cetacean sighted in the coastal water of the Pelagie Islands, Marine Protected Area in the Strait of Sicily (Mediterranean Sea).
An originally designed low cost battery operated acoustic bottom recorder, based on a quality commercial wideband audio recorder and on custom control electronics was developed to monitor the presence and acoustic behaviour of common bottlenose dolphin.
Co-occurrence with shipping traffic was also studied, while analyzing data, to evaluate interaction levels and possible effects. More than 15000 minutes of audio were recorded during 32 deployments in 14 sites, with variable sampling schemes, in a period from May to December 2006.
All recordings have been visually analyzed using spectrographic analysis, grouping events in 5 minutes time slots.
Over 2200 whistles were detected in the recordings. Spatial and temporal distribution of the detections, their statistical significance, their co-occurrence with traffic noise and effects of the noise over the signals' characteristics are presented.

A21

VOCAL ACTIVITY OF SHORT-FINNED PILOT WHALES (*GLOBICEPHALA MACRORHYNCHUS*): WHO IS CALLING?

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Acoustic recording tags are potentially powerful tools for studying cetacean acoustic communication in the wild. If recorded vocalizations can be attributed to the tagged animal, individual vocal activity can be linked with behavioural context, inferred from depth and other sensors in the tag. However, for social cetaceans living in cohesive groups it can be challenging to discriminate vocalizations produced by the tagged whales from those made by nearby conspecifics. Here we analyzed 82 hours of acoustic data gathered with DTAGs from 24 short-finned pilot whales tagged in 2008 off Tenerife (Canary Islands). To distinguish sounds from tagged and untagged whales, we measured the angle of arrival (AOA) and the received level (RL) of each vocalization. For echolocation clicks and buzzes, these parameters were sufficient to reliably allocate sounds to the tagged whale or conspecifics with minimal errors. In contrast, the origin of tonal and pulsed calls proved to be difficult to determine. A set of 5426 vocalizations with potential communication function were identified in the recordings and classified as tonal calls, pulsed calls or burst pulses. A preliminary analysis allocated 1380 calls to tagged whales, but potential errors in this classification are difficult to evaluate due to the apparently wide variations in RL and AOA of calls produced in different behavioural contexts. Spectral cues, which are reliable indicators of provenance for echolocation clicks, also appear to be inconsistent for tonal calls. For short-finned pilot whales forming cohesive groups near surface, periods with intense vocal activity of the group are challenging. In contrast, errors will be lower when classifying calls produced by whales diving independently or enough separate each other. These results have implications for studies on vocal behaviour and vocal rate applied to analysis of data from acoustic surveys.

A22

AREA MARINE PROTECTED (AMP) AREAS FREE OF ACOUSTIC POLLUTION? CASE EXAMPLES OF NOISE FROM FISHING AND SHIPPING ACTIVITIES IN DEEP-WATER AREAS OF THE MEDITERRANEAN

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Cetaceans and other marine fauna use sound for vital functions such as communication, foraging and predator detection. Signals mediating these functions can be masked by increased levels of ambient noise. Therefore, buffering from acoustic pollution should be considered when designing MPA. Some sources of noise can increase background noise levels at large distances. This is most relevant for “chronic” activities occurring repeatedly in an area. Here we analyze two chronic sources of anthropogenic noise in some areas of the Mediterranean: bottom-trawling fishing and shipping lines. The study was performed within the context of the EU project LIFE+INDEMARES and we present case examples showing that noise produced outside MPA has the potential to affect marine life within the borders of MPA. Recordings were taken in two key areas for the Natura2000Network: Cap de Creus (Catalunya) and Alboran Sea. Point sound samples (30min) were gathered with a calibrated hydrophone (Reson TC4032). In Cap de Creus, broadband (100Hz-40kHz) noise levels increased by 15dB re 1µPaRMS in recordings performed at 0.5, 1.2 and 1.4km from trawling boats over recordings in the same area with no boats in a 6nm radius. Under the conservative assumptions of the closest boat dominating the noise signature and spherical sound transmission, the radius at which trawling noise exceeds usual background noise in this area is around 3km. The Alboran Sea is crossed by over 25% of the World’s shipping activity, with the main shipping line located north of the Alboran Island. We performed recordings following a north-south transect and low frequency noise (<150Hz) broadband sound levels in the most northern point (18km from Alboran Is.) exceeded in 10dB re 1µPaRMS the levels in the other recordings. This examples point to the need of gathering long-term datasets of acoustic levels in MPA and create “acoustic buffer zones” around them.

A23

DENSITY ESTIMATION OF SMALL CETACEANS WITH STATIC ACOUSTIC DATA LOGGERS. PART 1: TRACKING HARBOUR PORPOISES IN A JUNGLE OF HYDROPHONES

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Acoustic methods to estimate animal density typically rely on identifing individuals by their calls or on locating animals using an array of static or mobile hydrophones.

A novel “time present” method (Tregenza, 2009) proposes that cetacean density can be estimated using the time animals spend in the effective detection radius (EDR) of a data logger without the need to distinguish individuals or to locate them. A crucial part of this is to identify the EDR and the mean animal time per logger when density is known. Here we present a method for testing a calibration grid of data loggers to effectively detect animals in an area.

A grid of 44 loggers (CPODs, Chelonia Ltd.) was deployed within a 1km^2 sea area off New Quay, West Wales. Theodolite observations of harbour porpoises were conducted from a headland to validate the number of animals in the area.

Of the 6699 minutes of observations, 579 had porpoise sightings in 35 encounters within 276 theodolite positions. In the same period a total of 96 acoustic encounters (1797min) were logged. 60% of all visual sightings had an acoustic match in the same minute and 80% of those within 1 minute either side. All but one visual encounter was detected acoustically in the grid, and 83% of encounters triggered the outer edge of hydrophones before the centre ones. Mean train duration/min per logger was found to be 58.82 microseconds for one animal and 104.36 for a pair of animals.

Although a considerable portion of the data is yet to be analysed and the grid set up should be improved in the future for more efficient data collection, the calibration grid was found to be a useful tool for estimating the effective detection radius and the mean animal time per logger for the purposes of density estimation.

A24

CONTACT CALLS SIGNALS AS A PATTERN FOR DETERMINATION OF LOCAL DIALECTS OF BELUGA WHALES (*DELPHINAPTERUS LEUCAS*)

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Contact signals of beluga whales (*Delphinapterus leucas*) with possible individual recognition function was described by us earlier (Osipova, Belikov, etc., 2009). This type of signals is stereotyped and characterizes by simple but highly recognizable contour of frequency modulation. We suggest that these features could be a valid reason for using mentioned type of calls not only for individual, but also for group recognition. Hence, it could be a good basis for determination of so-called local dialects of beluga whales. For testing this hypothesis we used records of contact signals made in two local groups of beluga whales in the regions of Myagostrov and Letnyaa Zolotitsa (Onegskiy Bay, White Sea. Russia). According to Belkovich (2006), animals from these two spots belong to different local herds and can not be intersected. Hence, there is a possibility of existence of local dialects because of possible distant and cultural separation of these two herds. The main objective of this investigation became the detection of basic parameters of signals that could be the keys for description of dialects of two local herds. For comparison signals of two groups of animals we used a set of frequencies and duration parameters of each signal in the samples. According to our results, most of the parameters (6 out 9) from two groups of signals demonstrate significant differences ($p<0,05$). These differences concerned such basic parameters, as overall length, maximum and minimum frequencies of signal. Also, there were found significant differences in duration characteristics of measured segments of signals. However, some frequencies values (3 out 4) are not differ significantly ($p>0,05$). Hence, there were confirmed that contact calls from two local herds of animals demonstrate significant differences in most duration and frequency parameters and could be useful for determination of local dialects for this herds.

A25

THE INTRAPOPULATION AND INTERANNUAL VARIABILITY OF THE ACOUSTIC REPERTOIRE OF WHITE SEA BELUGA WHALES (*DELPHINAPTERUS LEUCAS*)

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The intrapopulation variations of the acoustic repertoire (vocal dialects) of cetaceans have been studied rather well in such species like killer whales (*Orcinus orca*) and sperm whales (*Physeter macrocephalus*). It is very typical for them to form matrilineal groups with their own vocal dialects. It is supposed that the beluga population in the White Sea also consists of several stable groups or local herds. However, there is no data about the vocal dialects of belugas. We researched the underwater acoustic activity of belugas for several years in the regions of Solovetsky Island (1999-2003), Myagostrov Island (2006, 2008-2009) and Gluboky Cape (2009) (the Onega Bay). The analysis of acoustic signals from belugas in the Myagostrov local herd reveals considerable interannual variability in their vocal repertoire. It is impossible to exclude that such variability may be caused by the unstable structure of the local herd. Comparison of vocal repertoires of three local herds shows their basic similarity. No evidence of the existence of vocal dialects was discovered. The insignificant intrapopulation variations of vocal repertoires may be explained by distinctions in the kinds of behavioral activities that dominated in different places of existence. It is also possible that dialects were not found because we did not observe any behavioral situations where belugas have to use group-specific acoustic signals. On the other hand, the considerable similarity of vocal repertoires of different herds and the absence of dialects may testify that local herds of belugas are unstable. This work shows the importance of acoustic researches of cetacean for investigations of their population structure.

A26

CETACEAN DISTRIBUTION IN OFFSHORE IRISH WATERS AS DETERMINED THROUGH PASSIVE ACOUSTIC MONITORING (PAM) USING TOWED HYDROPHONE ARRAYS

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The present project focuses on the use of PAM during offshore surveys, carried out from Platforms of Opportunity (POPs) and on dedicated surveys during 2009 and 2010. Acoustic data were recorded using a high frequency towed hydrophone. Diagnostic whistles, clicks and burst pulsed sounds from cetaceans were recorded in real-time using Pamguard and were stored as .wav files for post analysis in the lab. Prior to analyzing acoustic data taken in the field, information on the species likely to be encountered during acoustic offshore surveys were collated by carrying out an exhaustive literature search and compiling a reference database of species-specific vocalization and echolocation characteristics in Irish waters. This database facilitated the identification of detections to species level. Stored acoustic data were processed following a protocol and using acoustic software (Pamguard, Adobe Audition, Gram). Acoustic detections of the animals were identified to species level where possible, with particular emphasis on variables like frequency, intensity, inter-click intervals, whistles and burst pulsed sounds with reference to the database created. A total of 535 hours were recorded during 55 days at sea, and 7 species of cetacean were identified. Once all the detection events had been identified to species level, further analyses were conducted, including mapping of distributions within the Irish Exclusive Economic Zone (EEZ) waters, identifying seasonal and diel variations in their distribution, identify “hot spot” areas. Comparison between results of visual and acoustic monitoring are also presented.

A27

INSIGHTS INTO THE FUNCTIONS OF ACOUSTIC SIGNALS PRODUCED BY ICELANDIC KILLER WHALES (*ORCINUS ORCA*) FROM SOUND PRESSURE LEVELS AND ESTIMATION OF ACTIVE SPACE

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Fish-eating killer whales (*Orcinus orca*) in Iceland are vocally active during feeding, producing calls, whistles, and low-frequency "herding" calls. We have recently reported that these whales also produce high frequency whistles, with fundamental frequencies above 17 kHz. The sounds produced by killer whales could function in short range communication within the feeding group, long-range communication with animals in other groups, and/or to manipulate prey. Here, we investigated these possible functions of calls, high-frequency whistles, and "herding" calls by calculating and comparing their source sound pressure levels. The range to signallers was measured using time-of-arrival-differences on a calibrated 4-element vertical hydrophone array. We collected a total of ~19 hours of recordings over 5 days in July 2008 and 10 days in July 2009 in Vestmannaeyjar, Iceland. We identified a total of 7,203 calls, 92 herding calls and 419 high frequency whistles but source levels were only calculated for signals of high signal to noise ratio localised near the hydrophone array. Because the orientation of signallers relative to the hydrophone array was unknown we here refer to apparent source levels (ASL). The source levels of the three sound types was found to overlap, but high frequency whistles had the lowest median ASL, followed by stereotyped calls, and herding calls had the highest median ASL. Differences in energy flux density of these sounds were even greater, as herding calls had the longest durations and high frequency whistles the shortest. This suggests diverse functions for the sound types. High frequency whistles are most likely used in short range communication, as their source level and high frequency suggest they would be detected over shorter distances. Stereotyped calls have characteristics more suitable for longer range communication, whereas relatively higher source levels and energy flux density for the herding call support its proposed function.

A28

HOW DO HUMPBACK WHALES FIND EACH OTHER? MODELING SOUND LOCALIZATION IN WHALES

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Humpback whales songs, which are thought to play an important role in reproductive behavior, can be heard for several kilometers. Though whales have been observed accurately locating singers from several kilometers distance, little is known about the acoustic cues whales use to localize. In this study sound localization in whales is explored though the use of physical and computational models. A paired-hydrophone system (0.4 m spacing), modeling the interaural distance between an adult humpback whale's inner ears was used to record sounds in the field. Recordings from these two "ears" were compared using neural networks, computational models that are designed to model neuronal function. Neural networks were verified using pure tones with artificially created cues and found to accurately reflect the responses of biological systems. Results from simulated and field data revealed several potential cues for localization in azimuth, including interaural timing differences and interaural spectral differences. Interaural timing differences were most useful between 0.5-1.75 kHz and accuracy was greater at the midline, decreasing toward the periphery. Spectral cues also changed systematically with angle. Possible sources of identified spectral differences are sound shadowing and mechanical coupling between hydrophones, analogous to shading produced by a whale's skull and bone conduction. Despite the challenges of localizing sound in water, cues similar to those used by terrestrial mammals are available to whales. Listening whales may need to adjust the positions of their heads relative to the singer to keep on course as they approach singers over several kilometers.

A29

ACOUSTIC AND LOCOMOTIVE RESPONSES OF BOTTLENOSE DOLPHINS, *TURSIOPS TRUNCATUS*, TO AN ACOUSTIC MARINE GEOPHYSICAL SURVEY

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Investigations of the effects of anthropogenic noise on marine mammals often lack full experimental control. This study provides detailed data on the noise source and the receiver, namely a geophysical survey and bottlenose dolphins. The seismic and bathymetric survey was shot on 19 days in November 2006 in the Red Sea. The area included an extensive open-sea enclosure accommodating 10 dolphins. Five different sound producing devices were simultaneously applied. GPS log files supplied information on their distance to the enclosure, speed, and direction. The dolphins' behaviour was monitored both visually and acoustically. Commented visual recordings were made from an observation tower and linked to acoustic recordings obtained from a spacious hydrophone-array. Recordings were analyzed in 10s-intervals. Acoustic recordings (15h) were examined for the slightest indication of vocal activity discernable below 24kHz, including whistles and echolocation clicks. Visual recordings (3h) were examined for the position, velocity, swimming association, and behavior of each individual within sight. All vocalizations analyzed were dramatically reduced on survey days compared to control days. This reduction was the more pronounced the closer the devices were and the faster they were approaching. Also locomotive behavior was clearly affected by noise. At shorter distances (below 2.2km) swimming speed increased and other behaviors such as social interactions were reduced if not fully absent. At highest speeds mother-calve separations occurred. Both, the reduction or frequency shift of signals used for communication and orientation and the changes of locomotive behaviors must be considered as costly. Although there were no indications for injuries like deafness (TTS/PTS), the changes in behavior observed in captive animals may have even more profound or long term consequences in the wild. This study cannot suggest a critical distance between noise and dolphins, however, it can provide suggestions to future geophysical surveyors and effect assessors.

A30

DEVELOPMENT OF THE SATELLITE HYDROACOUSTIC BUOY FOR MONITORING AND IDENTIFICATION OF MARINE MAMMALS IN FRAME OF THE "OSEO – FASIE" FRENCH - RUSSIAN PROJECT

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We present the advanced technologies to put into a practice the new approach to mitigation of impact of manmade noise on Marine Mammals. Our concept is based on Passive acoustic measurements of industrial noise levels in a limited area around industrial activity with synchronous detection of the presence of vocal marine mammals' species to monitor directly noise impact on them in real time. Decision-making about the harmlessness of industrial activity on the marine mammals is based on chosen noise exposure criteria. Project includes construction of reliable buoys connecting bottom to surface, in which a bottom acoustic data acquisition system is able to work in presence of strong currents and in which surface buoy provides a satellite transmission channel connected directly to Internet via Iridium or Globalstar modem. Satellite buoy is capable to perform continuous recording of data from its sensors, analyze recorded raw data with given algorithm and transmit the results with given period. The heart of the system is powerful but energy-effective embedded ARM based board capable of processing acoustic data in real-time. In the presence of industrial noise, we try to use advanced methods based on 2D Correlation of spectrogram and Wavelet transforming which can detect several kinds of marine mammal's sounds in a very noisy environment. Due to requirement of powerful data treatment at signal detection two approaches are adopted: the first one, consist in data compression before wireless transmitting to home server for post processing. The second one is to implement detection algorithm completely onboard of the buoy and send only information needed to mitigate impact of industrial noise on marine mammal. This work describe the first results of a collaboration on French - Russian Project of developing fully completed system with detecting marine mammals, real time data transmission, and estimating anthropogenic noise impact on them.

A31

AMPOD: APPLICATIONS AND ANALYSIS METHODS FOR THE DEPLOYMENT OF T-PODS IN ENVIRONMENTAL IMPACT STUDIES FOR WIND FARMS: COMPARABILITY AND DEVELOPMENT OF STANDARD METHODS

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In the expansion of regenerative energy, offshore-wind farms take up a special relevance. Construction and operation of wind farms, however, influence the marine environment. In German waters, the German Federal Maritime and Hydrographic Agency commit wind farm project applicants to conduct environmental impact studies (EIS) by regulations outlined in the "Standards for the Environmental Impact Assessment" (StUK3). Amongst others, StUK3 is describing how to investigate the habitat use of harbour porpoises with acoustic data loggers (porpoise detectors, PODs). These register echolocation clicks used for orientation, foraging and communication. The AMPOD-project aimed for developing standard methods and guidelines for the application of PODs in static acoustic monitoring (SAM) programs in EIS for wind farms. We investigated the influences of different parameters on data retrieval with T-PODs (Timing porpoise detectors), and compared different analysis methods. This knowledge helps for a better interpretability and comparability of results obtained - not only with T-PODs - in SAM studies. The results show the importance of calibrating SAM-devices. Adjusting the devices to a standard sensitivity helps to gather comparable data. Other issues: T-PODs with different deployment depths retrieved significantly different data in water depths greater than 20m, most likely caused by the porpoises' preference of certain water depths or by thermoclines interfering with the T-POD detection abilities. Above a certain level of background noise received by the monitoring devices, noise affects data by masking true detections or raising the number of false positives. Analysis of data should therefore consider recorded background noise, either by excluding or adjusting data retrieved at certain noise levels. We tested a model that may be applicable under certain conditions to align data recorded with devices of different sensitivity. We will introduce recommendations and guidelines on how to conduct SAM with PODs and propose standard procedures for POD application and data analysis.

A32

DOES DEPLOYMENT DEPTH OF C-PODS AFFECT THE DETECTABILITY OF HARBOUR PORPOISES (*PHOCOENA PHOCOENA*)?

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C-PODs, which are widely used during monitoring and EIA studies, are stationary acoustic monitoring devices used to record harbour porpoise echolocation clicks. Concern has been raised about different deployment methods used and how this may impact on detection probability. Here we test for the impact of deployment depth and whether different daily activity patterns may be visible at various depths due to e. g. differences in feeding behaviour during day and night. For more than 100 days two C-PODs were deployed at the same position but at different levels of the water column (ca. 5 and 17 m above sea ground). Deployment took place at one location within the North Sea and at three locations in the Baltic Sea. The parameters “detection positive 10-minutes (dp10m)”, “detection positive minutes (dpm)” and “raw data clicks (background noise)” were statistically analysed. Tests showed that recorded dp10m/day did not differ between deployment depths at four of the POD-positions. A clear daily activity pattern in dpm/hour occurred at all stations independent of deployment depth. However, the absolute number of recorded dpm/hour differed significantly for all four pairs. Whereas more activity was recorded at the sea floor in the Baltic, more activity was noted at the higher position in the North Sea. At all stations the PODs which were deployed closer to the sea floor recorded more background noise, so masking effects are unlikely to cause differences in dpm between depths in the Baltic. Further analyses will look into other explanations in greater detail. Nevertheless, results highlight the importance of considering background noise and deployment depth as important factors during C-POD studies - especially when working with fine-scale temporal resolutions of C-POD data. Recommendations for POD deployment depths will be given.

A33

DEPTH DISTRIBUTION OF SOUNDS PRODUCED BY ICELANDIC KILLER WHALES (*ORCINUS ORCA*) IN A FORAGING AREA

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Killer whales (*Orcinus orca*) have a wide acoustic repertoire and are thought to use sound for a variety of functions including foraging and social interaction. This study investigated the depth of production of four different sound types produced by killer whales off Vestmannaeyjar, Iceland, a foraging area where the killer whales were observed to prey upon Atlantic herring (*Clupea harengus*). A four element vertical hydrophone array was used to record acoustic signals and custom software measured time of arrival differences to estimate the depth at which sounds were produced. The sounds analysed were social communication calls and feeding sounds which include: echolocation clicks, tail-slaps, and a low-frequency call associated with tail-slaps thought to have a "herding" function. A clear peak in the depth distribution of the feeding sounds was identified at 15 - 20 m. There appeared to be a second cluster of echolocation clicks produced at greater depths in some recording sessions, which might suggest that some searching behaviour took place below the average foraging depth. Data from suction-cup tags deployed by our group and published accounts indicate that Icelandic killer whales spend most of their time shallower than 10m. Taken together, these results indicate a preference for feeding sounds to be produced at greater than 10m depth, likely consistent with the depth of the prey at the time the recordings were made. Though social calling was more dispersed across depths, a substantial proportion of social calls were produced at the same depth as feeding sounds indicating that killer whales produce calls while foraging upon herring at depth.

B01

AN INTRODUCTION TO THE DIURNAL BEHAVIORAL PATTERNS OF THE GULF OF MAINE HUMPBACK WHALES

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Humpback whales often behave unpredictably. Learning about their behavioral patterns has more than just commercial value; the more that is known about a species, the more effectively it can be protected. A survey of the Gulf of Maine humpback whale population was conducted from several whale watch vessels between 2002 and 2009 to examine the potential relationship between the frequency of observed behaviors and the time of day at which they were performed. Of the 12 observed behaviors, 6 occurred more often in the morning, and 1 occurred more often in the afternoon (Student's t-test, $p<0.05$). Whether or not these trends are biologically significant remains unclear. Behaviors were also looked at in terms of age class to determine a potential relationship. While there was a lack of feeding behaviors observed in calves, overall the results were did not determine a significant pattern. It is recommended that this study be done in a more intensive manner with more focused data collection methods. Diurnal patterns have not been studied in humpback whale populations, and this study provides a good baseline of information for future studies.

B02

AGGREGATION BEHAVIOUR IN STELLER SEA LION (*EUMITOPIAS JUBATUS*) PUPS AT TULENII ISLAND, RUSSIA

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Otariids (fur seals and sea lions) are gregarious mammals in breeding season. When females leave the rookery for foraging, pups stay alone and gather in groups, also known as “pup pods”. The main selective advantages of these aggregations are to develop social skills and physical abilities, to reduce the risk of aggression from adult animals (especially bulls), and in some species, group formation serves as a thermoregulatory mechanism. The aim of this research was to study the aggregation behaviour in Steller sea lion (*Eumitopias jubatus*) pups at Tuenii island, Russia, during the first 2 month of life. During 4 breeding season (2006 - 2010), from 6:00 to 22:00 h, the surveys were conducted every 1 h to record the number of pup pods in the area, number of pups per group, behavioral state, and location (land or sea). The number of groups and the number of pups in the groups increased during the first month and declining after 5-th July. It positively correlated with the total number of pups in the area. The biggest group were find in 2006, it contain - 38 pups. The type of activity varied according to the time of day, we distinguish 3 types: rest, play and mixed activity. Most part of pups were active early in the morning and in the evening. The proportion of aggregations at sea increased with pup age. In the end of breeding season interactions in a group were more frequent at sea than on land.

B03

SPECIFIC FEATURES OF THE BELUGAS BEHAVIOR TO INTRODUCTION OF ABIOTIC SIGNALS IN NATURAL ENVIRONMENTS

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Our data is based on underwater filming carried out in the summer of 2010 off the Belugas Cape (Solovetsky Island, the White Sea). A multi-functional sonde was positioned within the TV camera observation area. Its distant end carried the underwater lamps, a vibrator (80 Hz) and a contact key -clicker.
Belugas reaction to the first introduction of a technical object - a platform with a TV camera and a sonde was analyzed. In the course of the animals staying in the studied water area (from 3 to 4 hours) peculiarities of their cognitive behavior were defined.
First, individual animals swam by at the distance of 1 or 2 meters, then other belugas approached the sonde and studied it closely. A positive response and a beluga attraction effect were recorded in answer to the turning on of the lamp and a vibrator. The animals were swimming past the camera, but as the signals were turned on, they returned to the camera to watch the lamp. The peak of researching activity was reported after an hour of the belugas staying in the water area. Simultaneously about 4 or 5 animals grouped in the vicinity of the sonde and showed immense acoustic activity.
It proved impossible to develop in the belugas the skill of pressing the clicker since, instead of teething they use “bransboit” as a research instrument, pushing a strong stream of water from the mouth at the object they are “researching”. However, this did not result in turning on the clicker. In two hours of staying in the water area the animals lost interest in the object. It is of interest that even a female with a new-born cub

B04

ASSOCIATION PATTERNS OF THE COASTAL BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) IN THE WATERS AROUND FILICUDI ISLAND IN THE AEOLIAN ARCHIPELAGO, ITALY

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Many populations of coastal bottlenose dolphin (*Tursiops truncatus*) form discrete communities, defined by patterns of association and long-term site-fidelity. Associations between individuals in most social systems result from complex interactions among internal and external factors. Social structure in dolphins had been demonstrated to be related to sex, age and kinship degree but also to the responses to natural and opportunistic food resources.
Boat-based surveys were conducted during summer (June-September) from 2005 to 2010 in the shallow water around Filicudi island (Aeolian Archipelago, Sicily, Italy). Thirty-two dolphins were photo-identified by distinctive characteristics of dorsal fins and included in a catalog. The mean group size of dolphins observed was 5,18 (SD = 3,10; SE = 0,78), and groups with calves were significantly larger than groups without calves (Welch t-test: t = 2.3746, df = 11.678, p-value = 0,03564). Larger groups (group size $\leq$5) had also a different spatial behaviour from groups with group size > 5. The residence patterns and home ranges of resident individuals were assessed in the study area. We evaluated the relationships among dyads of individuals of the population using the half-weight index of association. We performed cluster analysis to analyze the social organization of the population in relationship to age, sex and feeding preferences. We found that the dolphin population organizes itself according to a fission-fusion society. Analysis demonstrated that there is preferential association among sex and age classes in this population. Mean association indices were also found to be significantly higher in relationship to feeding preferences.

B05

REINTRODUCTION AND MOVEMENT OF CAPTIVE BRED AND REHABILITATED JUVENILE GREY SEALS (*HALICHOERUS GRYPUS*) IN THE SOUTHERN BALTIC SEA

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The population of the Baltic grey seals has changed dramatically during the last century. Therefore, the aims of reintroduction project are: to compensate by-catch by rehabilitation of the wild injured and sick individuals; to release captive bred individuals which could settled down along the Polish coast where were historically observed; and to restore suitable habitats for this species to haul-out and breed. Since 2004, HMSUG has released 18 captive bred and 10 rehabilitated grey seals deployed with the satellite transmitters and monitored their migrations.

The released seals have migrated into Kattegat, Skagerrak and up to 60°N and 23°E in the Baltic, however the movement area has increased gradually from year to year. 68% of seals have joined other colonies of the grey seals and settled down mainly along the Swedish and German coast, Aland and Kattegat. None of the seals has returned to the release site to settle down, however in 2010 one seal has joined a new colony of the grey seals in the mouth of the protected area of Vistula River. This is in contrary to the seals released in Sweden, close to the settled grey seals colony, where each released seal returned to the release site to settle down. Seventy % of Polish seals have visited Polish coast more than once. During exploratory phase, 50% of the seals have moved along the Polish coast and 50% have moved directly north. The tendency to move along the coast was mostly observed for the captive bred seals (70%). However, there was no such difference in the direction and duration of the stationary phase.

There are probably many factors that affect the migration and settlement by grey seals but distance to available habitat and previous exploratory experience in early life stage could be of high importance.

B06

BEHAVIOURAL DEVELOPMENT OF A HARBOUR PORPOISE (*PHOCOENA PHOCOENA*) MOTHER-CALF PAIR IN CAPTIVITY

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In this study the social and spatial interactions between mother and calf are described in harbour porpoises. Very little is known about the behaviour of this species. This being the first documented successful birth of a porpoise calf in captivity and this study the only description of mother-calf pair bond development over time in either captivity or the wild. Spatial relative positions between mother and calf, the appearance or disappearance of behaviours, and the variation in their occurrence over time were quantified. The study was done using focal sampling and observations were always conducted by the same observer. The study started 2 months after the birth and presents the development of their behaviour during the following 10 months in a captive situation. Avoidance and aggression from the mother towards the calf tended to increase when the calf was 8 months old, while potential fishing in the calf increased around that time. The amount of time they spent in close proximity decreased around 10 months of age. The longest interval the calf and mother spent separated increased from 4 minutes when the calf was 3 months old, to up to 40 minutes when it was 10 months old. Additionally, differences in mother and calf time budgets, and durations of behaviours showed age-related differences. Studying the development of harbour porpoise calves during the first year is of great importance to their survival as it is the age class with the highest mortality. Though the study is based on only one mother-calf pair, and more data would be required to make generalizations at the species level, it provides a foundation for the study of mother-infant interactions and calf development that could be applied to the management and conservation of the species, with special importance for critically endangered subpopulations.

B07

OBSERVATIONS ON STELLER SEA LION UNDERWATER NURSING/SUCKLING BEHAVIOUR

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The observations on Steller Sea lions (SSL) reported here were conducted during July 22-26, 2008 at Moneron Island located in the southern part of the Tatar Straight. The rocks around the island host 3 SSL rookeries, of which one was described as reproductive in 2006.The observations were conducted both above and under the water; the behaviour was documented using Nikon D200, Olympus µ720 SW and Sanyo VPC-CA65 photo/video cameras. During the observations the SSL numbers on the rookery ranged from 16 to 31 individuals of various ages and sex, including 5 females with newborns. Besides common behavioural acts, underwater nursing/suckling behaviour by SSL pairs "mom-pup" was repeatedly documented, as well as attempts by pups to introduce suckling to "non-Mom" lactating females underwater. It is widely accepted that there are three major rearing strategies known for pinnipeds: "aquatic nursing", "foraging cycle" and "fasting" strategy. The conventional view that Otariidae use "foraging cycle" strategy, its basic features are as follows: females accumulate moderate blubber stores and return to land days before they are due to give birth; after 5-11 days postpartum fast, they return to sea leaving their pup on land while they forage. Duration of foraging trips is highly variable on season, age of pup and resource availability. Females than alternate foraging trips to sea with visits to land to nurse their pups. Shore bouts are usually quite short lasting only 1-3 days before the mother's body reserves have again been depleted requiring her to return to sea and feed. The described underwater nursing\suckling behaviour suggests that SSL may vary in their rearing strategies at individual level. Some "mom-pup" pairs may implement underwater nursing\suckling for grater maternal input in pups and allow pups to learn critical lessons including foraging techniques from their moms out at the sea while relaying on milk.

B08

BEHAVIOR OF FREE-RANGING COMMON DOLPHINS (*DELPHINUS DELPHIS*) IN GULF ST VINCENT, SOUTH AUSTRALIA

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Here we present the first data describing the behavior of common dolphins (*Delphinus delphis*) in Australian waters. Behavioural data were collected from 109 independent dolphin groups during boat-based surveys conducted in the Gulf St Vincent, South Australia between September 2005 and May 2008. Activity budgets are used to assess the effects of diel, season, depth, sea surface temperature, group size and composition on behavior for common dolphins. Additionally, the presence/absence of flesh-footed shearwaters (*Puffinus carneipes*) and bottlenose dolphins (*Tursiops* sp.) is examined in relation to dolphin behavior. Foraging (33.9%) and rest (2.8%) were the most and least frequently observed behaviors, respectively. Travel (33.0%), social (20.2%) and mill (10.1%) accounted for the remainder of the activity budget. Diurnal differences were detected with feeding (59.5%) and social (31.8%) groups most frequently observed between 10.00 - 11.59 and travelling groups (38.9%) most prevalent between 08.00 - 09.59. Resting groups were only encountered between 06.00-07.59 and 12.00-13.59. Behavior did not vary seasonally, although travelling and milling groups were most prevalent during spring and autumn, respectively. Behavior did not vary with water depth, SST, group size or group size, although did vary significantly between single and multi-species groups. Foraging was more frequent in multi-species groups, with 78.4% of all foraging behavior observed for common dolphins occurring in the presence of other species. Associations were most frequently observed with flesh-footed shearwaters, accounting for 29.4% of common dolphin encounters. Resting, milling or socializing was rarely observed in the presence of any associated species, indicating the primary mechanism for association is likely prey-related.

B09

ENVIRONMENTAL CORRELATES OF BEHAVIOUR AND GROUP COMPOSITION OF BOTTLENOSE DOLPHIN IN CARDIGAN BAY SAC, WALES

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It has been previously shown in that bottlenose dolphins encounter rates and distribution in the Cardigan Bay Special Area of Conservation have a non-random distribution. Dolphins were encountered more frequently in shallow waters over a sandy substrate mixed with gravel or cobbles. Here, we extend those analyses and consider variation in specific behavioural states, group size and composition in relation to spatial distribution of bottlenose dolphins within the Cardigan Bay SAC using data from 2007-2010.

Behavioural sampling was undertaken during land based and boat based line transect and ad libitum surveys. Data relating to group composition and behavioural parameters, including directionality, surfacing mode and main behaviours, were collected at 6 minute intervals, and a random subset of these data was selected for analysis.
The results of this study demonstrate that foraging was most frequently observed at particular inshore hotspots with an average group size of two animals. Group size increased significantly with distance from coast, as did the frequency of social and travelling behaviours. Presence of calves increased significantly with group size but bore no relation to distance from coast or behaviour.
These results suggest that behaviour is dictated by distance to coast and bathymetric characteristics with a tendency for animals to return to the same areas for benthic foraging. Isolated incidents of large groups feeding offshore (bait balls) could also indicate a relationship between competition for prey availability and group size, but this requires further investigation.

B10

ROTATIONAL SWIMMING TENDENCIES IN FREE-RANGING BELUGA WHALES, *DELPHINAPTERUS LEUCAS*

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Direction preference during rotational swimming is known for a number of cetaceans in captivity, especially for toothed whales. Individual biases for both clockwise and counterclockwise direction were observed in different species and the counterclockwise circling in bottlenose dolphins was shown at a group level. The reasons of such a lateralized behaviour are still unknown. Recently, Stafne and Manger suggested that the direction of circling might be associated with global forces: whales and dolphins of the Northern Hemisphere rotate in the counterclockwise direction, while those of the Southern Hemisphere circle clockwise (Physiology & Behavior 82: 919-926, 2004). Our findings in free-ranging beluga whales contradict this suggestion. Observations were made on breeding aggregation of White Sea belugas during a summer season. We observed rotational swimming of whale group on six occasions separated by 3-5 day intervals. From 15 to 22 animals of different age (including mothers with calves) circled simultaneously and as the individual identification revealed, the most of animals (61-74%) were the same. The duration of this behaviour was 8-14 minutes and the majority of time (83-90%) the group of belugas circled in the clockwise direction. Spatial distribution of animals differed in time in these groups and one animal was not leading longer, than one-two minutes. This is the first evidence of the circling preference of cetaceans in the wild, demonstrating that lateralized rotational swimming in captive dolphins is possibly based on natural behavioural pattern. The group-level clockwise direction in circling of this entirely Northern Hemisphere whale does not confirm previous suggestion thus seems to be not associated with global forces.

B11

THE BAY OF ALGECIRAS: A FEEDING AND BREEDING GROUND FOR COMMON DOLPHINS?

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Since 2003 the Mediterranean subpopulation of short-beaked common dolphins (*Delphinus delphis*) were qualify as “Endangered” according to the IUCN Red List criteria and recently as “Vulnerable” according to the Spanish National Catalogue of Endangered Species. The aim of this study was to better understand the habitat use of common dolphins in these two highly anthropogenic areas by comparing the behaviour and group composition of common dolphins between the Strait of Gibraltar and the adjacent Bay of Algeciras from 1999 to 2010. The Bay of Algeciras is a sheltered area with high levels of waste waters, heavy factory contaminants dumping, intense maritime traffic and an increasing whale-watching industry targeting the common dolphins while the Strait of Gibraltar is an open water area with less maritime traffic and higher water renewal so potentially less contaminated. A total of 130 common dolphin sightings from the Bay of Algeciras were compared to 410 sightings from the Strait of Gibraltar. The dolphins were observed more often feeding in the Bay than in the Strait of Gibraltar (X^2= 19.545 p= 0.002), where travelling was the predominant behaviour, probably due to the strong currents. Group size was significantly larger in the Bay than in the Strait (t = 2.71 p=0.007) suggesting a social area of aggregation. Significantly more calves and newborns were found in the Bay of Algeciras than in the Strait (X^2= 4.576 p=0.032) which suggests that the area may be used more as a breeding ground. Therefore, the conservation of the Bay of Algeciras is of special interest due to its essential role as a breeding and feeding area for endangered common dolphins. Special effort should be undertaken to limit the dumping of anthropogenic waste in this key area.

B12

BOTTLENOSE DOLPHINS AND BOAT TRAFFIC: ATTRACTION OR AVOIDANCE IN THE PRESENCE OF CALVES?

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Disturbance of the marine environment from human activities such as boat traffic is increasing globally, especially in coastal waters. One species potentially affected is the bottlenose dolphin, and several studies have shown negative reactions by the species to boats. These have usually been short-term but some long-term effects have also been demonstrated. In Cardigan Bay, West Wales, dolphins and recreational boat activity have occurred alongside one another for many years but with reports that in those areas where boat traffic has increased most, dolphins have moved away. In order to investigate the potential effects of boat traffic on this dolphin population regarding mothers and their calves, survey data were used to identify whether there was any correlation, positive or negative, between dolphins, calves and the presence and density of boats. Land-based survey data were collected daily over a 25-week period, between April and October 2008 from New Quay Bay, one of the busiest sites in the region. The number of dolphins and boats present during each recorded interaction was analysed for correlations. The data were then sub-divided by extracting the total number of calves, to see if there was a relationship between bottlenose dolphin groups, their calves and boat presence and density. The results showed a significant positive correlation between the number of individuals present and the number of boats, when bottlenose dolphins were considered as a group. When sub-divided into adults and calves, there was also a significant correlation between the presence of calves and the number of boats, or the number of adults and the number of boats. Therefore, indicating no evidence for avoidance behaviour amongst dolphin groups even when calves were present. This has implications on conservation management of the species in this Natura 2000 site.

B13

ASSOCIATIONS BETWEEN KILLER WHALE (*ORCINUS ORCA*) MATRILINES VARY DEPENDING ON BEHAVIOURAL STATES

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The killer whale society includes a variety of social bonds between groups and individuals. The role of different ecological and social factors in the dynamic of the social bonds is still unclear. The costs and benefits of aggregating might vary for different behavioural states and lead to differences in associations between killer whale matrilines. Our previous results indicated that the number of males in matriline influences inter-matriline associations. This influence could be explained by less beneficial foraging in a group with a large number of males. In this study we (1) compared associations between killer whale matrilines depending on behavioural states and (2) tested if the correlation between number of males in matriline and inter-matriline associations varies depending on killer whale behavioural states. The data were collected from 2005-2008 for 155 killer whale aggregations encountered in Avacha Gulf (Kamchatka, Northwest Pacific). The behavioural states (foraging, resting, socializing and travelling) were registered for killer whale aggregations and sampled every 5 min. Aggregations were classified according to the predominant behavioural states that were observed during more than 60% of the time. A simple ratio index (SRI) was used to analyze associations between matrilines (N=26). Significant differences were found in inter-matriline associations between foraging and (a) travelling ($p<0.05$) and (b) socializing ($p<0.05$). No significant differences in inter-matriline associations were found between travelling and socializing ($p>0.05$). A significant negative correlation was found between the number of males in a matriline and inter-matriline associations calculated for foraging aggregations ($p<0.05$). No correlations were found between the number of males in the matriline and inter-matriline associations calculated for travelling and socializing aggregations. The short-term dynamic of social bonds between killer whale matrilines is influenced by behavioural context. The correlation between number of males in a matriline and inter-matriline associations could be explained by competition for food resources.

B14

LATERALITY IN WILD BELUGA WHALES WHEN SCRUTINIZE AN UNFAMILIAR OBJECT

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The most of studied terrestrial vertebrate species show similarity in functional organization of brain asymmetry - so called general pattern of brain lateralization, when each brain hemisphere process visual information in stimulus-specific manner. However recent publications in captive bottlenose dolphins revealed a number of right-sided asymmetrical eye-use during discrimination of different objects. These results allowed Kilian and co-authors to propose a hypothesis, that dolphins (and probably all cetaceans) are the exception from other vertebrates and display an unique right-eye/ left hemisphere dominance for processing of all visual information (Behavioural Processes 68: 179-184, 2005). We studied eye preference during unfamiliar object scrutinizing in wild beluga whales on summer aggregation near Solovetskiy Island in the White Sea. The underwater camera in a waterproof box was installed on the bottom near the belugas most visited area of the aggregation. This camera in the box simultaneously played a role of an unfamiliar object and simultaneously recorded whales' behaviour when they were observing it. Our results indicate that beluga whales of different age (N=45) prefer to scrutinize an unfamiliar object underwater with the left eye. Analysis of repeated approaches of individually identified animals showed that this bias is reduced significantly along with familiarization to such an object, demonstrating that revealed left-eye/right brain hemisphere preference arises from lateralized processing of object novelty. Our findings demonstrates for the first time a lateralized perception of unfamiliar stimuli in wild animals The revealed preference to observe novelty with the left eye is in line with the pattern of brain lateralization showed for other studied vertebrate species, and doesn't support the idea about right eye dominance in cetaceans.

B15

WHAT DRIVES SMALL DELPHINIDS TO FORM MIXED-SPECIES ASSOCIATIONS?

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Mixed-species associations are temporary aggregations of individuals of different species involved in similar activities for periods of variable duration, from minutes to days and even years. The animals involved in these associations range from congeneric to non-congeneric species and occur across a wide range of taxa. Three functional explanations for the formation of such associations are foraging, protection against predators and social advantage. Mixed-species groups in mammals and delphinids in particular are frequent in the wild. Here we aimed to understand the ecological significance of mixed-species group formation by two tropical delphinids: the spinner dolphin (*Stenella longirostris*) and the pantropical spotted dolphin (Stenella attenuata) in the southwest Indian Ocean. We examined these associations to determine whether they occurred for protection against predators, for foraging or for social advantage. We used sighting data collected from 2004 to 2009 year-round. A total of 67 mixed-species groups of spinner and pantropical spotted dolphins were encountered around Mayotte in a total of 315 observations of all groups (21%). No daily or seasonal variability in the occurrence of associations was detected. Behavioral activities of single- and mixed-species groups differed significantly. Foraging was never observed in spinner dolphins and only in single-species groups of pantropical spotted dolphins. Mixed-species groups were larger than single-species groups. Finally, when in association, spinner dolphins used deeper waters than while in single-species groups. No evidence of association for social advantage was observed, but this does not exclude that possibility. We suggest that spinner dolphins associate with spotted dolphins for protection against predators when transiting between resting/socializing areas. It is hypothesized that the formation of these mixed-species associations could occur because they provide evolutionary benefit over populations or species that do not mix.

B16

THE EFFECTS OF OFFSHORE PILE DRIVING ON THE BEHAVIOR OF HARBOR PORPOISE (BY USING PASSIVE ACOUSTIC MONITORING)

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The first German offshore-wind farm “alpha ventus” is located approximately 30nm north off the island Borkum. Twelve wind turbines have been installed between April and August 2009. Since 2008, passive acoustic monitoring has been conducted in this area to investigate the habitat use and behavior of harbor porpoises in relation to the effects of pile driving activity. This monitoring project aims at evaluating the code of conduct for environmental impact assessment as requested by the German regulatory authority. Analysis will focus on the data gathered before, during and after construction of “alpha ventus”. Data was collected using C-PODs (Chelonia Ltd.), logging cetacean echolocation clicks.
The pattern of time intervals between successive echolocation clicks (inter-click interval, ICI), contains behavioral information. Two behavioral categories were differentiated: foraging and goal oriented movements towards a landmark during spatial orientation. Goal oriented movements were defined as sequences revealing long and slow decreasing ICI after Verfuss et al 2005 (JEB 208), and foraging was defined as sequences with very short inter-click intervals under 10 ms, representing foraging buzzes like described in Verfuss et al. 2009 (JEB 212). Data was visually screened for these behavioral categories using C-POD software.
The actual pile driving activity was carried out on 21.04.2009. Data was gathered from a period of four weeks before and six weeks after pile driving occurred. While the amount of minutes with porpoise registrations decreased after pile driving, the percentage of goal oriented movement within minutes with porpoise registration increased after pile driving compared to the before stage. Further data and results will be presented.

B17

THE SOCIAL STRUCTURE IN BREEDING GROUNDS OF THE HUMPBACK WHALES NEAR THE COMMANDER ISLANDS.

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Near the Commander Islands humpback whales sometimes co-operate with one another, for example during bubble net feeding or traveling along the coast. The presence of abundant shoaling fish could cause such behavior, as an alternative explanation is that these whales may have social organization during the breeding season. For our measurements, we took data from August 2009 and from June-September 2010. During these seasons, more than 530 groups of whales were detected and more than 650 were identified, also we took GPS point for all these groups, and we measured the time that whales spend in the groups together. The number of whales in group vary from 1 to 19, but in our analysis we took only groups up to 5 whales. We used SOCPROG 2.4 for the association analysis. Our data add support to the notion that mothers travel with their offspring for the first year of the calf's life. The statistically significant associations (the standard deviation of association indices was significantly higher in the real data set than in the permuted data sets) were found among the whales grouped in the same day (sampling period - day, simple ratio association index). The whales were divided into clusters (using average linkage; cophenetic correlation coefficient = 0.9656).Our findings suggest that, there is social organization that probably could be due to reciprocal altruism because we found that it is not statistically stable between the two measured years, but probably we need more data. We need the genetic data to understand if there is any kinship in the groups or if there any female-male interactions.

B18

POSSIBLE CORRELATION BETWEEN SEX GENDER AND LONG-TERM ASSOCIATION IN A BOTTLENOSE DOLPHIN POPULATION IN THE EASTERN LIGURIAN SEA (NORTH-WEST MEDITERRANEAN SEA)

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Bottlenose dolphins (*Tursiops truncatus*) have associations between individuals in a fission-fusion society that may be stable in time and space. The aim of this study is to investigate the social habits of this species analyzing the associations patterns based on gender in a wild population located in the Eastern Ligurian Sea (North-West Mediterranean Sea). From a database of 244 individuals, all the animals with at least 5 recaptures were included in the study (46 dolphins in total). The data were collected by Acquario di Genova between 2001 and 2009, within the project Delfini Metropolitani, using photo-identification technique; data collected by CE.TU.S (all the individuals with at least 5 recaptures) were also included in the study in order to investigate the possible movements of the dolphins between the Eastern Ligurian Sea and North Tuscany waters. For the data analysis the software SOCPROG v2.4 was used. Association rate between individuals was measured with the half weight (HWI) and simple ratio (SR) indexes. To determine whether the patterns of associations between individuals were significantly different from random, the association matrix were permuted 20.000 times. For sex identification, we used both long-term association with the calf and photoghaphs of the genital area during jumps. The inclusion of gender in the analysis may explain a possible correlation between sex and long-term association between individuals.

B19

EFFECTS OF VESSEL INTERACTIONS ON THE BEHAVIOUR OF HECTOR'S DOLPHINS IN AKAROA HARBOUR, BANKS PENINSULA, NEW ZEALAND

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In Akaroa Harbour, New Zealand, the endemic and endangered Hector's dolphin (Cephalorhynchus hectori hectori) is subject to the highest level of permitted commercial tourism operations in New Zealand. However, there is paucity in the data regarding the potential short-term effects of tourism activities faced by this population. Furthermore, the long-term effects are still unknown. Here first-order, time-discrete Markov chains were used to estimate behavioural state-transition probability matrices under varying vessel exposure conditions (*i.e.* in the absence of vessels -control, presence of vessels at more than 300 metres -distant or less than 300 metres -close). The effect of vessel traffic and interactions was subsequently quantified by comparing transition probabilities of the different chains. Vessel presence affected the activity budget of Hector's dolphins by changing transition probabilities, bout durations, and the time taken to return to a behavioural state once disrupted. In a close situation, dolphins were less likely to stay, return to, and engage in diving (inferred foraging) and travelling behaviours. The reverse was applicable for milling and socialising groups. The disruption of diving raises concern regarding the sustainability of this type of activity, given that the additional presence of vessel(s) further disrupted this behavioural state. The behavioural responses reported here are likely to have energetic implications, primarily by decreasing energy acquisition. This raises the possibility that such short-term behavioural changes may lead to biologically significant consequences. Management decisions are, therefore, required to minimise any potential long-term negative effects on this population.

B20

AGONISTIC BEHAVIOUR OF RISSO´S DOLPHINS TOWARDS SPERM WHALES IN THE SW OF FUERTEVENTURA, CANARY ISLANDS, WITH A DISCUSSION ON TROPHIC COMPETENCE IN CETACEANS

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On 24 September 2009 at 17:00 hours, we had a multispecies sighting of a surface sperm whale (*Physeter macrocephalus*) and at least 7 Risso's dolphins (*Grampus griseus*). The whale bellowed to a foraging group of a minimum of four whales distributed in an area of 2x2 km. The observation was made from a 17 m motor yacht towing a 200 meters array hydrophone, 16.10 km off SW Fuerteventura island (28º44'11"N; 13º39'16"W) at 1406 m depth. Risso's dolphins showed a clear agonistic behaviour towards the sperm, swimming around the whale and approaching close. The hydrophone registered regular clicks of other sperms feeding in the area and a cacophony of arousal tonal vocalizations attributed to Rissos's dolphins. The whale stayed at the same position for at least 10 minutes, continually turning on its axis. Before the dive, the whale adopted a vertical position emerging part of the head while opening the mouth. At least three defecations were recorded. Sperm whales are top marine predators of oceans and generalist mesopelagic feeder between 400 and 1200 meters of depth. It success is due to a combine of long-range echolocation, ability localizing deep prey patches, efficient locomotion and a large aerobic capacity during diving. Eight (40%) of the 20 cetacean species founded in the area in a visual-acoustic survey carried out between 2007 and 2010 were teuthofagous and deep-diving whales. Similarities in diet between two predators inhabiting the same habitat will affect the level of competition between these predators. Niche separation and geographic segregation have been proposed in beaked whales species with similar dietary preferences. This encounter is similar to other interaction observations between short-finned pilot whales (*Globicephala macrorhynchus*) and sperm whales off SW Tenerife and supports the hypothesis of trophic competence between these teuthofagous cetaceans in the area.

B21

SEX DIFFERENCES IN THE SITE FIDELITY OF HUMPBACKS WHALES *MEGAPTERA NOVAEANGLIAE* TO TWO AREAS IN THE COLOMBIAN PACIFIC COAST

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One of the aims of the conservation strategy for the Southeast Pacific humpback whale population (stock G) is an understanding of its migratory patterns. This study quantified the patterns of return for males and females to two protected areas: Gorgona Island (GI) and Málaga Bay (MB) (Colombia), with the aim of identifying differences in the frequency of return. The study evaluated 15 years of data collected by the Yubarta Foundation. Data were analysed separately for each area, and the frequency of return was calculated by means of probabilistic methods using individual return probabilities. Such probabilities were calculated per interval of time and the interval was defined as the period of time between the capture and the recapture of the individual. Intervals were every year, every two, every three years etc., up to the maximum number of years analyzed per area. Areas were later compared by means of a t test. Males showed a higher return probability than females and a more likely return in consecutive years, while females tended to return more frequently every two years. These patterns were observed for both areas but higher probabilities of both male and female return were calculated for MB. Differences in the frequency of return can be explained by the energy cost of migration and differences in the reproductive success. In addition, as not many females were observed returning without calves then it is possible that the return is related to the calving interval. Why individuals tended to return more frequently to MB over GI was not clear, but may be related to differences in habitat use. Results obtained can explain some demographic aspects for humpback whales and increase our understanding about migratory patterns. In addition, differences between areas are important in the management of humpback whales in protected areas.

B22

STUDY ABOUT THE POTENTIAL IMPACT OF WHALE WATCHING IN THE STRAIT OF GIBRALTAR ON THE BEHAVIOUR OF PILOT WHALES (*GLOBICEPHALA MELAS*)

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In the Strait of Gibraltar it is posible to observe up to seven different species of cetaceans along the year. The species most frequently sighted is the pilot whale (*Globicephala melas*). The aim of this study is to analyze the impacts of whale watching on this species. To carry out the study 2 areas were established: a control area (from 700 to 100 meters) and an impact area (less than 100 meters). The period of this study was from 2003 to 2007 between April to October, (including both months). The cetacean sighting was performed from two opportunistic platforms. A total of 48.091 kilometers were travelled with an effort of 2.882 hours at sea, and 506 data referring to pilot whales recorded. We compared statistically different variables such as activity, group size, group cohesion and presence/absence of calf, among others. The activities most frequently sighted were navigation (58%), and resting (23%) (when animals were immobile in the water surface). From the results we can observe that the relationship between activity and group cohesion variables is statistically significant. Navigation and resting activity is higher in the control area than in the impact area. This reflects the change of activity in the presence of whale watching boats. In fact, when the animals are resting, the group cohesion increases becoming more compact. In order to avoid influencing in the development of these activities, more caution is required from the whale watching boats when approaching groups of pilot whales, especially when they are browsing or resting, as they are subject to change in the presence of these platforms.

B23

EVOLUTION OF A UNIQUE AND AMBIGUOUS RELATIONSHIP BETWEEN ORCAS, PILOT WHALES AND TUNA-FISHERMEN IN THE STRAIT OF GIBRALTAR

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Every summer season Killer whales come into the Strait of Gibraltar to interact with fishermen in order to get Tuna fishes from the hooks. This interaction evolved when fishermen started to use drop-lines 3 decades ago. Sighting-data taken from a whale-watch boat from 1999 - 2010 shows that the arrival of the Orcas correlates with a reduction in sightings of the local Pilot whales, as if they panic. The Pilot whales return, but their group-size increases at the same time Orcas are sighted more regularly between the fishermen in the Strait. There are two spots where fishermen use to gather for Tuna fishing. The southernmost is only used by Moroccan boats. There the Pilot whales can be observed in the end of summer starting to chase the Orcas out of what they consider their territory. This unique behaviour has been documented for the movie “The Last Giants”. Due to reduced quota given to the drop-line fishermen, that take Tuna when it comes back from the Mediterranean after spawning, the season for the Orcas is getting shorter. In order to conserve this unique interaction between Killer Whales, Pilot whales and fishermen, it is suggested to increase the quota for drop-line fishermen and instead reduce it for other more harming techniques like purse seines or Almadrabas (pound nets), the latter taking Tuna on their way to their spawning grounds in the Mediterranean. This will improve the situation of Killer Whales, local fishermen and whale watching operators and reduce the pressure on the spawning stock of Mediterranean Bluefin Tuna.

B24

THE DYNAMIC OF IN LATERALITY OF OFFSPRING POSITION ALONGSIDE THEIR MOTHERS IN KILLER WHALE POPULATION OF AVACHA GULF (KAMCHATKA, NORTHWEST PACIFIC)

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Our previous study showed that the association patterns between females and their offspring become weaker during the first years of the offspring's life. In this study we looked at laterality of offspring position alongside their mothers and the dynamic of offspring position (left or right) depending on offspring age. The data were collected during summer seasons 2005-2009 in Avacha Gulf (Kamchatka, Russia, Northwest Pacific). All offspring were divided into two categories depending on their age: newborns (0-1 year old) and calves (2-4 year old). We used photos of mother-offspring pairs taken during the first 2 min of work with group of killer whales (observation period). All mothers and their offspring were individually recognized using photo-identification method. We counted the percentage of left side and right side positions for each offspring and compared them between offspring categories. We also checked the stability of offspring position alongside their mothers through the observation period compared to the initial position depending on the offspring category. The significant differences were found between newborns and calves for both tests ($P<0.05$, one way ANOVA test). Newborns more often were observed on the left side of their mothers 64% (n=89) then calves did 46% (n=151). The newborns position alongside their mothers was more stable 22% (n=27) while calves changed their initial position more frequently 48% (n=65). The laterality in social contacts has been shown for many mammals including some cetacean species. The leading killer whale female's role in the social contacts with her offspring might grow weaken with offspring age and that is apparently reflected in the changes in laterality of offspring position alongside their mothers.

B25

A DESCRIPTION OF GREY SEAL HAUL-OUT USE ON BARDSEY ISLAND, WALES AND POSSIBLE ASSOCIATION BETWEEN INDIVIDUALS: A PHOTO IDENTIFICATION STUDY.

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Bardsey Island is an island off the end of the Llŷn Peninsula. The island is used by grey seals (Halichoerus grypus) as a haul-out site. The main haul-out site is in the main bay, Henllwyn. The seals haul-out onto different areas of the bay depending on the environmental conditions, with the most obvious one being wind. The numbers of seals hauled out are also dependent on environmental conditions. The description of the haul-out use will serve as background for any possible associations found between individuals using the photo-identification method. This will be done using a single-lens reflex (SLR) camera, photographing every seal in the water and as they haul-out. The neck and head is used to extract the pelage pattern for matching. The objective is to determine any non-random associations between grey seal (Halichoerus grypus) individuals e.g., if two or more seals are present in the same location at a certain time (dyadic states). This will be used to study social structure. To statistically test whether there are any associations between the grey seal individuals, the software SocProg will be used. This software is a set of programs which analyses data on animal associations and displays association matrices using sociograms, principal coordinates analysis, multidimensional scaling and cluster analysis. Project still underway but will be concluded by the time of the conference.

B26

UNIQUE INTERACTION BETWEEN A WHITE-BEAKED DOLPHIN (*LAGENORHYNCHUS ALBIROSTRIS*) AND A MALE SPERM WHALE (*PHYSETER MACROCEPHALUS*) IN BLEIK CANYON, NORTHERN NORWAY.

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Interspecific interactions among cetacean species usually take place in areas where populations show high densities. In Bleik canyon, off northern Norway, there is a relative low density of cetaceans, thus, few behavioural interactions have occurred during the last years. The most abundant cetacean species in the area is the male sperm whale (*Physeter macrocephalus*). In general, there are few interspecific interactions described between sperm whales and delphinids, except a predator-prey relationship with killer whales (*Orcinus orca*), which are known to feed occasionally on calves in the breeding areas. In addition, some aggressive behaviour has been detected in high cetacean density areas such as the Gibraltar Strait, where long-finned pilot whales (*Globicephala melas*) and bottlenose dolphins (*Tursiops truncatus*) were seen annoying sperm whales. In the Bleik canyon, Atlantic white-sided dolphins (*Lagenorhynchus acutus*) may swim around sperm whales in a pacific coexistence when they seldom feed on fish. During July 2010, a single white-beaked dolphin (*Lagenorhynchus albirostris*) was seen pursuing and searching the companionship of an old sperm whale. When the whale dived, the dolphin would wait until it appeared again at the surface and followed it. This unusual behaviour lasted for almost two days. Though the sperm whale was seen in consecutive days, the dolphin was lost. We hypothesize this single dolphin might be a juvenile lost from the main group in search for protection from the sperm whale. Killer whales, also known to predate on small dolphin species such as white-beaked dolphins, had been seen in the area some days before this unique interaction was detected. It is also important to note that white-beaked dolphins were seen in the Bleik canyon in 2010 for the first time in at least five years.

C01

SYSTEMS FOR COASTAL DOLPHIN CONSERVATION IN THE LIGURIAN SEA (ARION)

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Bottlenose dolphin (*Tursiops truncatus*, Montagu 1821) is one of the Mediterranean cetaceans listed in the Annex II of Habitat Directive. The Mediterranean population is also present in the IUCN Red List where it is recognized as Vulnerable, according to criteria A2,c,d,e. This study introduce a new methodology in cetacean conservation and MPA management. The main objective is the creation a virtual corridor for monitoring and surveillance of the transient and resident bottlenose dolphins. Concrete conservation actions will take place in the Portofino MPA (Italy), this area is included within the boundaries of the International Sanctuary for the Mediterranean Marine Mammals "PELAGOS". The area selected for system demonstration can be considered as "Case Study" because there is a resident population of bottlenose dolphins which is an important fraction of the north-western Mediterranean population, and a large type of anthropic activities are present in the area. We show the implementation of a interference avoidance system capable to detected and track the dolphins, to identify the threats and to prevent collisions and other risks by diffusing presence warning messages in real time to all categories involved (tourists, professional and recreational fishermen, MPA management). The protocol of conduct for reducing risks for the species will be developed and agreed by involved stakeholders in cooperation with the local Coast Guard branch. Upon reception of the warning messages the ships and boats present in the area will be invited to follow the protocol of conduct and the Coast Guard will supervise its application. This approach will ensure the species protection improvement, the sustainable coexistence of dolphins and anthropic activities and will promote responsible usage of the sea.

C02

MODELLING TEMPORAL MARINE MAMMAL OCCURRENCE DURING OFFSHORE PIPELINE CONSTRUCTION IN NW IRELAND

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Displacement responses to anthropogenic noise by marine mammals depend on the relative importance of their habitat and are often species-specific. A year-round monitoring programme including cliff-based observations during favourable weather conditions has been conducted in Broadhaven Bay, Co. Mayo (NW Ireland), in the context of an offshore gas pipeline installation through the bay during 2002 (pre-construction), 2005 and 2008-2010 (during construction). The daily presence / absence of the five most frequently observed marine mammal species during 229 days of observations was analysed using GAMs with a binomial distribution and logistic link function. Year, season, tidal state, sea surface temperature (SST) and SST gradient over the larger area, along with effort (number of 1h scans / day) and sea state for correction of detectability, were included as explanatory variables. Species presence ranged from 29 (13%) days for minke whales to 77 (34%) days for grey seals. The models explained between 14.5% (bottlenose dolphin) and 43.6% (common seal) of the deviance. While bottlenose dolphins tended to use Broadhaven Bay primarily during neap tides, common seal presence was higher during spring tides. Common dolphins were the only species whose presence was negatively correlated with SST; highest bottlenose dolphin presence occurred between 13 and 14ºC, and highest minke whale presence around 12ºC; the presence of both seal species increased linearly with SST. All three species commonly using the inner part of the bay (bottlenose dolphin, grey and common seals) showed lower usage of the study area during years of highest construction activity by comparison to baseline observations. However, grey and common seal presence was comparable to baseline levels again in 2010, a year of low construction activity. Such a yearly pattern was absent in common dolphins and minke whales, which occur mainly in the outer part of the bay and offshore.

C03

DOES THE LEGACY OF 20TH CENTURY NAVAL WARFARE AFFECT MONITORING BASELINES FOR CETACEANS IN EUROPE?

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The impact of 20th century naval warfare on cetacean populations has not been quantified as little systematic monitoring was undertaken in the first half of the century. Submarine attacks on merchant vessels during the Battle of the Atlantic (1939-45) resulted in the sinking of 14.5 million tons of shipping. Oil tankers were selectively targeted and the first major oil spills occurred between January and June of 1942. German U-boat attacks on tankers off the East Coast of the United States spilled 590,000 tons of oil; the quantity of oil spilled in European waters is not known but probably far exceeded this amount. Depth charges were used extensively in counter-attacks on submarines. In World War I, monthly use of depth charges, mainly on the European continental shelf, increased from between 100 and 300 per month during 1917 to an average of 1745 per month during 1918. Attacks on submarines in World War II typically involved prolonged barrages of depth charge detonations, *e.g.* U-427 survived 678 depth charge blasts aimed at her in April 1945. Given current concerns and our improved understanding of potential impacts arising from recent oil spills and naval activities, it appears likely that marine mammal populations were negatively affected by the two World Wars. Cetacean populations may therefore have still been in a recovery phase when systematic monitoring began in later decades and this should be taken into account when considering the favourable status of both oceanic and coastal species occurring in the North Atlantic.

C04

ASSESSING LONG-RANGE MOVEMENTS OF MEDITERRANEAN SPERM WHALES THROUGH PHOTO-IDENTIFICATION

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The Mediterranean sperm whales qualify as “Endangered” according to the IUCN Red List criteria. Although the species is widely distributed, information about movement patterns within the Mediterranean Sea and through the Strait of Gibraltar is scant. To provide insight on long-range movements, photo-identification catalogues from different regions of the Mediterranean Sea and North Atlantic Ocean were compared. Specifically, CIRCE’s photo-identification catalogue (Strait of Gibraltar, 1999-2010), containing 46 individuals, was compared with the North Atlantic and Mediterranean Sperm Whale Catalogue (NAMSC, produced by IFAW, 1994-2004), the Tethys Research Institute catalogue (western Ligurian Sea, 2004-2008) and the Alnitak Marine Research Center catalogue (Alboran Sea, 2006-2008).
None of CIRCE’s 47 sperm whales were resighted in Atlantic waters nor in the eastern Mediterranean basin, while 4 (8.5%) were sighted in the Alboran Sea, 6 (13%) in the western Ligurian Sea and an other 2 (4%) in both areas.
These results evidence long-range movements of the species throughout the whole western Mediterranean Sea, with a straight-line distance of about 1600 km. Moreover, absence of any photographic recaptures between the Mediterranean Sea and the North Atlantic Ocean, support the existence of a genetically isolated sub-population within the Mediterranean.
Given the lack of baseline information on species abundance, distribution and population trends for the Basin, describing movement patterns and possible migratory routes is essential to develop and implement proper conservation measures. For a highly nomadic species, which spreads across international boundaries, creating integrated basin-wide monitoring programmes and networks of MPAs would be key.

C06

EFFECTS OF WHALE WATCHING ACTIVITY ON CETACEAN BEHAVIOUR WITHIN FEEDING GROUNDS IN ICELAND

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Skjálfandi bay, Northeast Iceland, is an important summer feeding ground for a variety of different cetacean species, most commonly minke whales (*Balaenoptera acutorostrata*), humpback whales (*Megaptera novaeangliae*) and white-beaked dolphins (*Lagenorhynchus albirostris*). Since 1995 the whale-watching industry has rapidly grown in the town of Húsavík by Skjálfandi bay, and has become an important economic factor in the area. Today two companies operate in Skjálfandi bay and each company schedules up to 7 - 9 tours per day during the high season, receiving more than 45,000 tourists per year. Due to this increased activity a study was conducted on the interaction of the most commonly sighted cetacean species with whale-watching boats, *i.e.* minke whales, humpback whales and white-beaked dolphins. Data was collected from a land-based station from June to August in 2009 and 2010 using a theodolite to track the movements and to observe the behaviour. The theodolite was connected to a laptop computer running the real-time mapping program Cyclops -tracker. Behaviours observed were swimming speed, linearity and re-orientation. Number of vessels and their distance from the cetaceans did have significant effect on the behaviour of the cetaceans. Different species did however react differently to the observed circumstances. Minke whales generally reacted to increased vessel numbers and increased proximity by decreasing their re-orientation. Humpback whales, however, generally responded to similar circumstances by increasing their swimming speed. Changes in the observed behaviour types are believed to possibly affect the animals' foraging success. Thus, the results indicate clearly the need to develop codes of conduct for whale-watching entrepreneurs to clarify the carrying capacity for tourism activity within cetacean feeding grounds in Iceland.

C08

MONITORING CETACEANS IN ANDALUSIA: A NECESSARY TOOL FOR MARINE MANAGEMENT

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Off the Andalusian coast, a vast sea surface is characterized by the presence of different water masses, Atlantic and Mediterranean, connected through the Straits of Gibraltar, the only natural passage to the Mediterranean Sea. Previous studies have shown the presence of different populations of cetaceans in this area, several of which can be considered resident throughout the year. In order to know more about these populations and potential threats that may affect them, the Regional Environment Government of Andalusia is carrying out a complete study which includes different, but closely interrelated, lines of work. One of them is the monitoring of populations at sea, both from aerial and from ship-based surveys. Thus, from October 2005 to December 2010 more than 52.300 km of aerial surveys were conducted on effort, recording 712 sightings of 10 species of cetaceans, this method being a very effective tool to study a wide area. Along with this, between September 2007 and December 2010 more than 12000 km of ship-based surveys were conducted from all the coastal Andalusian provinces, totaling more than 350 sightings of 11 species. Another important line of work is being carried out with data coming from stranded animals along the entire Andalusian coast. More than 600 cetaceans of 12 species were encountered from September 2007 to December 2010, the vast majority of them being dead animals. Necropsies were performed on dead animals that were in appropriate condition. Pathological examination as well as microbiological analysis, including determination of Morbillivirus, of the studied cetaceans attempted to clarify the causes of stranding and death, with special attention to potential anthropogenic causes. The results being obtained in this study increase knowledge about cetacean populations and their status, being therefore an important tool for management on marine environment in Andalusia.

C09

USING LONG TERM DATA (1989-2008) TO MONITOR CETACEAN DIVERSITY IN THREE OFFSHORE AREA OF THE WESTERN MEDITERRANEAN SEA

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Long term monitoring of cetacean presence on offshore areas is a challenging task. Long term survey data hardly exist, and monitoring of cetacean presence has to rely on robust indicators to be useful. We propose to split twenty years of survey data in two subset, one for 1989-1998 period (770 sightings) and one for 1999-2008 period (955 sightings). In order to have more robust population description, data were selected for good visibility conditions. Among various possibilities, we used the Shannon index as a measure of cetacean biodiversity in three western Mediterranean provinces: the Ligurian, Tyrrhenian and Provençal basins. Data cover 8 cetaceans species not observed in all three regions, and 1329 sightings (1989-2008) are for the Ligurian basin. Shannon indices were calculated both for number of school observed (SIS) and number of individuals counted (SIN). SIS for both time periods were similar and higher for the Tyrrhenian basin (2.03-2.25) than for the Provençal basin (1.46-1.50) and for the Ligurian basin (1.15-1.25). Hence Shannon index based on school sighted proved to be a reliable diversity indicator across the 20 years of monitoring time. SIN calculated for period 1989-1998 and 1999-2008 were stable for the Ligurian basin (0.47-0.44) but showed a marked decrease for the Provençal basin (0.93-0.59) and a clear increase for the Tyrrhenian Sea (0.65-1.11). Several reasons accounted for variation, both intrinsic to cetacean diversity itself, and induced by changes in survey strategy across the monitoring period. Compared to previously used relative abundance indice, Shannon diversity calculated on cetacean school number may be used for long term monitoring of cetacean presence. Combination of both measurement methods and non quantitative indicators such as habitat use description can provide an efficient toolbox for long term management of protected resources in open sea areas

C10

THE SIDE-SCAN SONAR: A NEW CONSERVATION TOOL TOWARDS THE PROTECTION OF THE ANTILLEAN MANATEE (*TRICHECHUS MANATUS MANATUS*) IN CARIBBEAN COSTA RICA

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The Antillean manatee (*Trichechus manatus manatus*) is an endangered species, and urgent measures are needed to guarantee the long-term conservation of its populations. However, little is still known about this species in most of its area of distribution (Caribbean and Northern South-America), mainly because it is a region of difficult access, with much covering vegetation and large extensions of channels with very dark waters. Manatees in this region are very elusive after years of intensive hunting. For these reasons, traditional methods used to study manatee in other regions do not apply here, and new available technologies need to be adopted. During 3 months, 10 transects were completed in each of four channels chosen because they reflected different social and ecological situations of the channels in the National Park of Tortuguero (NPT), Costa Rica (California, Tortuguero, Servulo and Negro). A Humminbird 998c side-scan sonar set up on a motor boat was used for this study. Along each transect the technician registered animals detected, date and time, depth, water temperature, GPS position, boat speed, surrounding vegetation and boat traffic. Manatees were detected in three occasions, alone and in groups, always in the California channel. This channel is in the border of the NPT, and so far had not been integrated into its regulations. These results have been presented to the authorities, and will be considered for future management decisions and regulations. A direct sighting of one individual also happened in the Servulo channel, currently closed to boat traffic. The sonar proved to be a very useful tool for the detection of manatees in these conditions; it is a cheap technology and easy to use and interpret after adequate training. Further studies with this technology are being continued at the NPT, and have been started in other areas of Caribbean Costa Rica.

C11

DONUZLAV LAKE IN WESTERN CRIMEA AS UNIQUE CETACEAN HABITAT

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Since 1961 Donuzlav Lake is tied to the Black Sea area by transisthmian channel, and lake wildlife exposes to increasing anthropogenic impact (sand quarrying, boat traffic, fisheries, recreation, etc.). The lake is unique for cetacean occurrence in densely populated area, but these data remain fragmentary and need intensive research. In 2006-2010 we studied cetacean residence in the lake by several ways: field excursions and boat surveys, interviews of local residents, periodic observations in standard station (Belyaus spit) to watch the channel and adjoining sea area. Sightings showed that the main part of bottlenose dolphin occurrence in the lake falls in May-October (peak-time is August-September). Harbour porpoises were not observed; meanwhile their carcasses (at least 8, including 2 cases of by-catch) were recorded in Belyaus spit. More frequently dolphins (single specimens or schools of 2-4 or 8-9 animals) were registered in channel zone and in 18-23 km from the sea (approximately half-and-half); in 5 cases animals moved to the fresh upper part of worm-shaped lake. Dolphin appearance in the lake coincides with fish migrations (mullet species mainly, but also scads, garfishes, etc.), and has diurnal rhythm: several animal schools (*e.g.*, June 13, 2010, up to 5 schools, including about 30 specimens) enter the lake in the morning and return to the sea in the afternoon; some schools can stay in Donuzlav during 2 days. Calves were not sighted. Cases of dead non-identified dolphins finding (3) were reported in 2008 and 2009. Donuzlav Lake can be considered as a case of critical habitat and cetacean adaptation to disturbed environment. Wildlife conservation (including cetaceans) in Donuzlav Lake and adjoining sea area can find its realization in the frames of the programme of new MPAs creation.

C12

ASSESSING THE IMPACT OF BYCATCH ON COMMON DOLPHIN IN THE EASTERN NORTH ATLANTIC

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Fisheries interactions are largely involved in the decline of marine megafauna. In the eastern North Atlantic, at least 1000 common dolphins (*Delphinus delphis*) are bycaught each year in various fisheries. The objective of our work was to assess the impact of bycatch on this population by using demographic modelling. We used a sample of female common dolphins stranded on the French Atlantic and western Channel coasts and collected by the National Stranding Network (n=406). Analysis of teeth and reproductive tracts enabled individual age and reproductive state to be determined and, hence, effective survival (including natural and man induced mortality) and reproduction parameters to be estimated. Age at sexual maturity and mean calving interval (respectively 8.24 years and 2.8 years) were similar to those estimated in previous studies whereas adult survival was unexpectedly low (0.84). These parameters were then used as inputs in two demographic models. A constant parameter matrix yielded an effective growth rate of -5.5 ± 0.5% per year, corresponding to the current situation including bycatch mortality. Deterministic projections indicated that the population would be reduced to 20% of its current size in 30 years and would be extinct in 100 years. Subsequently, the demographic invariant method yielded a maximum growth rate of 4.8 ± 0.1% per year, corresponding to the optimal demographic situation. Then, a risk analysis incorporating the Potential Biological Removal and based on two scenarii for population structure, suggested that current bycatch level was unsustainable for the neritic stock of the Bay of Biscay, towards which management actions should be directed. This new approach provided indicators of the status and trajectory of the common dolphin population in the eastern North Atlantic and therefore proved to be a valuable tool for management.

C14

POTENTIAL THREAT OF BOAT TRAFFIC FOR BOTTLENOSE DOLPHINS IN THREE SPECIAL AREAS FOR CONSERVATION OF THE CANARY ISLANDS.

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There are 12 marine SACs (Special Area of Conservation, by Natura 2000 network) in the Canary Islands due to the presence of bottlenose dolphins (*Tursiops truncatus*). Several studies have shown short-term changes in bottlenose dolphin behaviour due to boat traffic. This study tried to assess this potential threat on three canarian SACs, where bottlenose dolphins are present all year round. There were conducted simultaneous small boat-based surveys off SW: Tenerife, La Gomera and Gran Canaria. During survey effort, all the boats present in the area and their activities were recorded. During dolphin encounters, dolphin behaviour and number of boats present within 200 m of the dolphins were recorded every 3 minutes (scan sampling). The overall area surveyed was 6.077,44 km, for a total of 552 hours. The highest boat traffic intensity was recorded in Tenerife with an average of 52 boats counted daily, the majority of them for recreational use, including whale watching activity. And the lowest intensity was recorded in La Gomera with an average of 13 boats per day with sport fishing as major activity. There were 110 bottlenose dolphin sightings, with a total of 1298 sampling points. It was found that in Gran Canaria 97% of the time of dolphin encounters, boats were present, and in Tenerife 75% of the time, both areas with a maximum of 6 boats simultaneously around the same group of dolphins. In La Gomera this percentage decreased to 18%, with a maximum of 3 boats at a time. The main activity observed for the dolphins was travelling followed by: long dives when boats were present, and feeding when boats were not present. It was also observed repeated times, that the dolphins that were feeding or traveling changed their behaviour into long distance travelling dives when more than 4 boats were present.

C15

TOURISTS VIEWPOINT ON DOLPHIN SWIM TOURISM THAT INCORPORATE RESEARCH, EDUCATION AND CONSERVATION INTO ENCOUNTERS IN PONTA DO OURO, MOZAMBIQUE

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Swim-with-dolphin activities started in Ponta do Ouro (PDO) in the early 90's, with one company who offered educational dolphin swim programs that incorporated research, education and conservation aspects into the tourists experience. Both local and international marine mammal experts assisted the operator in drafting a specific code of conduct and have worked towards national marine mammal conservational laws. In 2008 a new operator was established in the region, which now subsequently sees a total of 8 operators within a 20km area. The recent proliferation of tour operatores in the marine mammal industry of Mozambique, specifically in PDO, has brought attention to the urgent need of addressing the conservational issues that dolphin populations face in this country. Between December 2010 to January 2011, corresponding to the busy tourism season in PDO, a survey of tourists took place to asses the level of interest in ethical marine mammal tourism versus the conventional tourism tours offered.

C16

A TRANSFERABLE, SCALABLE MODEL OF RESEARCH EMPOWERMENT - ENGAGING LOCAL PEOPLE IN LONG TERM, COST-EFFECTIVE, SUSTAINABLE AND SYSTEMATIC RESEARCH INTO GREY SEALS (*HALICHOERUS GRYPUS*) IN SOUTHWEST ENGLAND TO INFORM THEIR CONSERVATION.

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Looe Island Seal Photo Identification Project (LISPIP) is a novel project enabling local people to research pinnipeds in their own area. It involves collaboration between Cornwall Wildlife Trust (CWT), Cornwall Seal Group (CSG) and Looe Voluntary Marine Conservation Area (VMCA) volunteers. The objective has been to test two hypotheses: firstly that local people can be motivated to engage in long term environmental research and secondly that St George's Island, off Looe, has a static colony of up to six grey seals. LISPIP supports locals, enabling them to become proficient researchers gathering key seal data. Initial interest was generated by a talk and after community consultation, an action plan was created to build local capacity. By Dec 2008 a site-specific research protocol was designed and implemented over 24 months of systematic work. The first hypothesis has been proved: locals have coordinated 19 monthly surveys with teams of up to 12 volunteers - 42 volunteers participated in total with 29 doing more than two surveys, eight doing more than nine surveys and more than 11 volunteers actively involved in CSG meetings. The second hypothesis has been disproved with 30 seals being photo identified. 11 seals were repeat visitors with five seals seen at least six times (up to a maximum of 30). There were two peaks in the monthly distribution of seals - a secondary spring moulting peak before the main peak during the summer offshore foraging season. There were also seasonal differences in the gender composition. A smaller maximum number of seals was observed during surveys in 2010 than 2009 (28 and 41 respectively) and seal habitat use changed between 2009 and 2010. Following the success of LISPIP in engaging locals to generate long term data, CWT and CSG are rolling this methodology out to a second Cornish VMCA.

C17

PROJECTE NINAM, A PLATFORM FOR THE STUDY OF CETACEAN AND SEABIRDS IN NORTH CATALONIAN COAST.

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Projecte NINAM is the only permanent field based platform for the study of cetaceans and seabirds in the North of Catalonian country, near the French border. Operating since 2005 on the Natural Park of Cape of Creus, Projecte NINAM has developed several annual campaigns focussed on the fin whale (*Balaenoptera physalus*) pass and Bottlenose Dolphins (*Tursiops truncatus*) photo ID catalogue. Projecte Ninam has been working in the elaboration of several rapports on other cetacean presence for the authorities of the Natural Park. Projecte NINAM is working, as well, with the Catalonian Government: Fauna Service of the Environment Dept. controlling the Cape of Creus/Roses Bay I.B.A. (*Hydrobates pelagicus, Puffinus yelkouan, Puffinus mauretanicus* and *Calonectris diomedea*), and the CADS (Assessor Committee for the Sustainable Development). Since the beginning, the project has included the collaboration of most of the Catalan Universities: U. of Barcelona, Autonomous University of Barcelona and U. of Girona, to offer the possibility for students to practice in field work at sea, developing their own projects or involved in a cetacean research. Since 2010 Projecte NINAM is member of ACCOBAMS. The next step will be the publication of their results and to be able to collaborate with foreign scientists.

C18

DESIGN AND FIELD-TEST OF PORPOISE ALERTING DEVICE (PAL)

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To reduce by-catch in fisheries, currently employed pingers produce sounds resulting in disturbance or harassment of harbour porpoises. Porpoises maintain a large safety distance of several 100 metres to pinger-equipped nets (Culik *et al*. 2001). As a consequence, besides being excluded from fishing grounds, porpoises cannot establish a connection between the sound and the threatening nets.
A newly designed Porpoise Alerting Device (PAL) generates clicktrains matching alarm calls (Clausen *et al.* 2010) recorded during porpoise communication. The generated 1.4 s upsweep chirp consist of 750 clicks (132 kHz), starting with 400 Clicks/s and ending with 1100 C/s, followed by a 5.3 s pause.
Video and acoustic observation on 4 harbour porpoises maintained at the Fjord and Baelt Centre, Kerteminde, DK, showed a significant positive response as well as increased biosonar activity during one minute of PAL operation (each $n=11$, $p<0.05$, Wilcoxon Test) as opposed to one minute immediately before and after (controls).
This was confirmed by acoustic observation via C-POD (Chelonia, Cornwall) on free-living harbour porpoises off Fredericia, DK. Bioacoustic activity during one minute of PAL operation was significantly increased reaching 147 C/s (median, >140 kHz filter) as opposed to one minute immediately before (105 C/s) and after (70 C/s; $n=33$ trials, group size 1-6, $p<0.05$, Wilcoxon Test).
These results are very promising and we are currently developing a miniaturized PAL for further field tests.

We are grateful to M. Conrad, Elac Nautik, Kiel, M. Walberg, Fjord and Baelt Centre, Kerteminde, T. Ludwig and M. Kubaczyk, WTD 71, Kiel for support and to V. Lenarz and H. Frisch at CMS, Bonn for funding.
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D01

TESTING TWO DIFFERENT PHOTO IDENTIFICATION METHODS TO STUDY COMMON DOLPHINS (*DELPHINUS DELPHIS*) IN THE WESTERN MEDITERRANEAN

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During the past 30 years the Mediterranean population of common dolphin (*Delphinus delphis*) has suffered a dramatic collapse. Conservation plans recommend the development and testing of new research tools and techniques for the study of the species, such as photo-identification. The western Mediterranean population remains in good conservation state being useful for this purpose. Two photo-identification methods were tested: one strictly visual and a semi-automated process based on a similarity coefficient. The final catalogue contained 278 individuals seen in 108 sightings, with 43 females successfully identified. Pictures were classified according to the quality and distinctiveness of individuals and a frequency analysis revealed distribution around mean values in 45,39 % (N = 139) and 47,03 % (N = 143) of the cases respectively. The most employed natural markings for identification were the combination of nicks and the white patch on the fin, accounting for a 57,19 % (N = 159) in the general population and 60,46% (N =26) in females, excluding the white patch from being a dimorphic character. Success in the identification process resulted in a mean identification of only 10% of individuals per sighting, due to the high difficulty of photographing the species and the low marking rate among individuals. The catalogue made on the visual methodology was reviewed by the semi-automated one, revealing no mismatchings. On the other hand, the semi-automated method requires an exhaustive visual revision of the results.
When comparing by the semi-automated tool the only 23 individuals pictured from both sides and visually confirmed, the similarity coefficient among them showed a great variability and a mean of 40% even when the matching was 100% clear by eye. In future studies, we recommend the use of visual methods which should be improved together with the picture acquisition, in order to increase the identification success.

D02

SPATIO-TEMPORAL VARIABILITIES IN CETACEAN PRESENCE AND DISTRIBUTION IN CENTRAL-WESTERN MEDITERRANEAN SEA

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Though cetacean distribution in Mediterranean Sea has been intensively studied since late 1990s we are still far from a true comprehension of species spatial and temporal distribution. This is due to the fact that research in Mediterranean has been very fragmented in space and time, also due to cost of dedicated research platform.
Since 2007, monitoring cetacean from platform of opportunity along fixed transect lines has lead to a continuous monitoring of cetacean presence along summer on large spatial scales. From 2007-2010, respectively 1-2-4-5 ferry lines routes have hosted specialized observers allowing a synoptic sampling of central western Mediterranean sea (totalizing in summer 2010, 2000 km weekly monitored). Since the start, the network travelled 83.400 km; under an effort of 1.640hr, 1.537 sightings of almost 9.266 animals occured. Results from this research are presented year by year in order to point out the high spatio-temporal variability observed.
All 8 cetacean species considered as common in the Mediterranean sea have been sighted (total ER sight./hr 0,89±0,046), with striped dolphin being the most sighted species (0.449±0,033), followed by fin whale (0.229±0,02), bottlenose dolphin (0.061±0,01), sperm whale (0.019±0,004), cuvier's beaked whale (0.015±0,003), risso's dolphin (0.01±0,002), common dolphin (0.01±0,004) and long finned pilot whale (0.005±0,002).
Fin whale has shown a great spatio-temporal variability, with an ER that increased from 0.17±0,055 in 2007 to 0.35±0,062 in 2010 in Central Tyrrhenian Sea and also being almost rare in northern part of the basin in 2008 and 2009 and more abundant in 2010.
Some species, such as pilot and cuvier's beaked whale seems to be present only in the northern part of the study area, while risso's dolphin was sighted only in central and southern lines. Common dolphin seems to show a bi-polar pattern, being sighted in northern and southern lines and rarely in the central ones.

D03

ESTIMATING POPULATION SIZE AND SURVIVAL RATES OF BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) OF THE ALBORAN SEA USING MARK-RECAPTURE METHODS

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Evaluating the conservation status of a species requires knowledge of demographic parameters and population size but many gaps exist in the knowledge of the bottlenose dolphin (*Tursiops truncatus*) population in the Mediterranean Sea. This presentation uses photo-identification data of individually marked bottlenose dolphins from the Alboran Sea to estimate population size and survival rates based on mark-recapture methods and thus helps to fill some information gaps in this area. Data were collected between 2004 and 2009 in the northern Alboran Sea and Gulf of Vera and extended to the waters off the coast of Morocco in 2009. Bottlenose dolphins were encountered on 181 occasions over 11,065 km of effort, leading to the identification of 293 individuals. No recaptures were made between the Moroccan encounters and the rest of encounters, suggesting the existence of separate populations in southern and northern Alboran Sea. Excluding the Moroccan encounters, 175 individuals met the photographic quality and individual distinctiveness criteria for analysis. Petersen estimates for consecutive years were scaled to total population size by an estimated mark rate of 0.43 (CV=0.03). Population estimates were consistent across pairs of years ranging between 332 and 366 individuals except for 2004-05 (859 individuals, CV=0.45) due to a low number of recaptures between those years. An apparent survival rate of 0.76 (CV=0.06) was estimated using the Cormack-Jolly-Seber open population model in program MARK. Immigrant groups of dolphins have been documented arriving into the area and temporally staying, which could account for the low survival rate obtained, although further research on individual home ranges and immigration-emigration events is needed. Analysis of additional data from the southern section of the Alboran Sea and further research on distribution and habitat use would help understand the population structure of bottlenose dolphins in the western Mediterranean Sea, important for conservation and management purposes.

D04

A LONG-TERM OPPORTUNISTIC PHOTO-IDENTIFICATION STUDY OF WHITE-BEAKED DOLPHINS (*LAGENORHYNCHUS ALBIROSTRIS*) IN FAXAFLÓI AND SKJÁLFANDI BAYS, ICELAND

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Lagenorhynchus albirostris is endemic to the North Atlantic and present in Icelandic coastal waters the whole year around; however, little is known about site fidelity and population size. Photo-identification studies were conducted from April-November (1998-2010) during whale-watching operations in Faxaflói bay (FB) and Skjálfandi bay (SB) in the SW and NE coasts of Iceland, respectively. Minimum population sizes, annual and seasonal site fidelity, and movement between bays were calculated. During 2782 boat-based surveys (n=2009 in FB, n=773 in SB) L. albirostris was sighted on 1451 surveys (n=1192, 59.3% in FB, n=259, 33.5% in SB) and 2016 high quality colour digital photographs were analyzed. A total of 344 individuals were identified in FB, and 160 in SB. An average of 4.42 SD=3.03 (FB) and 3.29 SD=2.10 (SB) animals identified per survey. Mean minimum group size in FB was 9.66 (SD=8.71), while mean maximum group size was 16.46 (SD=14.97). Mean minimum group size in SB was 11.35 (SD=15.09) while mean maximum group size was 20.81 (SD=27.71). 63 individuals were sighted on multiple occasions, 60 (17.4% of the population) in FB and 3 (1.9% of the population) in SB. Mean residency time in FB was 21.88 (SD=24.62; range 1 to 119 days) and mean residency time in SB was 26.20 (SD=32.10; range 6 to 83 days). Annual sighting rate was 15.1% in FB while no individuals were re-sighted in SB, 18 dolphins (3.6%) were matched between FB and SB. Low site fidelity likely signifies a much larger home range than our study area, into either other coastal areas, or into the offshore area. Therefore, expansion of the study area into other coastal areas is needed. The matches between bays suggest that L. albirostris inhabits large-scale coastal range of the Iceland coast.

D05

SIMULTANEOUS SURVEY OF BOTTLENOSE DOLPHIN (*TURSIOPS TRUNCATUS*) IN FIVE SPECIAL AREAS OF CONSERVATION IN CANARY ISLANDS.

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There are 12 Special Areas of Conservation (SAC) - Natura 2000 network of the European Union- in the Canary Islands declared by the presence of bottlenose dolphins (*Tursiops truncatus*). The populations of bottlenose dolphin in at least three of these areas are under the same synergistic threats (*e.g.* maritime traffic, whale-watching, professional fishing, high speed ferries and coastal degradation). Efficient conservation management actions have not been taken due to the lack of information about the bottlenose dolphin populations ecology such as distribution, abundance, movement and habitat use. Simultaneous surveys from July to September 2010 were carried out on five SACs in the South West sectors of the islands of Gran Canaria, Tenerife, La Gomera, La Palma and El Hierro. The aims of this study were to evaluate the degree of residence, distribution, abundance and movements and the possible existence of sub-structuring patterns of the bottlenose dolphin population within these areas using photo-ID data. Each survey area was sampled by random transects using power boats. The total effort of the study was 7515,75 km and 649 hours: Gran Canaria (2349,25 km and 167 hrs), Tenerife (1554,70 km and 148 hrs), La Gomera (2173,49 km and 205 hrs), La Palma (913 km and 63 hrs) and El Hierro (525,31 km and 34 hrs). There were recorded 283 sightings of 12 cetacean species, 120 (42,4%) of these corresponded to bottlenose dolphins. The encounter average of bottlenose dolphins was 68% in Gran Canaria, 34,4% in Tenerife, 40,4% in La Gomera, 37,5% in La Palma and 7,9% in El Hierro. This study is the first simultaneous survey of bottlenose dolphins carried out in the Canary Islands, and the gathered information represents the base line of the management of this species in these areas.

D06

DISTRIBUTION OF HARBOUR PORPOISE (*PHOCOENA PHOCOENA*) IN THE SOUTH OF PORTUGAL

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Harbour porpoise (*Phocoena phocoena*) is listed in the Annex II of the EU Habitats Directive, which considers it a priority species for conservation and, thus, requires the creation of Special Areas of Conservation (SACs) in European waters. There is little information about the occurrence and distribution of this species in mainland Portugal. Most of the knowledge comes from stranding information. Additionally, during the 2005 SCANS - II project no sightings of harbour porpoises were made in the southern coast of Portugal, and only a few sightings were registered in the northwestern part. In 2009, the occurrence of this species was registered for the first time during the first survey of cetaceans undertaken in the most western part of this coast, around the region of Sagres.

The aim of this study was to model the presence of harbour porpoises along the south coast of Portugal, from Sagres to Tavira. From June to October 2010, whale-watching boats were used as platforms of opportunity for data collection. Information on group size and cohesion was collected. A total of 40 sightings of harbour porpoise were recorded and their distribution was modelled using generalised models to test whether differences in depth, slope, and distance from the coast line were influencing the occurrence of harbour porpoises in the study area. In 100% of the sightings the groups were considered very compact (< 1 body length). Group size varied from 1 to 8 individuals. All the animals were observed in shallow waters (up to 162 meters) and close to shore, on average at 5 nautical miles from the coast. These results suggest that this area might be important for this species and that further work should be carried out to be able to propose a SAC within the area where the species is targeted by whale watching boats.

D07

SURVIVAL RATE, ABUNDANCE AND RESIDENCY OF BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) IN THE STRAIT OF GIBRALTAR

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In the Strait of Gibraltar, bottlenose dolphins are targeted by whale watching companies and are distributed in the middle of the main entrance channel to the Mediterranean Sea for cargos and ferries which could cause acoustic and physical disturbances. The aim of this study was to estimate the level of residency, survival rate, population growth rate and the population size of the bottlenose dolphin of the Strait of Gibraltar between 2001 and 2008 using photo-identification. A closed robust design with heterogeneity and the Pradel population growth rate estimator was used to estimate the different parameters. A total of 14228 individual bottlenose dolphin dorsal fins were photographed and analysed. The annual survival rate estimate was 0.922 (SE: 0.009; 95%CI: 0.901-0.938) while the population growth rate varied but was estimated above 1 for all the years, which indicates a stable and/or positive growth rate during the study period. The population size has increased from 151 (CV: 0.21; 95% CI: 107-239) individuals in 2001 to 297 (CV: 0.04; 95% CI: 276-332) in 2008. A total of 73% of the animals identified were recaptured in two or more years, and in 2008, 90% of individual were known from previous years. Data suggest that an important proportion of the population in the Strait were resident during the study period. Up to 2008, although the survival rate was not as high as expected for this species, no negative trends have been detected in this population which is important for the conservation of a species distributed in a high anthropogenic stress environment. The long term monitoring of this population is important in the context of a continuous increase in the maritime traffic and whale watching activities of the area.

D08

FIRST RESIGHTING OF KILLER WHALES (*ORCINUS ORCA*) OFF AZORES ARCHIPELAGO

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Recently two ecotypes of orcas (*Orcinus orca*) have been recognized in the North Atlantic: type 1: feeding on fish and small marine mammals; and type 2: feeding on other cetaceans. Very little is known about orcas around the Azores Archipelago. Land and at-sea opportunistic data on Killer whales appearing around Pico Island was collected from April 2003 to November 2010 by the Nova Atlantis Foundation within running projects. Land based observations were conducted using lookout points covering 50km of coastline. At-sea surveys were undertaken for photo-identification purposes. Orcas appeared mainly from February till April, although one sighted occurred in June. Group size varied from 4 to 8 individuals and included males, females and calves. When newborn calves were present and the sea state was rough, groups stayed close to shore. In five at-sea encounters orcas were photographed and a total of 10 individuals were identified. A group first sighted in February 2008 was resighted in April 2010 in the study area. This is the first documented resighting within the Azores Archipelago. The presence of the species off Pico Island occurs for a short period of time and seems to be unrelated to prey availability since feeding behaviour was not observed. Therefore we believe they visit the coastal waters to find shelter. Nevertheless one group off Sao Miguel Island was observed killing a baleen whale recently. Usually when orcas appear in the area, no other cetacean species is sighted. One exception was observed when 3 orcas were chased out of the coastal waters by Risso's dolphins (*Grampus griseus*) in 2008. Our data suggests that this ecotype could be a type 2, consistent with the observation off Sao Miguel. Recently the same eyepatch for North Atlantic orcas was recognized for Azorean killer whales, however, no individual matches were found between both populations.

D09

HARBOUR PORPOISE DISTRIBUTION AROUND THE UK - RECORDS FROM AERIAL SURVEYS FOR WATERBIRDS

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From aerial surveys for waterbirds over the last decade, opportunistic recording of cetaceans, particularly Harbour Porpoises *Phocoena phocoena*, has enabled Wildfowl & Wetlands Trust Consulting (WWTC) to produce a distribution map, using relative densities, for this species around the UK coast. WWTC have undertaken aerial surveys since the Sea Empress oil spill off the Welsh coast in 1996, and to date, coverage has included almost the entire English and Welsh coasts and parts of Scotland and Northern Ireland. Nine species of cetacean have been identified, but Harbour Porpoise were the most abundant, with 5,736 records between 2001 and 2009. The results of the 1994 and 2005 SCANS and SCANSII surveys by the Sea Mammal Research Unit, whose coverage overlapped with WWTC's, showed that whilst overall numbers remained similar, the distribution of Harbour Porpoises had changed: In 2005, Harbour Porpoises on the east coast of Britain had a more southerly and offshore distribution than they did in 1994. WWTC's data provide supporting evidence for this shift in distribution. The value of opportunistic recording is demonstrated here. Several recent studies have included opportunistic sightings data due to lack of records and the expense involved in dedicated cetacean surveys. With future surveys for offshore renewables and marine protected area monitoring, opportunistic cetacean record datasets are set to grow. Although these have application as standalone databases, most benefit is gained in conjunction with datasets from other surveys. WWTC is working with the Joint Nature Conservation Committee to include records in the Joint Cetacean Protocol. This aims to provide a common format for cetacean records across Europe and JNCC have started analyses to determine the power that a combined database has to detect trends in range and abundance and thus aid the conservation of these animals.

D10

COASTAL COMMON BOTTLENOSE DOLPHINS'S FIRST RESIGHTINGS OFF SESIMBRA, PORTUGAL

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An ongoing study on the occurrence and ecology of cetaceans of the central west coast of Portugal is taking place since 2007. From January 2007 to October 2010 a total of 68 boat based surveys were conducted in Sesimbra from which resulted 14 sightings of bottlenose dolphins. From those there were 6 sightings with photographs of common bottlenose dolphins (*Tursiops truncatus*). A total of 1685 photos of all cetaceans species observed were analyzed. From this, 89 high quality photos were used to produce a photo-id catalogue of bottlenose dolphins which allowed the identification of 38 individuals. From all identifications, 4 individuals were resighted during our survey effort: one in the same year and 3 individuals in different years. In the vicinity of this region, a resident population of bottlenose dolphins is monitored from decades and all its individuals are identified. Both catalogues were compared and no matches were found between populations. It is known that this species tends to exhibit varying degrees of residence to particular regions, ranging from small localized inshore populations, sometimes resident to specific embayment such as the Sado estuary, to larger numbers of migratory coastal dolphins which appear to move latitudinally on a seasonal basis. In Sesimbra, common bottlenose dolphins may be using the region as a coastal-corridor with a certain level of fidelity as known for this species worldwide. Further research is needed to get more information. This is a long-term study and new data from the next years will help us to improve the photo-id catalogue. Also, the availability of an online catalogue could be a valuable tool to increase our database and promote research on this subject in Portugal.

D11

FIRST DENSITY ESTIMATE FOR COMMON DOLPHINS (*DELPHINUS* SP.) IN THE HAURAKI GULF, NEW ZEALAND.

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Within the Hauraki Gulf, North Island, New Zealand, common dolphins (*Delphinus* sp.) are exposed to a number of anthropogenic impacts, including pollution, tourism and fisheries by-catch. Despite this, basic data requirements necessary for management remain absent for the population. Herein, the first measure of density is reported for *Delphinus* in New Zealand waters. Data were collected during 91 independent boat-based surveys conducted between January and September 2010 in the inner Hauraki Gulf, a 3000 km^2 semi-enclosed body of temperate water. Sighting Frequencies (SF) (number of groups encountered per 100km) and Encounter Rates (ER) (number of individual dolphins encountered per 100km) were determined using the ratio n/L x 100, where n is the number of dolphins or groups and L is the number of km spent on-effort. During 6738 km of survey effort, a total of 88 independent groups, involving a minimum of 3323 common dolphins, were observed. For 74% (n = 65) of groups encountered, immature dolphins (*i.e.*, neonates, calves or juveniles) were present. SF (0.40) and ER (16) were lowest during austral autumn months of May and April, respectively. SF was highest during the austral spring month September (4.06) and ER was highest during the austral winter month July (130). A density estimate of 0.99 dolphins/km^2 was generated for the study area suggesting that common dolphins are abundant in the Hauraki Gulf. The high occurrence of immature animals further highlights the importance of Hauraki Gulf waters for calving and nursing.

D12

MAPPING THE MORAY FIRTH - WHERE HIGHLY VALUED AND PROTECTED CETACEANS MEET INDUSTRIAL AMBITIONS

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Cetaceans are known to inhabit the waters of both the inner and outer Moray Firth in north east Scotland, but there remain significant gaps in our understanding of their distribution, abundance and habitat use in the Moray Firth as a whole. The inner Moray Firth is recognised as an internationally important area for bottlenose dolphins and was designated in 2005 as a Special Area of Conservation (SAC) under the EU Habitats Directive. The outer Firth may also be important but has been studied in far less detail, especially the offshore areas which have no protected status.
These data gaps are of particular concern considering the degree of past and present industrial development and other human activities that occur in the Firth. Offshore oil and gas exploration and production, dredging, fisheries activities, pollution, marine renewable energy and boat traffic all affect the marine environment and can negatively impact cetaceans. Baseline information on presence and habitat use of cetaceans is necessary in order to quantify the present and future impacts of anthropogenic activities. Furthermore, effective conservation of wild populations requires an understanding of the relationship between populations and their habitats, preferably with predictive ability. A first step towards this is to determine which habitats are used with higher frequency. This information can then be used to help determine those environmental features that are required to maintain populations at a favourable conservation status. WDCS have collected data on the distribution and abundance of cetaceans in the outer Moray Firth since 2005 in the attempt to fill these data gaps.

D13

PHOTOIDENTIFICATION OF BAIRD'S BEAKED WHALES IN THE WATERS OF COMMANDER ISLANDS, FAR EAST RUSSIA

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Little is known about social structure and migrations of Baird's beaked whales. No detailed study was conducted to date, and most information about the species comes from the whaling industry in Japan. Waters off the western shore of Bering Island is a very convenient place for the detection and observation of Baird's beaked whales, because a deep-water trench lies not far from the shore there. During the research period 2007-2010, we observed 72 groups (a total of 476 animals) of Baird's beaked whales from the shore. The medium group size was 6.6±0.67 animals. We have encountered 8 groups (65 individuals) during our boat-based work at sea. The medium size of groups encountered at sea was 8.1±1.06 animals. We have identified 39 individual animals from 7 groups by the photographs taken at sea.

The photographs were used to make photoidentification catalogue of Baird's beaked whales. Results of identification allowed to reveal matches of individual beaked whales both within and between field seasons. No matches between Commander Islands and other regions of Russian Far East were found, though the presence of cookie-cutter shark bites on many animals indicate that these whales probably migrate to subtropical waters.

Baird's beaked whales were observed much more frequently in May- June and August-October, than in mid-summer. It suggests that the waters of Commander Islands is not a summer feeding ground, but the whales pass it in the course of spring and autumn migration. Alternatively, it is possible that whales stay in the area but move farther from shore in mid-summer, so that we are not able to detect them.

D14

CARDIGAN BAY BOTTLENOSE DOLPHIN SOCIAL AND POPULATION STRUCTURE FINDINGS FROM A TEN-YEAR PHOTO ID DATA SET

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Photo ID efforts have taken place in Cardigan Bay between 2001-2010. Here we present the bottlenose dolphin abundance estimates and population structure using our long term data set which enables us to explore various analytical avenues. 1314 photo ID encounters were analyzed and a catalogue of 238 marked individuals was established over the years, some seen as many as 108 times. Our data reveal that 37% were seen >12 times, 15% 8-11 times, 22% 4-7 times and 26% 1-3 times. Along with yearly sighting frequencies we can divide the population into resident, occasional and transient individuals. Here we analyze population abundance estimates, birth, death, immigration, and emigration rates through Mark-Recapture techniques. Previous research suggests the Cardigan Bay population to be part of a meta-population of the Irish Sea and so our analytical model is based on the assumption that the population is closed over short time intervals (summer months being the primary period), in which multiple samples are collected, but it is open when viewed from a long-term perspective across multiple primary periods. Open and closed models have revealed population abundance estimates of 156/129 (respectively) in 2001 and 177/167 in 2009 (the closed model population occupying the Cardigan Bay SAC only). Analysis of the temporal stability of associations within the population was found to be best represented by a model including a mixture of constant companions and casual acquaintances. This represents a scenario where relationships form and break down over a relatively short time period but also provides evidence of stable associations within the population that are maintained over several years. This supports our long term open model hypothesis. These findings have important implications for management when evaluating the north and south Cardigan Bay SAC boundaries and the existing monitoring scheme in place which is temporally and spatially limited.

D15

MODELLING THE DISTRIBUTION OF CETACEANS USING OPPORTUNISTIC PRESENCE-ONLY DATA IN S.MIGUEL ISLAND (AZORES)

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The distribution of cetaceans has always been a difficult and polemic issue, and more so in open waters and pelagic habitats. Due to the high economic cost of surveying and the low detectability of certain cetacean species, the distribution of many cetacean species remains poorly known in many areas. In this work we explore the potential of Spatial Distribution Modelling using presence-only models to obtain a potential distribution map of cetacean populations from opportunistic data. We used opportunistic data from the MONICET database, provided by commercial whale-watching operations in the Azores using a standard, validated, methodology. Two different presence-only models were applied, the Genetic Algorithm for Rule-Set Production (GARP) and the Maximum Entropy Modelling (MaxEnt). Using different GIS programs we prepared a set of different bathimetric derived ecogeographical variables: Depth, Slope, Rugosity and Bathimetric Position Index, using the Bathimetric Terrain Modeller Extension for ArcGIS to calculate the last two. A comparison of the performance of the two different models was carried out, using the Area Under the Curve (AUC) of the Receiver Operator Curve (ROC) and expert knowledge as key factors to see which one of the models produce more realistic results. The relevance of each variable in the models was evaluated using a Jacknife test. The results of this study could be used in a future for a conservation and management purposes in the Azorean waters.

D16

AERIAL SURVEY OF CETACEANS ALONG THE PORTUGUESE NORTHERN COAST

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Aerial surveys were carried out between August and October 2010 in order to estimate distribution, abundance and habitat use by cetaceans occurring along the central/northern Portuguese coast.
The study area comprises the coastal region between Caminha and Cascais and the survey was conducted using the line transect sampling method with two different course designs (zigzag and parallel) to a maximum of 111 Km away from shore.
Three trained observers and a data recorder held the observation in continuous effort with 21 hours of flight time and 1892 km in a zig-zag design and 1876 km in parallel design, resulting in 3768 Km of total effective survey.
A total of six species were detected during the surveys, being the common dolphin the most recorded species with 29 sightings and a total of 497 individuals recorded. The second most recorded species were pilot whales, with 5 sightings and 19 individuals, followed by harbour porpoise with 4 sightings and only 6 individuals. Two species of mysticetes whales were recorded in these surveys: minke whale and fin whale.
In the present work the two sampling designs will be compared in order to decide what is the best monitoring scheme that will be implemented in the following 5 years. These surveys provide the first data on abundance and distribution of cetaceans along the Portuguese Continental coast collected in a standardize way and are important baseline values for future long-term monitoring studies.

D17

APPLICATION OF STANDARD GEOSTATISTCAL SOFTWARE TO SAC IDENTIFICATION FOR BOTTLENOSE DOLPHINS IN TUSCAN ARCHIPELAGO

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With the increase of environmental threats such as resources exploitation, chemical and noise pollution and biodiversity loss, countries need to apply a conservation plan at European level. In the last years also marine mammals are included in the environmental policy (Habitat Directive 92/43 EC, Marine Strategy Framework Directive 2088/ 56 EC, CBD EBSA Criteria). Feeling the need to define graphically Special Area of Conservation, this work intend to explore a method to define SAC boundary for bottlenose dolphins. We illustrate Kriging (spatial interpolation methods) using a case study from Tuscan Archipelago. The Tuscany Islands, located in the Northern Tyrrhenian Sea, have been chosen as study area for bottlenose dolphins abundance. The result is the creation of georeferenced maps that reflect a trustable distribution of this specie in the study area. This work is developed in relation to GIONHA (Governance and Integrated Observation of Marine Natural Habitat), an INTERREG project for bottlenose dolphins monitoring program in Pelagos Sanctuary.

D18

SPERM WHALE (*PHYSETER MACROCEPHALUS*) BEACHINGS ON THE COMMANDER ISLANDS

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Very little is known about cetacean diversity near the Commander Islands (CI, Russia). Registration of stranding whales along with visual coastal and boat observations provide data about cetacean abundance and their sex and age classes in a CI waters. Dead cetaceans have been found on the CI shores since the time of their discovery in 1741, however, systematic monitoring of the marine mammals morality has been conducted since the mid-1950s.

The goal of the present study is to analyze registered events of sperm whales breaching on the CI shore. Methods include frequent coastal and boat observations. From the 1970s to 2010 seven dead sperm whales were found on the CI (6 on Bering Island and 1 on Medny Island). All six sperm whales on Bering Island were males; sex of the sperm whale beached on Medny Island was unknown. The most interest case of sperm whale beaching was registered on January10 2010 in 2 km of the mouth of Gavanksaya River of Bering Island. It was a calf, barely alive, lying on a beach. Its skin was dry and has many wounds and clefts. Judging from its size, its age was half a year or little older. This find, of a sperm whale calf on Bering Island, may confirm that females with calves stay in the CI waters all year around.

Thus, both direct observations at sea and finding stranded whales confirm that sperm whales of all sex and age categories probably inhabit the CI waters all year around. The sperm whales biology, distribution, migration and behavior near the CI are still unclear and required additional attention.

D19

CETACEAN DISTRIBUTION AND CONSERVATION CONSEQUENCES IN THE BAY OF BISCAY

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For conservation to be implemented effectively a baseline of information and understanding is necessary. For cetaceans, quantitative data describing the species distribution, habitat use and response to environmental change that drives that distribution is required. Usually large, spatially extensive, data-sets are needed. However ecological niche models, such as Maximum Entropy (MAXENT), continually prove to be effective methods of efficiently predicting species distribution with limited data. The study presented uses a sightings database (1998 to 2008), from platforms of opportunity, to model (MAXENT) the distribution of cetaceans in the Bay of Biscay for the purpose of cetacean conservation management. Nine species, from three major taxonomic groups and two sub-groups of cetaceans, were modelled on two temporal scales (mean annual and seasonal). Results showed that two of the groups (rorqual and pelagic delphinids) accounted for the distribution of the majority of cetacean diversity within the bay ($p < 0.05$). Rorqual habitat was modelled in areas of the continental slope and abyssal plane, whilst pelagic delphinids habitat was observed around the continental shelf zones. These distributions were linked quantitatively to the dominant environmental variables occurring within the bay. Seasonal differences in the models produced were observed for both cetacean groups tested, however greatest habitat distribution probability remained along the continental slope and around the Santander and Torrelavega Canyons in the southern Bay. These allow for the further understanding of the diversity of cetaceans, and cetacean functional groups, in the Bay of Biscay enabling the selection of areas of conservation management to be advised.

D20

PHOTOIDENTIFICATION AND POPULATION MOVEMENTS OF BOTTLENOSE DOLPHINS, *TURSIOPS TRUNCATUS*, ALONG THE GALICIAN COAST, NW IBERIA.

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Since 2000, CEMMA has collected photographs of bottlenose dolphins from the coast of NW Iberia. Initially, data was collected in a opportunistic manner while since 2006 a more systematic and intensive methodology was developed. The first data has revealed movements of individual dolphins from Galicia (NW Spain) to Euskadi (Bay of Biscay, N Spain). However, meso-scale dolphin movements within the Galicia platform are still poorly understood. Between 2006 and 2009, CEMMA has conducted 192 boat-based research surveys in Galician waters, in which 138 sightings (92% of bottlenose dolphin, *Tursiops truncatus*, involving 1,998 animals) with an encounter rate of 0.37 sightings per hour of navigation. Following Photo ID standardized methodology, 15,937 photographs were obtained and 255 individual dolphins were identified. The photographic efficiency ratio (valid photographs divided by all taken pictures) was 39.60% and the photo-identification efficiency ratio (photo-identified specimens divided by the total observed) was 44.14%. The proportion of recaptures for each individual and survey ranged from 0% to 28.39%. 6.60% of the identified dolphins were recaptured every year, 3.50% on three years, 23.00% on two years and 66.7% on one year. 5.60% of all taken photos have good quality but with not mark fins therefore are not considered individuals identified.

A third of the photo-identified individuals (n = 76) belongs to a resident group based in the Galician coast that includes dolphins photoidentified as far as 10 years ago. The applied methodology has allowed us to identify individual movements of more than 200km between distant locations along the Galician coast. While the 55.30% of the recaptured dolphins were registered in adjacent areas within the southern Galician coast, the 7.80% showed stronger movements and were located in relatively distant sites (>100km) including areas of the southern and northern Galician coastline.

D21

LONG-DISTANCE (1000+ KM) MOVEMENT BY A SHORT-BEAKED COMMON DOLPHIN IN THE CENTRAL MEDITERRANEAN SEA

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The short-beaked common dolphin *Delphinus delphis* has faced a major decline in abundance and distribution in the Mediterranean Sea over the last decades. In the coastal waters of Greece, a local population of common dolphins inhabiting the Inner Ionian Sea Archipelago has undergone a constant decline from around 150 animals in 1996 to only about 15 in 2007. Ranging patterns of common dolphins are poorly known and, to our knowledge, no long-distance movement of individuals has yet been documented based on photo-identification. In the northern Adriatic Sea, common dolphins used to be abundant but they had virtually vanished by the 1970s. In June 2010 an adult-calf pair of common dolphins - the adult possibly being the mother - was observed in the port of Monfalcone, an industrial town near Trieste (northern Adriatic Sea). These dolphins were repeatedly observed there between June and October 2010, and did not appear to move outside of the port. Both animals appeared in good physical condition, with no evidence of injuries or skin disease based on photos of their dorsum. The calf was estimated to be about 1 year old. High-quality photographs of the dorsal fin of both animals were taken for individual photo-identification. A comparison with a catalogue of 171 marked dolphins from the Inner Ionian Sea Archipelago, Greece, revealed that the adult was photographed there in 2008. If moving in a straight line, the animal would have travelled a minimum of 1000 km.

D22

ABUNDANCE AND DISTRIBUTION OF BELUGA WHALES (*DELPHINAPTERUS LEUCAS*) IN MARCH, 2008 AND 2010 IN THE WHITE SEA (RUSSIA)

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Until present, there have been no reliable data on beluga presence/abundance in the White Sea (WS) in winter. It was suggested that a small part of WS summer stock is residential, and the rest migrate to the Barents and Kara Seas in winter. To check this hypothesis, we conducted aerial surveys in WS in March 2008 and 2010. The surveys were flown in line transects with different intervals. On March 14-18, 2008 we flew over the central part of WS. Belugas were detected in groups of 1 to 13 individuals throughout the surveyed area. In March 19-23, 2010 we uniformly covered the entire WS water-area, both over open water and ice. Belugas were detected in groups of 1 to 15 individuals. Based on visual observations and aerial photographs, the number of detected belugas was 134 in 2008, and 237 in 2010. Estimated beluga abundance on the surveyed area was 1665±634 individuals in 2008 and 2183±836 in 2010; average density- 69 and 48 belugas per 1000km^2 of surveyed area, respectively. No correction for availability bias was applied. Most belugas were detected in cracks and clearings amongst dense ice-fields, sometimes far from the open water, in the central part of WS, Onega and Dvina Bays. The weather conditions in March 2008 and 2010 differed dramatically. In 2008, ice formation in WS started on February 17, and by middle March (survey period) the thickness of ice was only 10-20cm. In March 2010, ice thickness reached 80cm, and during the survey over 80% of WS was covered with ice. Thus, irrespective of ice situation in WS, a big portion of the beluga summer stock remains in WS for winter and prefers deep regions with relatively high density ice-cover. The work was conducted under White Whale Program supported by Russian Geographic Society and Utrish Dolphinarium,Ltd.

D23

SEASONAL HOME RANGE OF SPERM WHALE *PHYSETER MACROCEPHALUS* IN THE AZORES ARCHIPELAGO: IMPLICATIONS FOR LONG TERM SPATIALLY RESTRICTED PHOTO-ID STUDIES.

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Conservation of sperm whale populations relies on the effective monitoring of populations. Mark-recapture (MR) using photo-identification has proven to be an effective method for providing these data. Sperm whales are a long-lived and slow reproducing species, long-term data collection is therefore required but funding this can be prohibitive. Whale watching has become a thriving activity in the Azores, which is both a feeding, and breeding ground for sperm whales. Photo-ID data collected from whale watching boats by skippers and biologists/guides could provide inexpensive alternatives to dedicated surveys and provide long term datasets. Sperm whales range widely and, individuals are thought to visit the Azores seasonally. Using a 20-year photo-Id dataset, this study investigated seasonal "home ranges" of sperm whales within the Azores, and implications for biases in photo-id data collected by spatially restricted whale watching operations. Data from twenty whales identified over > 4 years was used. The distribution of presences and associated absences was modelled with a GAM, which included a spatial covariate (non-linear lat/long interaction) and a temporal covariate (year). The deviance explained and the output of a confusion matrix confirmed the good predicted power of the model. Roughly half of the whales showed a preference for specific areas within their seasonal home range, which appeared stable in time. Sperm whale site fidelity can affect capture probability and compromise photo-ID MR studies. These findings could be used to explore biases in population estimates and how to minimise them. Notwithstanding the need for additional work, it is already clear that data collected opportunistically by a commercial whale watching operation is providing useful data for research and management over extended periods of time. If continued, initiatives such represent a practical method for obtaining the long-term data sets required.

D24

FACTORS AFFECTING THE OCCURRENCE AND DEMOGRAPHICS OF BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) IN THE HAURAKI GULF, NEW ZEALAND.

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Bottlenose dolphins (*Tursiops truncatus*) are present year round in the Hauraki Gulf, a large shallow embayment on the northeastern coastline of the North Island, New Zealand. This study presents the first data relating to the occurrence and distribution of bottlenose dolphins in this region and assesses the possible effects of abiotic parameters on the demographics of this population. Boat-based sightings data were available from September 2000 to December 2009. A total of 214 independent encounters were recorded, involving 1-125 animals. Dolphin presence was significantly affected by month and depth. Group size varied significantly by time of day, season, depth and the presence of calves, and was highly skewed towards smaller sized groups comprised of < 20 individuals. Over 60% of groups encountered contained calves. Calves were observed throughout the year, but were most prevalent in the austral autumn. Group size and depth varied significantly with group composition. Bottlenose dolphins were observed in association with three cetacean and six avian species, most frequently with shearwaters (Puffinus sp.) and Australasian gannets (*Morus serrator*).

D25

SPATIAL AND TEMPORAL DISTRIBUTION MODELLING OF SPERM WHALES AND KILLER WHALES IN BLEIK CANYON, NORTHERN NORWAY

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Understanding the distribution of the cetaceans is crucial for identifying their key habitats, which is necessary for developing effective conservation measures. This study examined habitat preferences for two cetacean species regulatly present in the Norwegian Sea: the sperm whale (*Physeter macrocephalus*) and killer whale (*Orcinus orca*). We particularly wanted to examine: firstly, if there is a temporal shift in whale distribution through the summer and secondly, why sperm whales occasionaly forage in waters <400m deep. We modelled habitat use and preferences using sightings data collected between 2005 and 2010 from two opportunistic platforms (between 90 and 500 observations per year) to investigate which environmental variables could explain most of the distribution variation. After dividing the area into a 1x1 km grid, we used a MATLAB program to correct for the sampling effort bias of the boats, and a Maximum Enthropy model to correlate the explanatory variables considered in the model (mean, range and standard deviation of depth and slope, distance from the nearest coastline, Sea Surface Temperature (SST) and Chlorophyll-a concentration) with the sightings data. The evaluation of the models was achieved by calculating the receiver operating characteristic (ROC) of the models and their respective area under the curve (AUC) and by testing on an independent dataset. The core habitat on the continental slope was well highlighted for sperm whales, and we detected a temporal shift in the distribution of both species in the canyon. A correlation between SST and foraging closer to the shore was found, and to further investigate how it relates to prey availability, currents system and upwelling we suggest analysing the whole set of 20 years sighting data.

D26

ON THE DURATION OF SKIN DEFECTS PRESENCE OF BELUGAS (*DELPHINAPTERUS LEUCAS*) USED TO PHOTO IDENTIFY

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Photoidentification as the study method for marine mammal populations was first used in the 70s. The animals were identified by comparing their fins and flips, skin patterns and scars. Belugas photo identification provides a lot of difficulties as they lack both the contrasting coloring and fins. Therefore the identification is based on the belugas skin defects of different origin. This method has proved valid for studies of beluga individuals in the course of four-year research (2007-2010) at the Solovetsky Island, White Sea. However, these defects tend to disappear when belugas has molt. When an animal recovers from illness, its typical skin defects may weaken as well. To facilitate the research and escape identification errors, we have compiled a list of skin injuries of different a etiology and the persistency of their presence for belugas.

To short-lived mechanical lesions we refer scratches that affect only epidermal skin layer. Most long-lived are the defects interfering deep dermal layers and the underlying tissue. Injuries of dorsal ridge persist forever.

Micro-organisms that are known to cause skin diseases in belugas are briefly reviewed.

The herpes virus existing in the form of pale-gray rounded single elements up to 30 cm in diameter can be preserved for a year or longer. Otherwise it shows short lived dark gray zones of focal dermatitis with an impressed black central area. The papiloma virus infection has the form of single whitish wart that can last for several years. Lobomycosis is long-term fungi lesions characterized by whitish verrucuous lesions.

Candidiasis is one-season-long skin lesions with numerous black dots surrounded with a yellowish scurf.

We don't mention all infections agents (viruses, bacteria, fungi) suspected to cause skin diseases in belugas.

Thus skin lesions not only can be used for photoidentification but also often reflect the health status of beluga populations.

D27

CETACEAN RESEARCH NETWORK IN THE SOUTH OF PORTUGAL: ESTABLISHING A LOW-COST AND LONG-TERM MONITORING PROGRAMME

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The only available information on cetaceans in the south of Portugal comes from stranding records, localised surveys restricted in space or occasional sightings. The high cost of boat rental and the current world's economic situation makes it very difficult to start research programs on cetaceans. The main goal of this project was to collect more consistent data on the occurrence and distribution of cetaceans in the entire south coast of Portugal, *i.e.*, from Tavira to Sagres, in order to fill the existent information gaps. For that, a whale watching network was built, using four companies and seven whale watching boats. Between June and October 2010 an effort of 2263 hours was done in these whale watching platforms. Six species of cetaceans were identified of which four were odontocetes and two mysticetes - minke whale (*Balaenoptera acutorostrata*) and fin whale (*Balaenoptera physalus*). In spite of the occurrence of two species of mysticetes, the odontocetes accounted for 99.3% of the sightings, and only four sightings of baleen whales were registered. In total, 580 sightings were recorded, the most observed species was the short-beaked common dolphin (*Delphinus delphis*) with 437 sightings (~75% of the sightings), followed by the bottlenose dolphin (*Tursiops truncatus*) with 83 sightings, the harbour porpoise (*Phocoena phocoena*) with 40 sightings and the Risso's dolphin (*Grampus griseus*) with 16 sightings. These results show how a low cost network can be set up to build long-term monitoring projects. They also suggest that the area has an important potential from a socioeconomic point of view. Finally, this knowledge is of utter importance in a moment where efforts are being made to establish marine protected areas to comply with the Marine Strategy Framework Directive.

D28

INDEMARES PROJECT: IDENTIFICATION OF SPECIAL AREAS OF CONSERVATION FOR CETACEANS AT "GALICIAN BANK" AND "AVILES CANYON" (ATLANTIC AND CANTABRIAN SEA) FOR NATURA 2000.

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LIFE+INDEMARES is a project of the EU for the identification of Special Areas of Conservation for Natura 2000. One of its aims is the study of the distribution and abundance of cetaceans on different areas, C.E.M.MA is studying 2 of them: Galician Bank, a submarine mountain at Atlantic waters and 120nm of the Northwest coast of Iberian Peninsula, and Aviles Canyon at Cantabrian waters and 7nm of the Iberian coast. During 2009 and 2010, vessel surveys were carried out at Atlantic waters on 18 days (1 survey each year) and at Cantabrian waters on 24 days (2 surveys each year). To do these surveys pre-determined line transects were followed according to a parallel (Atlantic ocean) and a zig-zag (Cantabrian sea) type design, in order to sample the entire area in a representative manner. A total of 1764.21 km were surveyed on Atlantic waters in 142.8 hours, in which 78 sightings occurred with 1.8 hours/sightings. The observed species were fin whale (*Balaenoptera physalus*), striped dolphin (*Stenella coeruleoalba*), common dolphin (*Delphinus delphis*), bottlenose dolphin (*Tursiops truncatus*), Risso's dolphin (*Grampus griseus*), killer whale (*Orcinus orca*), Cuvier's beaked whale (*Ziphius cavirostris*), Sowerby's beaked whale (*Mesoplodon bidens*), sperm whale (*Physeter macrocephalus*). The relative density (individuals/25km^2) for main species was: 0.59 for fin whale and 2.14 for striped dolphin. A total of 1070.2 km were surveyed on Cantabrian waters in 94.73 hours, in which 31 sightings occurred with 3.1 hours/sighting. The observed species were bottlenose dolphin, striped dolphin, long-finned pilot whale (*Globicephala melas*), fin whale, Cuvier's beaked whale, common dolphin, Risso's dolphin, minke whale (*Balaenoptera acutorostrata*) and Sowerby's beaked whale. The relative density (individuals/25km^2) for main species was: 10.13 for bottlenose dolphin and 1.44 for striped dolphin.

D30

GIS APPLICATIONS FOR CETACEANS AND MENAIDE FISHERY AREA IN THE GULF OF CATANIA (SICILY)

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In basin of the eastern Ionian Sea is the Gulf of Catania which covers 300 sq km. The gulf has a high level of productivity despite subjected to a strong anthropogenic impact. In areas with 10 to 100 m bathymetric, use of tool drift menaide prevails among local activities of small handicraft fisheries. During study an investigation on active marine fisheries in the gulf has been conducted, installing satellite devices on menaide vessels and getting information on pc of 273 fishing trips and 799 caught, through the SoftecoSismat software.From 1997 to 2010 were also made 446 surveys to define distribution area of a permanent population of bottlenose dolphins (*Tursiops truncatus*), covering over 9000 inm at sea. Data collected by Ketos researchers from boat include 94602 minutes of observation and 10519 minutes of sighting with 165 sighting events of *Tursiops truncatus*. Net menaide is a selective tool for fishing anchovies (*Engraulis Encrasicholus*) used throughout the year; equally bottlenose dolphin doesn't effect seasonal migrations and maintains an extensive presence in the gulf, although with greater concentration in the south area, Brucoli place. To locate and evaluate bottlenose dolphin habitat, GIS technology was applied storing data in ArcGIS database and comparing with fishing area. Results show full overlap of the areas and high rate of interaction of dolphins with fishing gear; they prefer to plunder anchovies from nets effecting an opportunistic predatory behaviour and causing huge damages both to the utensil and to the fished one, especially during summer months. Overlapping between action area of vessels and bottlenose dolphin hunting areal, combined with the high degree of intelligence of the species, supports the onset of feeding in net behavioural category, this requires action by local authorities in order to protect fishermen and ensure no persecution against particular conservation interest species like dolphins.

D31

MIGRATION PATTERNS OF FISH-EATING KILLER WHALES IN KAMCHATKA, NORTHWESTERN PACIFIC

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In killer whales families social learning promote the maintenance of cultural traditions such as: vocal repertoire, feeding specialization and space usage. In British Columbia waters fish-eating killer whale pods perform seasonal relocations following the schools of migrating salmon. The Russian Far East generally has a straighter shoreline lacking deep bays and small islands. Also different species of salmon have specific distinctions in dynamics and abundance between Northwest and Northeast Pacific. These differences may have an effect on killer whale distribution. The goal of this research is to study movement patterns of killer whale groups across inshore Kamchatka waters. Our study is based on photo identification data, collected in Avacha Gulf (1999-2010), Commander Islands (2008-2009) and Karaginsky Island (2009) as part of Far East Russia Orca Project.
Analysis of matches shows that all these regions reperesent a range of single population of fish-eating killer whales (about 800 km along the shore). Nine of 21 matches of killer whale groups refer to single season. The maximum speed is 550 km in 13 days.
We used SOCPROG 2.4 software to analyze mark recapture data of 46 killer whales groups. Lagged identification rate was measured for killer whale groups from Avacha Gulf and Commander Islands. We fitted five mathematical models to explain space dynamics of groups. The most appropriate model for our data is the model of reimmigration by Hal Whitehead (2001). According to the model, 12.5±1.5 groups spend 18.2±2.7 days in and 32.1±4.6 days out of our study area in Avacha Gulf. The similar (but less significant) results were found in Commander Island's waters. These results show high space mobility of killer whales from Kamchatka waters. It is possible, that necessity for "monitoring" of salmon schools and avoidance of food competition between pods lead to far distance migrations in

D32

DISTRIBUTION OF CETACEANS IN GULF OF GUINEA, WEST AFRICA AND ADJACENT AREAS: AN INVESTIGATION INTO ENVIRONMENTAL PARTITION AND NICHE SEPARATION RELATING TO ECO-GEOGRAPHICAL CO-VARIANTS

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The West African cetacean community remains poorly understood with little dedicated research within the region. Past publications highlight a diversity of species however their full distribution remains largely unknown. The research presented aims to further evaluate this knowledge gap, utilising sightings data collected on board of geophysical vessels during the seismic surveys in West Africa, Liberia to Angola (2004-2010). Approximately 2053 hrs survey effort was collected, totalling 220 sightings and 19 species (14 odontocetes and 5 rorquals). Further analysis was undertaken on sightings data relating to underlying environmental features, including bathymetry (depth, slope) and sea surface temperature (SST), enabling determination of specific cetacean niche variation present. Bathymetric data was sourced from GEBCO 2008 (30arc'') whilst average SST for the period 2000-2010 (LME Project, Virginia University) was modelled for the Gulf of Guinea region. Species were taxonomically grouped into small & large odontocetes and rorqual species. Statistical analysis showed that niche distribution differed significantly regarding depth ($p=0.003$), slope ($p=0.002$) but not SST ($p=0.103$). Regarding slope significant difference was found between rorqual species and small ($p=0.0089$) and large odontocetes ($p=0.0056$) but there was no difference between odontocete groups ($p=0.2752$). However consistent differences were shown for depth among all groups tested. Finally additional functional grouping of foraging habits (epipelagic, mesopelagic and generalist) showed that distribution varied in relation to SST and bathymetry. This further elucidates that temperature gradients observed throughout this dynamic region may be a significant factor influencing prey distribution and therefore cetacean foraging activity and diversity.

D33

DISTRIBUTION OF MARINE MAMMALS IN SOUTH ATLANTIC BY VESSEL SURVEY

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There are only few data about marine mammal's distribution and abundance during the time after stop of whaling in Antarctic. Institute of Oceanology RAS has a unique possibility of carrying out the annual monitoring of marine mammals using the vessels working in Antarctic. Our previous studies (2005-2009) have allowed to reveal patterns of present distribution and species composition of marine mammals off Antarctic Peninsula, in Drake Passage, and Scotia Sea. Humpback and Minke whales were most often observed in these waters (60,4% and 9,5%). Killer, Fin, and Sei whales were observed in smaller quantity (4,6%, 4,3%, and 3,2%). Investigations were carried out Oct.4-Nov.15, 2010, during 31st voyage of RV "Akademik Sergey Vavilov" from Cape Good Hope to Tierra del Fuego. Observations covered daylight hours (640 h, 5200 nm). Eleven species of cetaceans, and fore species of fur seals were observed. The analysis of the data has allowed to divide the region of investigation into five parts which differ on an environment and species composition of marine mammals. (1) Minke whales and South African fur seals were registered in shallow waters off Cape Good Hope. (2) Subantarctic fur seals and Dusky dolphins were recorded in Subantarctic region between 35º and 50º S. (3) Fin whales and Sei whales predominated (73,5% and 15,2%) in region of Antarctic Convergence within a zone of 53º to 56º S and 0º to 40º W. Besides, Orcas herds and solitary Blue and Bottlenose whales were observed here. There were Killer whales within the group of Sei whales. (4) Only two species of whales (Fin and Humpback) were met in Scotia Sea. Whales migrated to south or fed. Both Fin and Sei whales were observed in small groups (2-3 animals) within rare herds. (5) There were not whales in Drake Passage in this voyage.

D34

RECOVERY OF THE KILLER WHALE (*ORCINUS ORCA*) PHOTO IDENTIFICATION CATALOGUE IN BLEIK CANYON AREA, OFF NORWAY

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Resident killer whales (*Orcinus orca*) in Norway were known to feed on the spring-spawning herring, an unstable and unpredictable food resource. Some dramatic herring stock and migration changes have occurred in Norwegian waters, and thus, might have affected the distribution of the population feeding on them. In addition, transient and off-shore orcas might share some feeding areas where opportunistic feeding behaviour takes place. The area around Bleik Canyon, seems to be an important area for the species during the summer, as more than 20 sightings per year have been reported. The aim of this study is to re-start a photo-ID catalogue, try to approach the habitat use and identify if different morphological ecotypes occur in the area. During 2009 and 2010, 22 and 23 sightings were respectively reported, having a 36,3% and a 8,6% of sightings inside de canyon, showing no stability in the habitat use of the species. The temporal pattern of sightings was also variable, changing from a peak of abundance in August-September in 2009, to a peak in June-July in 2010. A total amount of 74 individuals were identified, being probably females a 54,4% and probably males 37,84%. Identification succes was low, with a mean of 14,87%. Identification characters were divided into: dorsal fin, saddle patch, post ocular patch and body scars, being the combination of dorsal fin and saddle patch the most successful to identity individuals (21,62%). After checking the morphology of identified individuals, we conclude that two different ecotypes might be sharing the area, transient and resident killer whales, showing no inter-annual variability in their presence in the area. Still these results are preliminary, and we hope that the addition of new individuals to the catalogue through further years of study will shed some more light on the Norwegian killer whale population.

D35

PYGMY AND DWARF SPERM WHALES IN THE CANARY ISLANDS

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Pygmy Sperm Whale (*Kogia breviceps*) and Dwarf Sperm Whale (*Kogia sima*) are teuthofagous species very similar in appearance and both occur in tropical and temperate worldwide. Both species have been recorded in the Canary Archipelago. First record of K. breviceps was in 1973, a specimen beached in an indeterminate site of North of Gran Canaria. Of 916 stranded cetaceans between 1980-2010 in the Canary Islands, we have recorded 64 (7%) specimens of Kogia spp.: 53 (82.8%) were Pygmy Sperm Whales, 9 (14.1%) were Dwarf Sperm Whale and 2 (3.1%) were indeterminate. Three K. breviceps and one K. sima were pregnant. Two of the K. breviceps (with calves) were pregnant while still lactating. Although it is difficult to distinguish both species in the field, dorsal fin is a characteristic feature. Both species have been sighted at sea off the oriental coast of Lanzarote and Fuerteventura. From October 2007 to October 2010 we conducted 137 days of visual-acoustic survey and zig-zag random transects from the coastline to 37 km offshore. The study area of 9848.43 Km^2 was surveyed with a 17 m motor yacht, covering 7572.06 km and 624.62 h “on effort”. We had 627 sightings of 20 cetacean species, of which 15 (2.4%) were Pygmy Sperm Whale, 3 (0.5%) were Dwarf Sperm Whale and 1 (0.16%) was an unidentified Kogia. Pygmy and Dwarf Sperm whales were observed lie motionless at the surface alone or in small groups of a maximum of three animals, in 3 occasions they were close to Gervais’s beaked whale (*Mesoplodon europaeus*) groups.

D36

COMPARISON BETWEEN VISUAL-BASED AND ACOUSTIC-BASED DISTRIBUTION MODELS TO PREDICT CETACEANS PRESENCE IN THE NORTHWESTERN TYRRHENIAN SEA

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Within the large scale monitoring project “MED 09”, visual and acoustic surveys were conducted to assess cetacean species distribution in three deep canyons areas of the Western Mediterranean Sea. In this study, the data collected in the Tyrrhenian Sea area are analyzed. The investigated area was surveyed from August 29 to September 4, 2009 for a total of 1811 kilometers. Favorable visual sighting conditions existed for 712 kilometers (4 observers on effort and Beaufort wind scale <4) of the trackline. A total of 114 cetacean observations were made: 18 sperm whales (*Physeter macrocephalus*), 6 Cuvier’s beaked whale (*Ziphius cavirostris*), 57 Delphinidae, 22 fin whales (*Balaenoptera physalus*) and 11 undetermined cetaceans. Concurrently, passive acoustic data were collected 24 hours a day by using a broadband array of hydrophones. Acoustic detections were recorded and geo-referenced for Cuvier’s beaked whales, sperm whales and dolphins. The aim of this study was to compare the results obtained from modeling acoustic-based and visual-based presence/absence data. A Stepwise logistic regression approach was used for both the visual observations and the acoustic detections. The cell statistics of depth and slope were used as covariates. Significant correlations were outlined ($P < 0.05$) for all the species either using visual or acoustic data. All the models showed good fit, however visual-based models had higher accuracies (60% to 89% vs 51% to 63% of correct overall classifications). This model exercise demonstrates that acoustic data can be used for modeling cetacean presence/absence although further work should be done to understand how to improve the accuracy of the acoustic-based models. In addiction, these results provide a new piece of essential information for the management of cetaceans in the Tyrrhenian Sea, showing a new potential critical area.

D37

FIRST ASSESSMENT OF SPERM WHALES (*PHYSETER MACROCEPHALUS*) IN THE EEZ WATERS OF NEW CALEDONIAN (SOUTH WEST PACIFIC)

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Historical catches of sperm whales occurred in the western part of the New Caledonian EEZ and until the 80's in the South Pacific. In order to establish their distribution in the New Caledonian archipelago a dataset of 96 sighting positions collected over 30 years from scientific tuna-aerial survey and marine mammals sea survey and completed by opportunistic sightings was used. The lasts were only used when they were supported by a photograph or when the observer was considered reliable (scientist or sea professional).

Our data show that sperm whale inhabit the waters of New Caledonia all year round. More observations were collected between August and November (61%). Half of these came from aerial surveys which were more frequent at the end of the year. However, the same pattern was found (63.5%) when this kind of data was excluded. Sperm whales can be found all around New Caledonia but more observations were collected on the West coast of the main island (70%) than on the East coast.

Data were divided in two seasons in order to analyse the distribution in relation with the environmental parameters. The explanatory physical variables considered were depth, sea surface temperature (SST), depth of isotherm 15ºC, slope, and oceanic currents. Principal component analysis was used to characterize the habitat of the sperm whales according to season. Results showed that bathymetric feature, SST, currents and to a lesser extent strong slope proved to be relevant indicators of the sperm whale presence in both seasons. These results are consistent with other studies on the species.

This study provides the first assessment of sperm whales in the EEZ waters of New Caledonia but current abundance remains unknown.

D38

FACTORS AFFECTING THE OCCURRENCE AND DEMOGRAPHICS OF KILLER WHALES (*ORCINUS ORCA*) IN THE HAURAKI GULF, NEW ZEALAND

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The killer whale (*Orcinus orca*) (hereafter referred to as orca) has been frequently observed in the Hauraki Gulf, a large shallow body of water on the north eastern coastline of North Island, New Zealand. Herein, we present the first fine scale data relating to the occurrence and distribution of orca in this region and assess the possible effects of abiotic parameters on the demographics of this population. The presence of associated marine species is quantified and differences in the occurrence and demographics of single and multi-species groups are examined. Sightings data were collected between September 2000 and April 2010 during opportunistic vessel-based surveys. A total of 139 independent orca encounters were recorded, involving 1 to 18+ animals. Effort was greatest during January and austral summer and lowest in September and austral spring/winter. Orca presence was significantly affected by sea surface temperature (SST), diel and season. Group size was highly skewed towards smaller groups comprising two animals. Small groups were most frequent during the austral autumn while medium and large groups occurred more often in summer/spring. Over 65% of groups encountered contained immature animals. These were observed throughout the year, but were most prevalent in autumn and summer. Water depth significantly affected group composition. Orca was observed in association with two cetacean and four avian species, most frequently with the common dolphin (*Delphinus* sp.) and the Australasian gannet (*Morus serrator*). The survey encounter rate (SER) varied by month and season, with SER being highest in September and spring and lowest in January and summer.

D39

SPERM WHALES (*PHYSETER MACROCEPHALUS*) IN BLEIK CANYON, NORWAY: POPULATION ESTIMATION AND INDIVIDUAL TRACKING THROUGH PHOTO-ID COLLECTIONS

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The focus of this study is the population of adult sperm whale males in Bleik Canyon (69ºN, 15ºE) off the coast of northern Norway. Previous studies have shown this population to be an open population with few individuals present for many years and a large group of exchanging males, mainly younger individuals. Photo-ID pictures and observation data for sperm whales have been collected from this area since 1987, using a commercial whale safari company as platform. This provides the current research with over 20 years of continuous data, one of the largest sperm whale data set in the world. My study aims to update the current abundance estimate, investigate those that are long-time present in the area and highlight some of the concern of using both photo-ID and commercial whales safaris as platforms for scientific studies. In total we have identified 175 individuals from observations in the period 2003-2009. Of these, 88 were only seen during one season, 18 were seen twice and 9 were seen three times or more. Only one individual was seen every year in the period 2003-2009 and another one was seen in all years except 2005. This indicates that the sperm whale population in Bleik Canyon is an open population, where most individuals are only seen in the area one season and only occasionally seen in consecutive years. The results from the population estimation will be presented at the conference.

D40

RISSO'S DOLPHIN (*GRAMPUS GRISEUS*) POPULATION CHARACTERISTICS OF CANARY ISLANDS WITH AN OBSERVATION ON OCTOPUS PREDATION.

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A photo-ID study on Risso's dolphin was carried out between January 2009 and October 2010 in three areas of Canary Islands: North of Gran Canaria, South of Gran Canaria and Easter coast of Lanzarote and Fuerteventura. Three hundred and nine days boat-based effort were realized, with 82 sightings of the species, with an average group size of 9,83 animals. 32 groups (39,02%) had calves. 27.420 photos were analyzed, 138 individuals were identified in Gran Canaria and 78 in Lanzarote and Fuerteventura islands and the recapture was respectively 64,49% and 29,49% for each area, with 21 recaptures from a previous study in the period of 2000-2005. The species was founded in significant shallower waters off the South of Gran Canaria than off the North. The species was observed in 3 occasions predating on octopus (Octopus vulgaris) in the South of Gran Canaria. These observations are supported by the presence of this cephalopod in the stomach content of two stranded animals in the area, and the hypothesis that Risso's dolphins can use the South of Gran Canaria - with a shelf until 50m - as a feeding ground. The results of this study showed: 1) The presence of a resident population of Risso's dolphins all the year round and throughout several years in the area, 2) The importance of the areas for the feeding and the reproduction of the species, and 3) The existence of movements between islands.

D41

CETACEAN DISTRIBUTION ALONG THE PORTUGUESE NORTHERN COAST INFERRED FROM COASTAL SURVEYS

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Data regarding on distribution of cetaceans along the Portuguese coast mostly relies on stranding data and until 2008, there were no systematic cetacean surveys in the Portuguese Continental waters. In 2008, the SafeSea project was initiated and one of the main goals was to provide the first set of baseline data on cetacean species existing in the continental Portuguese coast, monitoring their distribution, abundance and habitat use.

Systematic monthly sighting coast surveys for cetaceans were conducted in 15 sites evenly distributed along the northern Portuguese coast. Between September 2008 and October 2010, a total of 305 hours of effort was conducted. Within this period, 110 cetaceans sightings were recorded comprising a total of 701 individuals. Regarding the number of sightings, harbour porpoise was the most sighted species (n=57), followed by common dolphin (n=34), unidentified cetaceans (N=13) and bottlenose dolphin (n=6). In what concerns total number of individuals sighted, common dolphin comprised 437 animals, followed by bottlenose dolphin (n=91) and harbour porpoise (n=81). The sightings do not present a seasonal pattern and its distribution is quite homogenous. Regarding the cetacean distribution, the study area was divided in 4 regions defined accordingly to their coastal topography, physiography and oceanographic characteristics. The results obtained showed higher concentration of observations in the central part of the study area (strata 2 and 3), followed by the southern strata. The northern part of the study area, close to Galicia is the region with fewer observations.

The data obtained demonstrates that observation from vantage points in the Portuguese coast is an effective and useful monitoring tool that can be used in long term monitoring programs.

D42

AZORESPHOTOID: FIRST RESULTS FROM AN OPEN-ACCESS PHOTOIDENTIFICATION CATALOG

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The Archipelago of the Azores is a group of oceanic islands located in the middle of the Atlantic Ocean, due its own characteristics can be considered as a cetacean biodiversity "hot spot", with 27 species of cetaceans identified. The AzoresPhotoID catalog uses photos contributed by the local whale and dolphin watching operators, from tourists and from local researchers. An off-line database was constructed using commercial image processing software. However the catalog has an online version, based on blogging and image sharing platforms (http://azoresphotoid.blogspot.com/for communication and http://www.flickr.com/azoresphotoid/ for the catalog itself). Images and the associated data are available on a Attribution-NonCommercial-ShareAlike Creative Commons license. From 2003 to 2010 nearly 700 individuals have been catalogued, from seven different species: *Megaptera novaeangliae*, *Tursiops truncatus*, *Globicephala macrorhynchus*, *Grampus griseus*, *Balaenoptera borealis*, *Balaenoptera physalus* and *Physeter macrocephalus*. From these, more than twenty individuals have been resighted at least once. The analysis of the catalogue showns that Bottlenose Dolphins, Sperm Whales and Risso's Dolphins seem to have a pattern of interannual sightings, what suggests the preference of the Azorean waters for some individuals. This study shows that opportunistic images can be a valuable fotoidentification resource.

D43

GRAY WHALE (*ESCHRICHTIUS ROBUSTUS*) IN THE MEDITERRANEAN SEA. ANOMALOUS EVENT OR EARLY SIGN OF CLIMATE-DRIVEN DISTRIBUTION CHANGE?

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On May 8th 2010, a gray whale was sighted off the Israeli Mediterranean shore and twenty two days later, the same individual was sighted in Spanish Mediterranean waters. Since gray whales were last recorded in the North Atlantic in the 1700s, these sightings prompted much speculation about this whale's population origin. Here, we consider three hypotheses for the origin of this individual: 1. It represents a vagrant individual from the larger extant population of gray whales which are found in the eastern North Pacific; 2. It represents a vagrant individual from the smaller extant population found in the western North Pacific; 3. It represents an individual from the previously thought extinct North Atlantic population. We believe that the first is the most likely, based on current population sizes, on known summer distributions, on the extent of cetacean monitoring in the North Atlantic and on the results of a performed route analysis. While it is difficult to draw conclusions from such singular events, the occurrence of this individual in the Mediterranean coincides with a shrinking of Arctic Sea ice due to climate change and suggests that climate change may allow gray whales to re-colonise the North Atlantic as ice and temperature barriers to mixing between northern North Atlantic and North Pacific biomes are reduced. Such mixing, if it were to become widespread, would have implications for many aspects of the marine conservation and ecology of these two regions. Finally, the arrival of this individual to the Mediterranean also suggests that gray whales may be capable of much longer movements than are exercised during their routine migrations, performing by far the most extreme vagrancy known to have been exercised by a mammal.

D44

DISTRIBUTION AND MOVEMENTS OF HUMPBACK WHALES (*MEGAPTERA NOVAEANGLIAE*) IN THE WATERS OF BERING ISLAND.

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The North-Pacific population of humpback whales (*Megaptera novaeangliae*) was heavily harvested. Today, it is gradually recovering. Waters of Commander Islands provide good conditions for humpbacks' feeding. The number of feeding whales here grows rapidly each year, and today, it contains more than 600 individuals. During 2009 and 2010 years we collected data on local movements and distribution of humpback whales using both land observations and photoidentification. Land observations included 15 minute scans using binocular with range finding reticle. We plotted points of whales' registration (n=608 in 2009; n= 2409 in 2010) on the map and then estimated their displacement. Also we used fluke photos to describe movements of individuals. We have identified 64 individuals in 2009 and more than 600 individuals in 2010. Positions of individually identified whales were recorded using GPS. Then we also plotted points on map. Both analyses revealed that humpback whales change their location slightly during summer season. The patterns of displacement were similar in 2009 and 2010. In August 2009 whales displaced in the northwestern direction and in September returned back. In 2010 (June - September) we observed fluctuations in the same direction with period 24±2 days. The results showed that aggregation of humpback whales in this region is rather constant and move mostly along the shelf slope. This fact can be related to distribution of zooplankton, such as Calanus and Thysanoessa spp. that prefer low temperatures. The rapid increase of humpback whale abundance in the waters of Commander Islands may be a result of redistribution of whales between the summer feeding grounds.

D45

USE OF MORPHOLOGICAL PECULIARITIES OF TAIL CREST\'S EXUBERANCES AS ADDITIONAL PATTERNS IN PHOTO-IDENTIFICATION OF GRAY WHALES.

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Particular attention to the problem of conservation of the western gray whale are related both to the scarcity of the population - about 130 individuals, and increased human impact, associated with the oil and gas development in the immediate vicinity of the Piltun lagoon- the main area of summer feeding area for the gray whale. A collaborative Russia-U.S. research program on western gray whales (*Eschrichtius robustus*) summering off northeastern Sakhalin Island, Russia, has been ongoing since 1995 and has produced important information on the present day conservation status of this critically endangered population.
The basic technique of work was photo-identification of gray whale by the form and distribution of pigmentary spots, scratches and scars in certain cases by mark from skin parasites which can remain on an animal's body for the long time. Sometimes this technique is not effective especially when the whale's photo is out of focus or the whale doesn't expose a back highly over the water surface going away from boat, as a result to identify an animal on marks on one side, it is not possible. For more effective work with whales photographs, we made an attempt to use three additional patterns: 1) height of tail crest's exuberances 2) the distance between first two exuberances of a tail crest 3) form of a hump. During field works in 2010 method has been successfully used for identification of gray whales in summer feeding area (northeast coast of Sakhalin island). As result we identify 42 whales from them 3 new calf.
Use of additional patterns in photo-identification of gray whales allows identifying animals on the bad quality photographs. Specific filters in the Access database helping to reduce number of selected individual whales for photo ID analyses that facilitates photo-identification work.

D46

ABUNDANCE AND DISTRIBUTION OF RISSO'S DOLPHIN IN THE SOUTHWEST IBERIAN PENINSULA

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Risso's dolphins generally inhabit deep oceanic and continental slope waters worldwide. They are considered as least concern by the IUCN, and little information exists about their abundance in Spanish waters. The aim of this study was to estimate Risso's dolphin abundance in the south-western Iberian Peninsula using photo-identification and determine their distribution from the Strait of Gibraltar to Cape St Vincent. From 2001 to 2010, more than 33,000 km of effort and a total of 19 sightings with 2349 dorsal fin photo-identification pictures allowed the identification of 59 individuals. Their distribution was restricted to two isolated areas, the southern coast of Portugal and the south-eastern part of the Gulf of Cadiz, being absent in-between. No individuals have been resighted between those two areas. Although they are fairly rare in the area, they are targeted by coastal whale watching activities in South of Portugal. In the Gulf of Cadiz, they have been observed in two occasions feeding in shallow waters (around 20 m) called Banco del Hoyo, a fishery hotspot located 15 nm offshore near the Strait of Gibraltar. Further studies should focus in this area in order to better understand whether interactions occur between Risso's dolphins and fisheries and if they could have a negative impact on those individuals.
Risso's dolphins are usually absent from the Strait of Gibraltar but a group of six individuals was observed in summer 2010 and was chased away by both long-finned pilot whales and bottlenose dolphins. This behaviour is common in the Strait of Gibraltar for these two highly territorial species which have been previously observed chasing killer whales, striped and common dolphins out of their home range.

D47

CORRELATION OF HARBOUR PORPOISE ABUNDANCE TO PREY DIVERSITY ON A SMALL SPATIAL SCALE

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Harbour porpoise density in the Sound, a narrow strait connecting the Baltic Sea and Kattegat, has been found to vary across the year with low densities in the winter and high densities in the summer. Due to high energy requirements, porpoise distribution is believed to be correlated with distribution of their main prey. By examining the stomach content of 53 primarily by-caught porpoises in the Sound (1985-2010), we aimed to test whether the difference in seasonal porpoise distribution are reflected in the choice of consumed prey. We found a marked difference between the two seasons: the high density season (April-October) had higher diversity of fish, higher availability of a primary prey species, cod, and mass of the individual prey were generally larger than the low season (November-March). We advocate that the development of frontal zones in the northern part of the Sound in the spring is an important driver for porpoise abundance since it may aid the porpoises in locating their prey. These findings suggest that distribution of harbour porpoises is more complicated than previously considered, and not simply determined by the abundance of main prey species.

D48

PHOTO-IDENTIFICATION OF WHITE WHALES (*DELPHINAPTERUS LEUCAS*) IN WESTERN KAMCHATKA: PRELIMINARY RESULTS

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Here we present preliminary results of photo-identification of white whales summering in the estuary of Khairuzova and Belogolovaya rivers (Kamchatka, Russia). This work is a part of diversified project on white whales biology in Russian Far East: White Whale Programm (A.N. Severtsov Institute of Ecology and Evolution, RAS).
Photo ID on white whales is not a widespread approach to their biology although it was successfully used for Alaska's Cook Inlet (Alaska, USA) and White Sea belugas (Russia). Our field season was conducted in the period of 30 July - 31 August 2010. In total we made more than 13.5 thousands of pictures during 90.6 hours of work. Images were underexposed (setting at -2 or lower exposure depending of light conditions) to show otherwise faint marks in images of white animals). All pictures were sorted by quality and analyzed for identification of individual animals. Our experience showed that forced correction of exposure increased number of suitable for analyzing images considerably. At the same time this approach complicates image-based differentiation of gray animals: light gray, gray and dark gray age classes couldn't be identified reliably. For accurate age class identification it is necessary to make a description of animals during photographing.
We identified 22.5% (173) of total encountered animals (832), and 14 (1.7%) animals were encountered repeatedly. There were found considerable amount of white animals, unavailable for individual identification because of absence of any visible marks. We didn't observe animals, obtained scratches or bites during our work; therefore we don't have information about its appearance changes throughout days and months. By analysis of identified animals' spatial distribution we made the assumption that belugas had individual preferences in places for foraging and resting.
We are planning to continue our work with collecting more data about little-studied population of belugas in western Kamchatka coastal waters.

D49

INTER-ISLAND MOVEMENTS OF BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) IN THE CANARY ISLANDS: IMPLICATIONS FOR CONSERVATION AND SAC DESIGN

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Eleven Special Areas of Conservation (SAC, EU Habitat Directive) are designated in the Canary Islands to protect bottlenose dolphins. However, there is little knowledge about the movement patterns of the dolphins in the Archipelago and their spatial fidelity to each SAC, even though this information is necessary to allow appropriate management of the species. Inter-island movements of the dolphins will influence the opportunity for genetic interchange in the population of the archipelago. Moreover, abundance estimates performed separately in different islands may overestimate the population size in the whole archipelago if the same dolphins move among islands and the identification catalogues are not pooled. Here we present results from photo-ID studies performed off the three more occidental of the Canary Islands: El Hierro, La Palma and La Gomera, from 2008 to 2010, showing that bottlenose dolphins move among these islands. Out of 100, 53 and 4 individuals identified off El Hierro, La Palma and La Gomera, respectively, 11 dolphins were encountered on two of the islands and 2 in the three islands.
These results are consistent with the population structure recorded for bottlenose dolphins in other archipelagos, where dolphins have been found to have an archipelagic distribution with different areas of concentration. In contrast, dolphins in other insular areas, such as Hawaii, show strong site-fidelity to different islands. Our results show that the distribution of bottlenose dolphins in the western Canary Islands exceeds the limits of the SACs designated for their conservation in the three islands studied. Anthropogenic impacts recorded in these islands, such as interactions with fisheries, may have a larger demographic impact on the overall population than previously expected if the same dolphins are being affected in several areas throughout their Canary Islands range.

D50

SPATIO-TEMPORAL ANALYSIS OF COASTAL BOTTLENOSE DOLPHIN (*TURSIOPS TRUNCATUS*) DISTRIBUTION IN MONTEREY BAY, CALIFORNIA.

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Thanks to its geophysical characteristics and its richness in nutrients, Monterey Bay hosts a rich diversity of marine fauna, including many species of cetaceans, and a resident population of bottlenose dolphins. The California non-profit Okeanis has been studying the structure and distribution of this population since 2006. During each of four research seasons, June - October 2006 - 2009, an average of 37 boat - based surveys were conducted. The study area was limited to an inshore band, 1 km wide from the coastline, defined North by Santa Cruz and South by Monterey. In the study period, we covered 3786 km, and spent 420 h searching for cetaceans. We recorded 312 encounters with coastal bottlenose dolphins, an average of 32.5 surveys with dolphins every year. We spent 214 h (50.9 % of total effort) with bottlenose dolphins. During the surveys, we recorded boat position and environmental conditions. For every encounter, we used photo-identification to determine group composition and social structure.
On a Google Earth map, we created a linear grid of 1 km^2 squares covering the entire study area. Spatial data were imported into ArcGIS 9.1 and the distribution of dolphins was analysed and compared to environmental data. The hourly occurrence of dolphins was studied too.
Results show a higher encounter rate between 8 and 10 am, and a higher density of dolphins in two main areas, were ship wrecks occurred. No influence of factors such as water temperature and chlorophyll a concentration was evident, possibly indicating a greater influence of small scale factors in the coastal distribution of dolphins. The influence of rip currents is still to be investigated, as well as the social structure of the population.

D51

RECENT DISTRIBUTION AND ABUNDANCE OF WESTERN GRAY WHALES IN THE NORTHEAST SAKHALIN REGION, RUSSIA

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Systematic shore- and vessel-based distribution surveys conducted offshore northeast Sakhalin in the summer-to-fall seasons of 2004 to 2009 indicate the presence of two primary western gray whale (WGW) feeding areas in this region. The first is the near-shore Piltun Feeding Area (PFA) located at a distance <5 km from shore in water depths <20 m. The second is the deeper Offshore Feeding Area (OFA) located southeastward of the PFA at a distance of 35-50 km from shore in depths between 35 and 60 m. Both the survey and photo-ID data indicate that the total number of WGWs observed in northeast Sakhalin waters remains at a relatively stable level during the study period (about 120-130 individuals). The surveys have revealed inter-annual variations in the whale distribution and abundance within the feeding areas. The maximum number of WGWs observed varied between 47 and 122 in the PFA and between 9 and 83 in the OFA. Increases in WGW numbers in the PFA seem to coincide with decreases in their numbers in the OFA and vice versa. Redistribution of WGWs between the OFA and the PFA seems to coincide temporally with variations in the biomass and distribution of benthic food sources associated with natural changes in oceanographic conditions. Whales continue to feed in both feeding areas while off-shore oil development and construction activities are proceeding on northeast Sakhalin.

D52

SEASONAL DISTRIBUTION OF HARBOUR PORPOISE, COMMON DOLPHIN AND MINKE WHALE IN THE IRISH SEA, AS DETERMINED FROM LONG-TERM MONITORING USING COMMERCIAL FERRIES.

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From July 2001 to July 2010 in excess of 775 hours of survey effort was conducted on board commercial passenger ferries as part of the Irish Whale and Dolphin Group (IWDG) Ferry Surveys Programme on three routes across the Irish Sea. Teams of 2-3 observers conducted survey effort from the ships bridge and recorded all marine mammal sightings, as well as environmental and effort data. Additional data recorded from the Irish Sea during other IWDG ship-based research projects were included in this analysis to help fill data gaps between the fixed ferry survey transects. Sightings and survey effort were assigned to quarter ICES Grid squares, and effective survey effort and relative abundances for each species was calculated per grid square. The data were mapped and analysed by season to assess temporal trends in species distribution and relative abundance. Results showed a strong seasonal aspect to the distribution and relative abundance of Minke whales and common dolphins in the Irish Sea. Minke whales were present in the Irish Sea and St. George's Channel predominantly in late spring and into the summer, with the highest relative abundances recorded in the western part of the Irish Sea during spring. Common dolphins were present at low relative abundances from late spring to late summer. Common dolphin distribution appeared to shift southward, out of the Irish Sea, in autumn and winter. Common dolphins were most frequently encountered over the Celtic Deep which lies midway between the Irish and south Welsh coasts. Evidence of seasonal trends in harbour porpoise distribution and relative abundance was less marked and may have been confounded by other factors.

E01

EXAMINING THE IMPORTANCE OF NORTH-WESTERN SARDINIAN COASTAL WATERS (ITALY) FOR COMMON BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*): TEMPORAL DISTRIBUTION, ABUNDANCE AND GROUP DYNAMICS

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In this study, we present the results of a year-round, 2-yr photo-identification study, to examine the importance of North-western Sardinian coastal waters (Italy) for Mediterranean common bottlenose dolphins. We did this by assessing the temporal distribution of dolphins, assessing the group dynamics, and finally by calculating the abundance of animals utilizing this area by applying mark-recapture abundance estimate techniques. Prior to the present study, no research has previously focused on this species within these waters, despite the potential for human impacts. These data resulted in an abundance estimate of approximately 43 individuals. Common bottlenose dolphins were observed in all seasons and moments surveyed, although seasonality was evident, with more encounters during the Fall and Winter and larger groups sighted during Spring. The movement of prey species and interaction with marine fin fish aquaculture could be potential explanations for the seasonal variation in the presence of bottlenose dolphins. Thus bottlenose dolphins off north-western Sardinia appear to form part of a larger, open, coastal population. While their occurrence within these waters is frequent, the north-western Sardinian waters appear to be only a section of a much larger home range for this bottlenose dolphin population.

E02

HUNTING GROUNDS OF BELUGA WHALE (*DELPHINAPTERUS LEUCAS*) (ZHIZHGIN ISLAND, WHITE SEA)

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Earlier studies revealed that the coastal water of the Zhizhgin Island (White Sea) is the area of constant presence of beluga whale in the summer. It is known that belugas are in the three local sites of the water area. These are many shoals on these sites. The main objectives of the present study were to estimate the number and dynamics of number of belugas in the Zhizhgin water area; to identify the main types of behavior. Our data were collected in 25 June - 15 July 2010. The observation post was 45 m above the sea level on the tower of the lighthouse. The main method was standard visual observation. The greatest number of adults observed at the same time was 19. There were often calves in the groups. The types of behavior common to “breeding aggregations” (social, rest, mating, etc.) have been observed sporadically (6%). The main types of behavior were migrations (48%) and hunting (46%). During the observation period the water temperatures and a number of belugas was increased. The overall correlation between a number of belugas and water temperatures is rather high ($r=0,53$; $p<0,05$). Probably, it is connected with an increasing a number of fish stock near the Zhizhgin area during a temperatures increasing. It was no observed a relationship between a number of belugas in the area and tidal level. This relationship is specific for “breeding aggregations” areas. Thus, we suppose that Zhizhgin water area is belugas regular hunting area. The main directions of arrival and leaving were west, south-west and east. Therefore the main “breeding aggregations” of White Sea (near Solovetsky Archipelago) is located 23 km south-west of the Zhizhgin Island we can assume that the Zhizhgin water area used by belugas of the Solovetsky aggregations as a permanent hunting area.

E03

LONG-TERM STUDY OF THE DISTRIBUTION OF CETACEAN SPECIES IN THE PELAGOS SANCTUARY (NORTHWESTERN MEDITERRANEAN SEA).

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This work present a 18-year series of distribution data for seven species of cetaceans in the Pelagos Sanctuary (Northwestern Mediterranean Sea). Sighting data were collected during summer shipboard surveys (June to September) conducted between 1990 and 2007 in an area of approximately 25.000 km^2. A total of 2940 sightings were collected: 1996 (67.9%) striped dolphins, 626 (21.3%) fin whales, 120 (4.1%) Risso's dolphins, 114 (3.9%) sperm whales, 27 (0.9%) common bottlenose dolphins, 25 (0.9%) long-finned pilot whales, 23 (0.8%) Cuvier's beaked whales. The temporal and spatial variability of the species' distribution was investigated by using a grid of 6.8 x 9.3 km cell unit.
General Linear Models and Logistic Regression models were used to analyze the species' encounter rate variability and their spatial distribution, respectively. GLM analysis revealed the existence of significant temporal trends ($P<0.05$) for fin whales and striped dolphins in the area (*i.e.* decreasing and increasing, respectively) and the absence of such trends for the other species. Moreover, a stepwise logistic regression analysis was used to study the presence/absence of the seven species. Cell statistics of depth and slope (*i.e.* mean, SD, CV, min, max) were used as explanatory variables. Significant correlations were outlined ($P < 0.05$) for all species, revealing marked preferences for specific physiographic features. All the models showed good fit and good performances in their habitat predictions, ranging from 53% to a maximum of 80% of correct presence/absence classifications. Finally, the temporal stability of these preferences was evaluated revealing the significant effect of the environmental variability for the majority of the studied species ($P< 0.05$).These results provide essential information to assess critical habitats within the Pelagos Sanctuary and to suggest appropriate conservation and management actions for the cetacean species regularly using the area.

E04

THE INFLUENCE OF ECOLOGY ON SOCIALITY IN THE KILLER WHALE.

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The persistence and size of social groups can be governed by both ecological and phylogenetic constraints. Comparing sociality of phylogenetically divergent individuals under the same ecological conditions can identify the relative influence of these ecological constraints on group formation. Studies on killer whale social structure have found a matrilineal hierarchically tiered social structure in populations studied to date. However, ecologically divergent types of killer whales in the Northeast Pacific exhibit differences in sociality that appear to be linked to prey choice, but in which phylogenetic divergence may also play a role. In this study we compare group size and persistence, and the association level of different hierarchical social tiers of a community of Atlantic killer whales which predate seals around the Scottish coast, but which are genetically divergent from Pacific mammal-eating killer whales. We also compare photo-identification data collected from East Iceland where killer whales are mainly feeding upon herring to compare with data collected from nearshore Scottish waters where the whales are predominantly hunting seals. The results reflect earlier findings from the Pacific of stable long-term groups being formed, but association among groups being much higher when foraging for fish than when foraging for mammals. As these individuals are phylogenetically divergent from Pacific marine mammal-eating similarities in social structure will be due to ecological rather than phylogenetic constraints on sociality. The mean and typical group size when hunting seals was 5 individuals, similar to group sizes of Pacific mammal-eating ecotype. Our results suggest that ecological rather than phylogenetic constraints influence sociality and lead to variation in group size and persistence within and among killer whale ecotypes and populations.

E05

FORAGING ECOLOGY OF LACTATING NORTHERN FUR SEALS (CALLORHINUS URSINUS) ON THE COMMANDER ISLANDS.

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Lactating northern fur seals (NFS) are income breeding, central-place foragers that have limited time to feed before needing to return to the rookery to nurse their pup. Therefore, prey abundance near rookeries is a key factor in pup weaning. Data on 83 foraging trips were collected in 2003, 2004, 2008 and 2009 from 23 lactating NFS from Severo-Zapadnoe rookery on Bering Island (Commander Islands). Dives <5m and < 0.5min were classified as travelling dives and excluded from subsequent analyses. There were no interannual differences in the size of females (mean mass=39±5 kg; mean SL=132 ±7cm). The mean duration of foraging trips was almost equal in different years (mean 3.4 ± 1.4 days). In 2003, 2004, and 2009 the first foraging trip ranged between 1 -6 days, (mean 3.3±1.3 d), but was significantly longer in 2008 (mean=5.1±1.6d, range 2 - 8 d; p=0.02). The mean maximum dive depths were also similar in most years (mean 14.0±5.0 m), although in 2008 there was a significant but small and likely negligible difference. The years 2001-2005 were oceanographically “warm” years, but changed to cooler conditions in 2007. To determine how this may have affected the local food web, hard parts from 270 scats and spews of juvenile NFS males were identified. The frequency of occurrence of Gadidae (from 2.6% to 13.6%), Ammodytidae (from 28.5 % to 9.1%) and Bathyteuthidae changed dramatically over the period. Despite changes in local prey and oceanographic conditions, there seemed to be little impact on NFS lactating female foraging behavior.

E06

RORQUALS FEEDING GROUND IN ORIENTAL CANARY ISLANDS

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Little is known about the distribution, movements and feeding ecology of rorquals in the North-eastern Atlantic sector. Lanzarote and Fuerteventura are the most eastern Islands of the Canarian Archipelago, situated at 100 km of the North West African coast in an oceanographic transition zone within the Canary Current System. The presence of deep waters close to the coast, the local upwelling, together with the cold and productive water currents of the African coast, makes the region one of the most productive region of the Canary Islands. From October 2007 to October 2010 we conducted 137 days of visual-acoustic census and zig-zag random transects from the coastline to 37km offshore. The study area of 9848.43KmÂ² off the oriental coast of Lanzarote and Fuerteventura was surveyed with a 17 m motor yacht, covering 7572.06 km and 624.62 hours “on effort”. We had 627 sightings of 20 cetacean species, 72 (11.5%) of these sightings were of rorquals, of which 41 (56.9%) were Bryde’s whale (*Balaenoptera brydei*), 4 (5.5%) Sei whale (*B. borealis*), 5 (6.9%) Fin whale (*B. physalus*), 1 (1.4%) Minke whale (*B. acutorostrata*), and 21 (29.2%) no identified rorquals. Bryde’s, Fin and Sei whales were observed feeding in the area, with active surface lunges, on fish patches of pilchard, mackerel, horse mackerel and anchovy. This behaviour was also observed for Bryde’s whale, gathering up to 10 individuals in a small patch at the surface, and in association with Atlantic spotted dolphins (*Stenella frontalis*), common dolphins (*Delphinus delphis*) and Cory’s Shearwater (*Calonectris diomedea*).

E07

CORRELATION BETWEEN FIN WHALE DISTRIBUTION AND ENVIRONMENTAL PARAMETERS IN CENTRAL TYRRHENIAN SEA

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Fixed Line Transect for continuous monitoring of cetaceans reduces spatial heterogeneity allowing to better investigate correlations with environmental parameters (*i.e.* Chlorophyll, Sea-Superficial-Temperature). The use of ferries as research platform to survey FLT is employed in a large scale and simultaneous monitoring of cetaceans in the NW Mediterranean Sea. In particular, the ferry route from Central Italy to Sardinia, located just off the SE boundary of Pelagos sanctuary, has been weekly monitored in summer months by MMOs from 2007 to 2010. Observations were undertaken following distance sampling protocol, in fine weather conditions, considering each transect as an independent statistical unit. In 4 years, 133 journeys were undertaken and 490 cetacean sightings were registered over the 13.797NM travelled. Of the 6 species identified, Balaenoptera sp. showed the most interesting findings, increasing in ER from 0,17 sightings/hour in 2007 to 0,35 in 2010, becoming the most observed species in the last two years (45% of total sightings). The distribution of sightings, displayed with Kernel analysis, showed the existence of a core-area of 30NM north-east off Sardinian coast and in 2010, a new area of high frequency of sighting was defined for the first time. Aim of this research is to detect a thermal and/or an oligotrophic preference in cetacean distribution, that has been correlated with environmental parameters acquired from Aqua-MODIS. During the investigated months, SST values were generally negatively correlated with chlorophyll. Monthly Chl concentration showed general correspondence with fin whale distribution in the core-area off Sardinia while, when the central Tyrrhenian Sea seemed poorer in primary production, the presence of the species was spread along the transect. The new high frequency area defined in 2010 showed a direct correlation with Chl values only in June, suggesting that many factors still need to be investigated, for better distribution modelling and further conservation actions.

E09

TROPHIC RESOURCES OF BLAINVILLE'S BEAKED WHALES (*MESOPLODON DENSIROSTRIS*) AND CUVIER'S BEAKED WHALES (*ZIPHIUS CAVIROSTRIS*) IN EL HIERRO, CANARY ISLAND.

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Trophic resources of Blainville's beaked whale (*Mesoplodon densirostris*) and Cuvier beaked whale (*Ziphius cavirostris*) residents of the island of El Hierro, Canary Islands, are poorly studied. The only existing data on diet of these species are from the stomach contents analysis of a few specimens stranded in different islands of this archipelago.
This work is an indirect study of the prey availability in areas where sightings of beaked whales are common along the years on the island of El Hierro. The study was carried out using two different methodologies. The revision of the remains of "potential prey" that have appeared floating on the sea-surface during the photo-identification of beaked whales surveys in the same study area. The second methodology is the direct observation of mesopelagic community by mesopelagic trawls between 800 m and 200 m of deep with a commercial net.
We present here the list of species obtained by both techniques and the comparison with the stomach contents found in beaked whales stranded in Canary Islands. Ten mesopelagic hauls were carried in June of 2009. A total of 31 cephalopod species were caught. The most important families were Enoploteuthidae (56,56%), Histioteuthidae (12,21%) and Pyroteuthidae (11,76%). Regarding fish community, 56 species were collected. The Myctophiformes species dominated the samples, followed by Stomiiformes and Anguilliformes orders. A total of 22 potential preys were found in the area, 68.18% belonged to fish species, of *Argyropelecus* and *Sternoptyx*, whereas the cephalopod constituted 31.82% of total prey.
The diverse mesopelagic community of cephalopods and fishes in El Hierro island suggests the waters have enough amount of food could explain the presence of *Mesoplodon densirostris* and *Ziphius cavirostris* along the year in the same area.

E10

KILLER WHALE (*ORCINUS ORCA*) PREDATION STRATEGIES ON BLUEFIN TUNA (*THUNNUS THYNNUS*) IN SOUTHERN SPAIN

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In Southern Spain, 39 killer whales mainly predate on migrating Bluefin tuna, a depleted species under concern in the Atlantic Ocean and Mediterranean Sea. In spring, they are seen in the eastern Gulf of Cadiz, while in summer, they are observed in interaction with the longline Bluefin tuna fisheries of the Strait of Gibraltar. The aim of this study was to characterize the foraging behaviours in both areas. Behaviour and respiratory patterns were studied between 2008 and 2010 from CIRCE's research vessel. Killer whales were tracked on 13 occasions, with an amount of 17.5 hours of tracking data recorded. Whenever we were able to follow the animals at close enough distance, the respiration profiles were measured. A total of 7145 pictures of killer whale's dorsal fins were analysed to better understand the individual role in the group. In the Gulf of Cadiz, the whales looked for food cooperatively in waters between 10 and 100 meters deep by searching in a widely spread-line increasing their exploration area, whereas prey capture was carried out individually, a lone whale in each pod was chasing the tuna until exhaustion and then provisioning the others individuals of the pod. However, in the Strait of Gibraltar, killer whales were hunting in compact group and diving for around 4 to 5 minutes in water depths between 200 and 400 meters. Different foraging behaviours strategies were displayed in the two areas, suggesting different energetic costs. This energetic information is important in a context of a decreasing bluefin tuna stock which is their main prey resource.

E11

MODELING THE ECOSYSTEM ROLE OF TOP PREDATORS (CETACEANS AND SEALS) IN THE IRISH SEA

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The strategic situation of Ireland in the North East Atlantic, with high biodiversity and productive waters, makes this area important for apex predators. A total of 24 species of cetaceans and two species of seals have been recorded within the Irish EEZ. The occurrence of a number of small dolphin species in the pelagic ecosystem suggests the importance of these marine mammals within this area, especially the Irish Sea. Although, several studies on feeding ecology on marine mammals have been carried out around the world, very little information is available on the diet of small cetaceans in Irish waters. Furthermore, these predators are usually included within trophic models as a single category, due to lack of diet information. We develop an ecological trophic model using Ecopath with Ecosim (EwE) using the diet data of harbour porpoise, bottlenose dolphin, grey seal and common seal occurring in Irish waters as top predators of the model. We investigate the role of these predators in the Irish Sea in order to understand the food-web dynamics in the area, and in particular fishery interactions.

E12

FORAGING BEHAVIOUR OF LONG-FINNED PILOT WHALES (*GLOBICEPHALA MELAS*) IN THE ALBORAN SEA, WESTERN MEDITERRANEAN

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Long-finned pilot whales (*Globicephala melas*) are known to inhabit the Western Mediterranean and aspects of their dietary preferences have been documented, however a paucity of data exists on the detailed nature of their diving and foraging behaviour from this region. In the summer of 2010, 16 individuals (sub-adult and adult males/females) were instrumented with suction cup attached acoustic and movement recording DTAGs in the Alboran Sea. Individual deployments lasted up to 13.7 hours and a total of 96.5 hours of tag data were collected. Pre and post-tagging focal follows were conducted to select closely associated or nearest neighbour individuals for multiple tag deployments and surface social behaviour studies. Such selectivity resulted in datasets that revealed high levels of surface, dive and acoustic synchrony (in the form of call exchanges) between some individuals. 10 of the tagged whales performed deep foraging dives (>500 m) during tag deployments and 68 such foraging dives were recorded across all individuals. Foraging dives had a maximum depth of 989 metres (mean 688 ±141 m) and a mean duration of 15 ±2 minutes. These dives were typified by their deep depth, presence of rapid velocity acceleration bouts (sprints) and the occurrence of echolocation clicks and buzzes (associated with prey detection and capture attempts). Between 1 and 15 buzzes were recorded during deep dives (mean 6 ±3) at depths ranging from 53 to 989 metres (mean 599 ±164 m). Night-time foraging dives (mean depth 840 ±124 m) were deeper than daytime dives (mean depth 620 ±85 m), contrasting the potential expectation that diurnal foraging differences are linked to vertical migrations of prey to shallower water depths during the hours of darkness. This is the first detailed study of long-finned pilot whale foraging behaviour in the Mediterranean and demonstrates that these whales are dynamic, capable deep-water foragers.

E13

SPATIAL AND TEMPORAL VARIABILITY OF MEDITERRANEAN FIN WHALE FEEDING AREAS IN THE PELAGOS SANCTUARY

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The Pelagos Sanctuary, a key area for Mediterranean cetaceans, constitutes an important feeding ground for fin whales (*Balaenoptera physalus*). The knowledge about the species' critical habitats is still poor, although essential elements for a sound management exist. Mediterranean fin whales feed at depth, however, studies based on passive tracking techniques proved that the whale foraging behaviour could be inferred from the surface by identifying specific swimming patterns. In a preliminary study, vessel tracks were successfully validated as proxy for the whales' surfacing patterns, which were classified in three behavioural categories: travelling, fast-travelling and foraging. In this study, 166 track samples collected between 1995 and 2008 during dedicated summer surveys in the Western Ligurian Sea were analysed with the aim of identifying potential foraging habitats. A Canonical Discriminant Analysis enabled to classify the track samples according to the three behavioural categories, using track velocity (mean and maximum) and an index of linearity as predictors. Moreover, the behavioural categories were analysed with respect to topographic (bottom depth, bottom slope), and remote-sensed features (sea surface temperature, and chlorophyll-a concentration). A grid of 6.8 x 9.3 km of cell units was used to overlay the tracks to the environmental features. Significant differences ($p < 0.05$) were detected between foraging and travelling categories with respect to environmental features. Foraging tracks were significantly associated with lower surface temperatures and steeper sea bottom slopes, suggesting that foraging whales select areas with specific environmental characteristics. The temporal variability of the foraging areas was also investigated through the analysis of the cell centroids, revealing significant latitudinal differences in the foraging habitat distribution among years (Kruskal-Wallis: $c2 = 15.7$, $df = 6$, $p < 0.05$). Understanding critical habitats' dynamics is of crucial importance to enable conservation measures for Mediterranean fin whales, which are heavily impacted by anthropogenic activities.

E14

THE HARBOUR PORPOISE (*PHOCOENA PHOCOENA*) IN THE EASTERN SCHELDT: A RESIDENT STOCK?

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Stable carbon and nitrogen isotope ratios ($\delta^{13}C$ and $\delta^{15}N$) were analysed in muscle and bone tissue of 160 harbour porpoises (*Phocoena phocoena*) stranded along the Dutch coast between 2003 and 2008 to get further insight on their foraging ecology and habitat use. Muscle reflects dietary intake of months, while bone tissue reflects the intake of years (life-time). Comparing their isotopic composition can identify shifts in diet or feeding location within the same individuals. Our data showed significantly higher $\delta^{13}C$ values in the muscle tissue of porpoises stranded along the Eastern Scheldt (-17.7‰ ± 0.4) compared to other animals stranded along the Dutch coast (-18.3‰ ± 0.5). The Eastern Scheldt is a tidal bay, created by dams isolating the former estuary from freshwater input of the river Scheldt. Since the building of a storm surge barrier, movement of porpoises in and out of the Eastern Scheldt may be limited. In the Eastern Scheldt, porpoises have been observed for the past ten years. They have become more abundant in the area and can now be found there all year round. Two dedicated surveys have documented a minimum of 37 porpoises in the Eastern Scheldt, including mother calf pairs. Our data indicate that most porpoises stranded in the Eastern Scheldt foraged here for a longer period of time. We also found evidence based on isotopic composition of animals that had recently entered or left the Eastern Scheldt before stranding. This distinct isotopic signature of animals stranded along the Eastern Scheldt was not observed in bone tissue, indicating a recent shift in habitat use. There was no evidence that the animals analysed in this study were born in the tidal bay. Whether porpoises from the Eastern Scheldt can be considered a resident stock remains a matter of debate and deserves further investigation.

E15

INFLUENCE OF ANTHROPIC ACTIVITIES ON THE SOCIAL ECOLOGY OF COMMON BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) IN NORTH EASTERN SARDINIA - ITALY

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The group sizes, the composition and the affiliation of individual animals within a dolphin population are prerequisites fundamental to our understanding of the social structure and behaviour of these long-lived mammals. This study show the social ecology of common bottlenose dolphin (*Tursiops truncatus*) along the Northeastern coast of Sardinia. Data were collected from 242 dedicated boat-based surveys resulting in 743 hours and 173 sightings, using photo-identification methodologies. From 2006 to 2010 were photo-identified 76 dolphins. Half Weight Indices (HWI) of association were used to calculate coefficients of association (CoA's) between individual dolphins from the study area. The results show how the different anthropogenic impact such as fishing activities, fish farm, vessel traffic, coastal development, that are considered to shape the sociality of this species in this coastal area. The implications of this study may be particularly significant to management proposals currently aimed at this important common bottlenose dolphin population because the study area included a National Park (La Maddalena), a Marine Protected Area (Tavolara-Punta Coda Cavallo) and a Special Protected Area (Capo Figari).

E16

GROWTH DATA AND OTOLITH ATLAS FOR MESOPELAGIC FISH OF THE NORTHEAST ATLANTIC.

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Mesopelagic fish are considered by the FAO to be the world's largest under-utilised fishery, and there is a growing interest in the use of mesopelagic fish populations for commercial fisheries. They are important prey items for many higher predators, and are frequently recorded in the diet of pelagic dolphins and seabirds. Despite this, little is known about their biology, and there are no published relationships between otolith length/width and fish length/weight. These studies are useful in assessing the biomass importance of mesopelagic fish for cetaceans. Data on the mesopelagic fish collected during a midwater pelagic trawl survey in the North East Atlantic, in 2009, are presented here. Twenty-six mesopelagic fish species were identified and mapped, with the myctophid Notoscophelus kroyeri being the most abundant. 2353 mesopelagic fish were caught during the survey. Length and weight data of 1125 individual fish was recorded, from 12 different species. Fish length/weight and otolith relationships are described. The relationship between otolith dimensions and fish total length were described using linear regressions and the relationship between otolith dimensions and fish wet weight were described using a power curve fitted to the data. Though most relationships between otolith dimensions and fish body parameter are described in terms of otolith length, in this study it was found that for some species, otolith width was a better predictor of fish total length and/or fish wet weight, illustrating the importance of measuring both dimensions when calculating regression equations. Otolith dimension to fish body parameter regression equations were calculated for 11 species, 10 of which are previously unpublished. This study provides a valuable contribution to the knowledge of mesopelagic fish of the Northeast Atlantic, and the guide to the otoliths of sampled mesopelagic fish will be of use in future cetacean and other predator dietary studies.

E17

DIET OF FIVE CETACEAN SPECIES IN THE NORTH AEGEAN SEA (GREECE)

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Few records on cetaceans' distribution are available for the North Aegean Sea and no research on diet has been attempted up to now. The present study, based on stomach content analysis of stranded animals, aims to fill the lack of data on cetaceans' feeding habits in the area. Out of the 32 cetaceans stranded since 2002 from Strimonikos Gulf in Chalkidiki to Alexandroupoli on the Turkish border, stomachs' samples were collected whenever possible. The stranded specimens belong to five species: Bottlenose dolphin (*Tursiops truncatus*), Common dolphin (*Delphinus delphis*), Striped dolphin (*Stenella coeruleoalba*), Risso's dolphin (*Grampus griseus*) and Harbour porpoise (*Phocoena phocoena*). A total of 17 stomachs were examined, among them two were empty. From the others fifteen stomachs, fish otoliths, undigested fish, cephalopods beaks, undigested cephalopods and crustaceans' parts were found and analyzed up to species level, whenever possible. The results show that the first three dolphin species' diets were composed of both fish and cephalopods: Common dolphin's diet was composed of species from the Clupeidae family and very few cephalopods, while Striped dolphin fed on small pelagic fish, such as bogue (*Boops boops*), Myctophidae as Madeira lantern fish (*Ceratoscopelus maderensis*) and in smaller proportion on cephalopods. Finally the Bottlenose dolphins fed primarily on snake blenny (*Ophidion barbatum*), bogue (*Boops boops*) and cephalopods squids of the genus Loligo. Risso's dolphin's diet was composed exclusively of cephalopods, prevalently from the Theutidae family, and by the genus Histiotheutis. This present work also contributes first data on Harbour porpoise's diet in the Mediterranean Sea: the diet of the Harbour porpoise was found to consist of fish, with a high preference of the Gobidae family. This ongoing investigation is complementary to both fisheries and field research so as to understand cetacean needs and human impacts on their survival in the region.

E18

CEPHALOPODS IN THE DIET OF STRIPED DOLPHIN, *STENELLA COERULEOALBA* (MEYEN, 1833) AND BOTTLENOSE DOLPHIN, *TURSIOPS TRUNCATUS* (MONTAGU, 1821) STRANDED ALONG THE COASTS OF THE TUSCANY (NORTH-WESTERN MEDITERRANEAN SEA)

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Cephalopods are considered as the most important preys in top predator diet. As the rapid digestion that cephalopod flesh is subjected to makes it difficult to identify the prey, this study focuses on an analysis of cephalopod beaks detected in the stomach content of striped dolphins, *Stenella coeruleoalba* (N. 4, males, TL mean 203 cm) and bottlenose dolphins, *Tursiops truncatus* (N. 3, females, TL mean 225 cm), stranded along the coasts of Tuscany. Beaks from stomachs were taken as the best taxonomic feature to the purpose of classification in order to define the feeding habits of these species.
On overall 112 cephalopod preys, 85 individuals were identified, belonging to 12 species. A total of 10 cephalopod species were detected in the stomach content of striped dolphins: *Ancistroteuthis lichtensteini* was the most common prey (15.5% of all beaks), followed by *Loligo vulgaris* (8.5%) and *Galiteuthis armata* (7%). As regards bottlenose dolphins, a total of 5 different cephalopod species were detected in their stomach content: *Eledone cirrhosa* resulted to be the most common food item (65.9%), followed by *L. vulgaris* (14,6%). The biomass of identified ingested cephalopods was estimated at 2600 g from the *S. coeruleoalba* and at 5500 g from the *T. truncatus*. Only three prey species (*E. cirrhosa, L. vulgaris* and *Illex coindetii*) were common in the diet of both mammals. Bottlenose dolphin mainly feeds on benthonic cephalopods, from the coastal line to the continental shelf. Striped dolphin mainly preys on pelagic cephalopods. These data confirm previous studies and suggest that low competition exists between the two predators insofar as cephalopod food resources are concerned due to the different habitats of the two predators. *S. coeruleoalba* stomach content also revealed the presence of two species (*G. armata, Argonauta argo*) that were not detected in dolphins living in other Mediterranean areas.

E19

STABLE ISOTOPES OF CARBON AND NITROGEN IN COMMON DOLPHIN'S BONE AS TOOLS IN POPULATION DIFFERENTIATION

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Distinguishing population units of small cetaceans continuously distributed in a widespread area is challenging, but very important for conservation purposes. Recently, stable isotope analyses (SIA) have been used to differentiate between dolphin populations. Carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) stable isotope ratios in the bone tissue of stranded common dolphins were measured in order to detect intra-specific differences and population structure. Samples were collected between 1978 and 2008 on the Atlantic coast of the Iberian Peninsula (Galicia, Portugal and Andalusia) and the North-west coast of Africa (Mauritania). The study area was divided based on habitat characteristics (upwelling areas, productivity, fresh water outputs, etc.) and the natural barriers between the sampling areas. Therefore, individuals derived from four putative population units: from Cape Finisterre to the estuary of the Douro river (Zone I, n=10), from there to the Roca Cape (Zone II, n=21), from there to the south of the Strait of Gibraltar (Zone III, n=38), and Mauritania (Zone IV, n=87). Results indicated significant differences between zones for both isotopes (MANOVA, Wilk's λ=0.197, F=63.032, p<0.001). Both $\delta^{13}C$ (ANOVA, F=99.855, p<0.001, r^2=0.663) and $\delta^{15}N$ (ANOVA, F=53.684, p<0.001, r^2=0.514) contributed to the differences between common dolphin populations. $\delta^{13}C$ was significantly different for Zone IV dolphins, using sea grasses ecosystems, and those from other areas. While $\delta^{15}N$ was significantly different between all populations except those from Zone I and II. The differences may be due to the overall difference in $\delta^{13}C$ that originates from coastal benthic or oceanic pelagic-based food webs, and also to the local variation in prey species and prey trophic levels. This is the first application of isotopes to population assignment of common dolphins in the Northeast and Sub-tropical Atlantic. Results suggest that isotopes may provide a powerful tool in the assignment of intra-specific population units and in the conservation of small cetaceans.

E20

A LONG-TERM SIGHTING DATA SET FROM WHALE WATCHING OPERATIONS AS A REFLECTION OF THE ENVIRONMENTAL DYNAMICS IN A MULTI-SPECIES CETACEAN HABITAT

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Through a co-operation between the NGO MEER and local whale watching operators on the island of La Gomera (Canary Islands, Spain) a long-term sighting data scheme was initiated in 1995 which lasts until today. The majority of whale watching vessels operating from Valle Gran Rey in the Southwest of the island have been involved into cetacean sightings data collection in coastal and pelagic habitats inhabited by a great variety of species. During 15 years (from September 1995 until September 2010) a total of more than 6.500 sightings of up to 23 cetacean species have been documented at low cost in a pioneering way, establishing previously unknown detailed knowledge about the local cetacean fauna. As of today, this collection represents one of the few data sets where cetacean abundance and distribution has been monitored throughout the year for almost one and a half decades. Findings on the long-term development of sighting numbers, relative as well as seasonal abundance of different species are presented. These findings reflect the dynamic nature of the environment itself, because cetaceans are known to react with great flexibility to changes in their habitat. This they can function as indicators for environmental variability. By using the long-term data, the relation between cetacean abundance/distribution and the ecological conditions of the sea around them is laid out.

E21

STABLE ISOTOPE ANALYSIS OF BALEEN WHALE SKIN AND BLUBBER: A MODEL FOR LIPID NORMALIZATION OF δ13C

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Diet analysis by conventional methods such as stomach contents analysis is difficult for baleen whales given their size and that access to specimens (*e.g.* freshly stranded individuals) is rare. Stable isotope analysis by remote biopsy darting provides a non-lethal means of acquiring this information from a representative sample of healthy individuals. Protein in tissues yields a stable isotope signature that is faithful to that of an individuals' prey. Lipids are rich in ^{13}C compared to protein and thus must be removed to attain an ecologically meaningful $\delta^{13}C$ signature. The effect of lipids on $\delta^{15}N$ however is negligible. Lipid extraction is costly, laborious and may lead undesirable alterations of $\delta^{15}N$. Mathematical correction models (normalization) for $\delta^{13}C_{lipid\text{-}extracted}$ - $\delta\ ^{13}C_{bulk}$ (the change in $\delta^{13}C$ due to lipid removal) are available for many marine taxa, however for lipid-rich integument of cetaceans, these models were found to be inaccurate.

Skin and blubber biopsies were taken from live and stranded fin (n=14), humpback (n=5) and minke (n=5) whales from Britain and Ireland. Skin and blubber samples were analysed separately for $\delta^{13}C$ and $\delta^{15}N$ for both control (bulk) and lipid-extracted samples. The C:N elemental ratio strongly correlates with lipid content and was found to be collinear with the change in $\delta^{13}C$ for both tissues. Generalized linear models were constructed to predict the change in $\delta^{13}C$ for both tissues using the C:N ratio as an explanatory covariate. The performance of presented models was tested by jackknifing. The presented models performed better than published models for other taxa, indicating that more specific normalization models are required for lipid normalization of cetacean integument. The implications of lipid normalization in stable isotope mixing models using the SIAR package in R (Parnell *et al.* 2010) are discussed.

E22

HYBRIDIZATION, INTER-SPECIES ADOPTION AND MIXED SPECIES GROUPS: RESPONSE OF DELPHINIDS TO GEOGRAPHIC ISOLATION AND LOW ABUNDANCE?

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A number of coastal delphinid species are characterized by small population size and limited range. Some small populations are the result of past and/or present human caused mortalities. In order for small populations to survive, mixed-species associations may provide an alternative for anti-predator, foraging and social needs. However, when mating occurs in these mixed-species groups it may also contribute to the evolution of species. Two small dolphin populations inhabit the lagoon of Mayotte, East Africa; about 100 Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) and only three humpback dolphins (*Sousa chinensis*). In 2006, a possible Tursiops/Sousa hybrid was photographed and biopsied in the lagoon of Mayotte. Its hybrid status was confirmed by microsatellite DNA analysis and it further indicated that the hybrid may be a second generation offspring between Tursiops and Sousa. Between March and June 2007, one of the female humpback dolphins in Mayotte was observed with a spinner dolphin calf (*Stenella longirostris*). This calf was not present when the female was resighted in August 2007. However, a different spinner dolphin calf was observed with the same female in February 2008. Mixed-species groups of Indo-Pacific bottlenose and humpback dolphins also occur off the south coast of Zanzibar, East Africa. In this area 18% of the observed groups were mixed-species of larger size, socializing (including mating) more frequently, compared to single species groups. The mating primarily involved young male bottlenose dolphins herding female humpback dolphins. While intergeneric hybridization and mixed-species groups have been documented on multiple occasions in cetaceans, fertile hybrids and inter-species adoption have not previously been documented. These cases of hybridization and inter-species adoption in humpback dolphins may reflect the limitation a small population has to mate and reproduce, as their geographic isolation restricts immigration and emigration. Inter-species interactions may constitute an alternative to compensate for limited intra-specific social interactions.

E23

NUMBERS, BEHAVIOR AND SEX-AGE STRUCTURE OF BELUGA WHALES SUMMERING IN TIGIL'SKY REGION OF THE WESTERN KAMCHATKA, FAR EAST RUSSIA

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Here we present the first data on the biology of beluga whales summering in the estuary of Khairuzova and Belogolovaya rivers (Western Kamchatka). The research was conducted in the period of 30 July - 31 August, 2010. In total 342 hours of visual observations and 16 hours of acoustic records were obtained. During the onshore observations whales were encountered 551 times. Maximum number of belugas observed in the estuary at a time amounted to 250. The distribution of whales over the water area depended on the dynamics of salmon runs and water levels. In the period of active salmon run belugas were constantly present in the rivers and moved to the sea only during low water. Beluga whales of both sexes and all age categories including females with calves were encountered. We didn't notice any changes in the sex-age structure of the whale groups. Young animals and females with calves were present in the area through the whole research period. Belugas preferred the deepest parts of the estuary and used several certain feeding areas. The most common types of behavior of the whales were feeding and travelling, the rarest - resting and social behavior. Belugas used wide variety of the acoustic signals. The maximum acoustic activity was observed during social behavior, the minimum - during resting. In summer period the estuary is actively used by man for fishing. In spite of the heavy vessel traffic belugas didn't avoid busy areas and most of the places preferred by whales were located nearby the shipping routes. Fisherman poll showed that sometimes belugas take fish from the fisherman nets. In general the attitude of natives toward this species is neutral with a bit of curiosity. In spite of the availability of quota for belugas, no hunting occurs in the region.

E24

THE ECOLOGICAL NICHE MODELLING OF MINKE WHALES WITHIN THE SAGUENAY-ST. LAWRENCE MARINE PARK: APPLICATIONS TOWARDS DEVELOPING SPATIO-TEMPORAL PLANNING AND MANAGEMENT STRATEGIES

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The Saguenay-St. Lawrence Marine Park is an area of important marine biodiversity and oceanography. The area within the park is acknowledged as a critical habitat for many cetacean species including the minke whale (*Balaenoptera acutorostrata*). As the management demands for information on the habitat use of cetaceans within the park increases new methodologies are required to help both visualise and determine the functional importance this region on those whales occurring there. To meet this management demand an Ecological Niche Modelling (ENM) approach was used to help understand the variability in spatio-temporal habitat suitability of B.acutorostratawithin the Saguenay-St. Lawrence Marine Park, and how much influence underlying eco-geographical variables (EGVs) effect that distribution. To achieve this aim sightings data from dedicated research surveys (2002-2007, May-September inclusive) were compared to a suite of EGV habitat predictors including bathymetric (depth, slope) and oceanographic (SST, chlorophyll-a concentration, fronts) using GIS. These were analysed spatially using a Maximum Entropy (MAXENT) approach. Results of the study showed that at a mean annual scale areas of highest habitat utilisation were concentrated within the regions of the Laurentian Channel Head, especially the northern and southwestern slope, and the St Lawrence - Saguenay Fjord confluence area. However, when analysed at a monthly scale across the five years of study it was observed that habitat utilisation predominantly shifts in intensity between the near shore (May), Saguenay Mouth (June-July) and Channel Head (August-September). Post-process Jackknife analysis of the statistical influence of EGVs on the habitat utilisation of B.acutorostrata indicated that the population of whales consistently shift between two distinct habitat types as the season progresses validating observations from previous and concurrent studies. These observations are therefore considered important with respect to the further development of marine spatial management strategies of cetaceans within, as well as beyond, the Saguenay-St. Lawrence Marine Park.

E25

HABITAT USE AND THE EFFECTS OF BOAT TRAFFIC ON BOTTLENOSE DOLPHINS AT NEW QUAY HARBOUR, CARDIGAN BAY

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New Quay harbour in Ceredigion is a key site for bottlenose dolphins in Cardigan Bay, which hosts the largest resident population of this species in the UK. Bottlenose dolphins are observed almost daily from New Quay pier in summer and it is thought that the animals use this site predominantly for feeding. However, other behaviours have been observed in parts of the survey area. The Sea Watch Foundation has been performing regular land based surveys annually at this site from May to October since 2005. Surveys were carried out in shifts from 07:00 to 21:00h, or whilst sufficient light allowed. Dolphin behaviour and location in the bay were recorded, along with boat traffic and subsequent boat interactions, during which any changes in behaviour were noted. There has been a concern that an increase in boat traffic may have an effect on the animals that visit the area. However, over the past six years, levels of boat traffic have fluctuated but not steadily increased, presumably reflecting prevailing weather conditions. Dolphins spend more time at the site than previous years. In 2005, sightings occurred at a rate of 1.6 animals per hour. This has steadily increased over the years with the exception of 2008 where there was a significant drop to 0.9 animals per hour. 2010 showed the highest sightings rate to date at 2.5 dolphins per hour. Sighting rates did not correlate with the changes in levels of boat traffic. Most boat operators in New Quay harbour adhere to a code of conduct implemented by Ceredigion County Council, which has been enforced to minimise disturbance to the dolphins. These results suggest that despite the relatively high levels of boat traffic in the harbour, this has not deterred the animals from entering the survey area, and they continue to visit it frequently.

E26

COMPARISON OF HABITAT USE OF COMMON DOLPHIN (*DELPHINUS DELPHIS*) AND BOTTLENOSE DOLPHIN (*TURSIOPS TRUNCATUS*) IN PORTUGAL MAINLAND

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The co-occurrence of two or more species of the family Delphinidae in the same geographical area is frequent and has been reported elsewhere for common dolphins (*Delphinus delphis*) and bottlenose dolphins (*Tursiops truncatus*). Between January 2007 and October 2009, a total of 99 boat-based surveys were conducted in three locations off Portugal mainland (20 in Póvoa de Varzim, 21 in Nazaré/Peniche and 58 in Sesimbra) with a total of 18647 minutes of survey effort. We mainly studied the occurrence and distribution of common and bottlenose dolphins and analyzed differences between the species considering their group dynamics (group size, presence/absence of calves and behaviour) and habitat parameters (sea surface temperature, depth and distance to coast). From a total of 81 independent sightings of cetaceans, 60 were of common dolphins and 13 of bottlenose dolphins. Both species were observed mostly in small groups (45% and 50% respectively) and were never observed in mixed groups or in the same day. In 59% of the encounters common dolphins groups included calves, contrary to bottlenose dolphins groups composed predominantly by adults (17% sightings with calves). Common dolphins were observed travelling, feeding, socializing and resting, while bottlenose dolphins were only observed travelling. Differences were also found when comparing habitat preferences, with common dolphins occurring preferentially in deepest waters ($p<0,05$) and more distant to coast ($p<0,05$) and bottlenose dolphins in shallower waters near shore. The results suggest that habitat partitioning is occurring due to differences in these species ecological niches, but further research is needed namely on feeding ecology.

E27

FIN WHALES FEEDING ON NORTHERN KRILL OFF PICO ISLAND (AZORES) DURING SPRING MIGRATION

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Baleen whales are regularly seen around the Azorean archipelago in spring. Observations suggest that these animals are transient and probably on passage during their post-breeding migration to temperate waters. Here we provide evidence that Fin whales (*Balaenoptera physalus*) fed on Northern krill (*Meganyctiphanes norvegica*) at this time near Pico and that Blue whales (*Balaenoptera musculus*), Humpback whales (*Megaptera novaeangliae*) and probably Sei whales (*Balaenoptera borealis*) also fed in this area. Sighting and opportunistic photo-identification data were collected by CetaceanWatching Lda during whale watching trips run between 1st April 2010 and 30th September 2010. Approximately 6300 nautical miles of navigation were undertaken within a study area of approximately 800 km^2 off south Pico. Out of a total of 461 sightings, 52 comprised baleen whales (11.3%) and were subdivided as follows: 10 Blue whale; 25 Fin whale; 9 Sei whale; 3 Humpback whale; 4 Bryde's whale (*Balaenoptera brydei*); 1 Common minke whale (*Balaenoptera acutorostrata*). 74.5% of the baleen whale sightings occurred between 1st April and 25th May. Among 16 Fin whales, 5 Blue whales and 5 Sei whales that were photo-identified, 1 Fin whale was sighted 4 times within a period of 20 days but no other re-sightings were made. Samples of krill and faeces from the re-sighted whale were collected in situ. The krill was identified as Northern krill and the faecal samples showed features compatible with that krill. Furthermore, in the presence of krill, Blue whales, Fin whales, Sei whales, and Humpback whales showed behaviours indicative of feeding such as side-lunging, deep diving and circling. All except Sei whales were also seen producing red stained faeces. These pieces of evidence suggest opportunistic feeding along the migration route and support the hypothesis that the area off south Pico represents a strategic foraging habitat for several baleen whale species.

G01

PHOTOGRAPHIC RESIGHTINGS SHOW PHILOPATRY IN A MALE BLAINVILLE'S BEAKED WHALE.

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Philopatry is more commonly associated with females in cetaceans. We provide evidence for the existence of philopatry in an individual male Blainville's beaked whale (*Mesoplodon densirostris*) through repeated photo-identification and satellite tag data. The individual (Md143), has been photographed on 19 separate days between 2000 and 2010, during small-vessel surveys off the southern coast of Great Abaco Island in the northern Bahamas. At the time of first sighting, he was estimated to be less than six months old: the accompanying adult female (Md106), presumed to be his mother, was seen six months previous to this sighting, in 1999, without a calf. Md143 was approximately half the length of Md106 when first seen, and after one year he had grown to approximately 3/4 the length of Md106. As Md143 was approaching the age of nine years old, his teeth began erupting; two years later his teeth were fully erupted, with significant accumulation of linear tooth rake scarring on his head and thorax between these two sightings. These repeated sightings of Md143 and two weeks of satellite telemetry data suggest short- and long-term site fidelity; his physical maturation and evidence of aggressive intraspecific interactions indicate competition for mates in the same area where he was born. Md106 has had three other known calves, a female that has been sighted on 10 separate days between 1998 and 2010, an unknown immature that has been sighted on 10 separate days between 2003 and 2009, and a single sighting of a neonate with Md106 in 2006, but none of these three animals have ever been sighted with Md143. This lack of post-weaning interaction between Md143 and his mother and siblings suggest social mechanisms that facilitate inbreeding avoidance.

G02

WHAT XVIIITH CENTURY LOG BOOKS CAN SHOW: MARCHAND'S VOYAGE (1790-1792)

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Marchand led a commercial circumnavigation on the Solide, on a 72 feet sailing vessel, during the years 1790-1792. They sailed 44,499 nautical miles in 20 months: from Toulon they crossed the Atlantic Ocean to Cape Horn, followed the western American coast until Vancouver Island, then crossed the Pacific Ocean to China, before sailing from Mauritius back to France by the south of Africa. The most northern point was 57º and 59º5 in the south. Marchand wrote as captain his own log book, and so did his executive officer, Chanal, and ship's doctor, Roblet. The officers wrote hourly their observations at sea, especially concerning fauna: they observed cetaceans almost on one hundred occasions. Being back to France, after a very quick and secure voyage, Chanal entrusted his log book to the Minister for Marine, Fleurieu, who was a scholar. We know which taxa they noted, to the best accuracy possible at this time, correlated with date, position, weather, temperature and state of the sea. Although they were not specialists (even the doctor was not a biologist), but learned and experienced seamen, their observations took in account the results of previous voyages (Cook's, Bougainville's…) and compared the data or checked if the species they were seeing was already known or not by contemporary scientists. Fleurieu wrote himself the account of the voyage, adding chapters on his own especially about birds, cetaceans and hydrology, in order to be useful to further voyages. He compiled others log and specialised books. So we compare the Marchand's and Chanal's log books, the doctor's account and Fleurieu's encyclopaedic work. The comparison is very profitable to get an idea of the state of fauna at the end of the XVIIIth century, and appreciate the differences with today observations, maybe due to whaling and climate change.

G03

EXPERIMENTAL INFECTION OF TURBOTS WITH SEAL LUNGWORM LARVAE: MOLECULAR TOOLS DETERMINE POTENTIAL VERTEBRATE INTERMEDIATE HOST

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Harbour seals from German waters are infected with two species of lungworms, *Otostrongylus circumlitus* and *Parafilaroides gymnurus* (Metastrongyloidea), which parasitise the respiratory tract. They are pathogenic and often cause secondary bacterial infections. In spite of their clinical and epidemiological significance, the life cycle and biology of these lungworms is still largely unknown. Regions of ribosomal DNA (ITS-2) of lungworms parasitising harbour seals in German waters were sequenced to characterise the different species. As larvae and eggs of metastrongyloids are difficult to distinguish morphologically, species-specific traits of the ITS-2 were used to develop molecular markers to identify larval nematodes via PCR and in-situ hybridisation. In this study five aquaculture-bred turbots (*Psetta maxima*) were experimentally infected with live L1s of female gravid *Otostrongylus circumlitus* that came from a harbour seal that was shot because of serious illness. Turbots were orally infected with active L1 larvae, killed and dissected on day 18, 46 and 53 post infection. L1 larvae were maintained alive and active in a mixture of seal blood and NaCl for 47 days. In four turbots light microscopy showed nematode larvae (n=10 to 200) in tissues of the gastrointestinal tract, which were measured and photographed. Histological examination and in-situ hybridisation of tissue samples from infected turbots showed lungworm larvae within the intestinal wall. Based on larval ITS-2 nucleotide sequences, larval nematodes were identified as *Otostrongylus circumlitus* using PCR and in-situ-hybridisation. Our results confirm that turbots may play a role as intermediate host in the transmission of lungworms of harbour seals.

G04

DEMOGRAPHY AND SOCIAL STRUCTURE OF THE BOTTLENOSE DOLPHIN POPULATION OF THE FRENCH CHANNEL

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The study of demographic parameters and social structure of endangered marine top predator populations is critical to assess their ecology and to take conservation measures. Normandy coasts host one of the largest but poorly studied bottlenose dolphin populations, *Tursiops truncatus*, in France. This study aims at improving the knowledge on these animals in particular within the context of both upcoming marine renewable energy projects and the creation of marine protected areas. Demographic parameters were estimated using the robust design mark-recapture method applied to photo-identification data collected between 2006 and 2010. Preliminary results indicated a survival rate of 0.98 and a probability of temporary emigration of 0.5. Temporal and spatial analysis on association coefficients between individuals revealed that the population lived in a fission fusion society, like most bottlenose dolphin populations of the world. While a large proportion of associations were casual, lasting about one day, certain individuals shared more stable and stronger associations. Further investigation is needed using genetics to test the influence of sex and relatedness of the individuals in association patterns. In conclusion, this study suggests a demographically healthy population characterized by a fission-fusion social organization that should be further examined using spatial, trophic (stable isotopes, fatty acids), eco-toxicological and acoustic analysis techniques in order to better assess the risks linked to increasing human activities.

G05

SOCIAL STRUCTURE AND TEMPORAL VARIATIONS IN INDIVIDUAL ASSOCIATIONS OF BLAINVILLE'S BEAKED WHALES (*MESOPLODON DENSIROSTRIS*) IN EL HIERRO (CANARY ISLANDS)

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Beaked whales (Ziphiidae) spend most of their time diving and perform short surfacing intervals. Due to this cryptic behavior, little information exists on the social structure of Blainville's beaked whales (*Mesoplodon densirostris*) and there are no data on the stability of the social groups or individual associations. A resident population of this species in the coastal waters off El Hierro (Canary Islands) allowed us to perform a long-term photo-identification study of M. densirostris from 2003 - 2010. High and medium quality photographs were used to identify individuals, based on the comparison of scarring patterns and coloration from the head, thoracic and posterior regions. The presence/absence of teeth, relative size of the whales and their association with young were used to determine their gender and broad age class. A total of 166 groups were photographed and these included on average 4 whales. The photoID catalogue (www.cetabase.info) includes a maximum of 112 individuals: 15 males, 12 adult females, 42 indeterminates (male/female sub-adults or females not observed associated with young); in adittion, 32 catalogue entries of young whales and 11 entries of adult/subadult whales correspond to individuals without permanent recognizable markings. Results show that whales form stable short and medium term associations that change periodically. Females associate with different males in consecutive calving periods and associations of several females with young tend to last until females mate again. The social structure of Blainville's beaked whales seems to be defined by a polygamous breeding system with a long-term fission-fusion strategy and relatively long inter-calving intervals.

G07

IMPORTANCE OF ORIENTAL CANARY ISLANDS AS BREEDING GROUND FOR BEAKED WHALES, BASED ON SIGHTING AND STRANDING DATA

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Eight beaked whale atypical mass stranding events occurred in the oriental coast of Lanzarote and Fuerteventura between 1985 and 2004. In order to assess the importance of the area as breeding ground for beaked whales, a visual survey was conducted from October 2007 to October 2010, with 137 days, 7572.06km and 624.62 hours "on effort" in an area of 9848.43Km², with a total of 117 beaked whales sightings, and analyses of 69 stranded animals between 1980-2010. Fifteen (36.6%) of the 41 Cuvier's beaked whale groups, had calves present, of which a 73.3% of the groups only one calf was observed, and 26.7% two calves. The mean group size with calves was significantly greater (mean= 3, SD= 1,069, n= 15) that groups without calves (mean=2.3, SD= 0.92, n= 26) (t-test for independent samples of groups with calves vs. without calves, $P< 0.05$). A total of 4 calves (23.5% of the overall calves observed) were neonates with visible foetal folds or small size. All calves were observed between March and October, although the smallest were recorded during April (n=1), June (n=2) and October (n=3). In 5 (16.7%) of the 30 sightings of Gervais' beaked whale and in 3 (20%) of the 15 Blainville's beaked whale sightings, there were calves, one of them with a few weeks of life. Cuvier's beaked whale sightings and strandings data showed a reproduction period extended throughout the year, with a possible peak for births during the first half of the year. Gervais's beaked whale data showed a birth period between the end of the spring and the beginning of the autumn. The sightings and the strandings in the areas corroborate the importance of the area as breeding ground for these three beaked whale species.

G08

GENETIC DIVERSITY AND STRUCTURE OF FIN WHALES (*BALAENOPTERA PHYSALUS*) IN NORTH-WESTERN OF THE MEDITERRANEAN SEA

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In summer, fin whales population present in the north-western basin of the Mediterranean Sea is estimated around 1800 individuals (Notarbartolo-Di-Sciara and Al 2003) including approximately 715 in the Ligurian sea (Gannier A., 2006). A question always arises concerning this population:
- is it resident of this part of the basin thus corresponding to a ligurian sub-population?
- or is it migrant and corresponding to several sub-populations which meet in Ligurian sea during this season?
The tools of genomic are now largely used for genetic diversity studies. The use of a large scale of neutral molecular markers as microsatellites makes it possible to obtain knowledge on the genetic identity of individual, on the genetic structure of groups, their origin, their migration, their reproduction…
Biopsy campaigns at sea from May to October were organized by WWF-France between 2006 and 2010 and nearly 150 fin whale samples were collected. Sex determination and genetic identity using eleven microsatellite loci were carried out for each individual.
The global sex-ratio is in balance for four years (2006, 2008 and 2009). However, this sex-ratio changes according to the period of the year. It is reversed between spring (66% male) and the autumn (77% female) while it is in balance the summer.
In 2007, the sex-ratio is largely for the females (78%) but the weather conditions were atypical for the season.
The genetic identity data were compared between each individual. On a total of 86 individuals sampled in 2006 to 2009, four of them were met at least twice during the same year or from one year to another.
Analyses of Neighbor-Joining (NJ) were carried out and shown a clear structure in three groups, whatever the year of the biopsy. There is a homogeneous distribution of the males and females between the groups.

H01

SHIP STRIKES - THE BEHAVIOUR OF FIN WHALES (*BALAENOPTERA PHYSALUS*) IN PRESENCE OF FAST-FERRIES IN THE BAY OF BISCAY.

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In the last decades, the expansion in maritime traffic has become a significant threat to sea mammals, particularly through ship collisions. Fin whales are currently the most recorded species hit by ships. Here, we analyze the behavioural responses of fin whales to fast ferries in the Bay of Biscay to understand the effects of the disturbance caused by shipping. The Bay of Biscay is an area with a high variety and abundance of cetaceans, which has simultaneously a great potential for shipping development. The data collection was conducted from 2006 to 2008 through a partnership between the Charity Organization Cetacea (ORCA) and Brittany Ferries (which currently continues). A total of 227 fin whales were identified and their behaviour analysed. Group behaviour is definitely relevant in collision risk. Fin whales in groups were on average closer to the vessel than single individuals within a high-risk angle ahead of the ferry. However, these animals seem to be generally aware of the presence of the ship, as suggested by their non-random swimming direction relative to the orientation of the vessel. Therefore, it is important to recognize the significance of fin whale behaviour prior to collision and in presence of ships, in order to improve the global management of the maritime activities and reduce unnecessary disturbances and impacts on marine animals.

H02

BOTTLENOSE DOLPHINS MOVEMENTS IN RELATIONS WITH ANTHROPIC ACTIVITIES IN MAJORCA (BALEARIC ISLANDS).

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Around the Balearic Islands bottlenose dolphins regularly interact with coastal artisanal fisheries. In response, the DGP initiated in 2000 a series of multidisciplinary projects to study the problem and to design possible mitigation measures.
The GIS programs are a powerful tool for the study of life history of marine mammals. Combined with the new generation of GPS navigators and the data obtained with photoidentification, they multiply the capacity of data field acquiring and its posterior analysis. With this new methodology we have collected and analyzed the data of 139 standardized surveys in a two zones: 1.250 Km^2 in Andratx, SouthWest of Majorca Island, and 1.115 Km^2 in Artà, NorthEast of Majorca Island, Western Mediterranean. Home range for 164 individually identifiable bottlenose dolphins was calculated using Kernel Home Range method. Data for these individuals were collected a six year (2004-2009). We have transformed the 4.138 sampling nautical miles into 92.226 “control points”. Each “control point” has associated the following variables: year, month, day, hour, position, sea state, cloud cover, boat speed, boat course, boats presence, fishing gear presence, sighting number, number of individuals, number of calves, swimming speed, feeding form, socializing y/n, resting y/n, non-classified activity y/n and identified animals presence. We have divided the zone of study in squares of 2x2 Km. Each square has two associate variables: depth and slope. So each “control point”, by his position, incorporated these two variables. Finally, we have calculated the perpendicular distance from the coast of each “control point”. With this great information volume we have analyzed the dolphin’s behaviour and its relationships with the human activities. They are observed differences between the population sizes in summer/winter. Furthermore exists a seasonal pattern summer/winter linked to the coast distance. These differences seem to have to the temporality of the human activity.

H03

ALBACORE TUNA FISHERIES AND MEGAFAUNA BYCATCH: COMPARING DRIFT NETS AND PAIR TRAWLING USING FISHERIES RISK ASSESSMENT

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The commercial fishing industry has diverse effects on ecosystems, including depletion of target species, damage to habitats and capture of non target species, such as marine mammals, seabirds and turtles. The incidental capture of non target species is an important management issue which has resulted in changes in fishing practice. One such change in fishing practice is the ban on driftnets by the European Commission in 2002, surface gillnetting being subject to lengthy debate regarding the high incidence of dolphin by-catch. In the Northeast Atlantic Albacore tuna *Thunnus alalunga* were targeted using surface gillnets and following the ban on gillnets in the EU are now targeted using pair trawlers. Pair trawling also experiences marine mammal bycatch, with incidental capture of bottlenose dolphin *Tursiops truncatus*¸ common dolphin *Delphinus delphis*, long-finned pilot whale *Globicephala melas*, minke whale *Balaenoptera acutorostrata*, white sided dolphin and *Lagenorhynchus acutus* all recorded. There has been a recent trend towards adopting ecosystem based fishery management which recognises the impacts of fishing on all ecosystem components. A key aspect of ecosystem based fisheries management is the application of risk assessment to assess the risks of a fishery to all aspects of an ecosystem. We used a hierarchical risk assessment process, developed in Australia, to assess and compare risks posed by the Northeast Atlantic gillnet and pair trawl tuna fisheries to the ecosystem. Factors examined included the impact of both fisheries on target species; by-product or bycatch species; threatened, endangered, protected species; habitats; and communities. The risk assessment process culminated in the identification of the species, habitats and communities most at risk from both types of fishery and assessed whether pair trawling for tuna was an improvement on gillnets, in terms of incidental capture of marine mammals.

H04

HIGH RISK AREA OF COLLISION: A MULTI-SPECIFIC APPROACH IN THE MEDITERRANEAN SEA BASED ON THE MODELISATION OF THE DISTRIBUTION AND PREFERENTIAL HABITAT

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Collision is one of the main threat fin whales and also sperm whales are facing in the Mediterranean Sea. Several works deal with the first species, but none deal with sperm whales nor with both species. We already know that the ecological niche of both species are separated, fin whales being more pelagic, beyond the 2000 isobaths, and sperm whales being more frequently seen over the continental slope. For that reason, we considered essential to study high risk area of collision for both species together in order to propose the best mitigation solutions including both species. For that purpose we gathered summer data in effort between 1998 and 2008 from 14 French and Italian organisms representing more than 68 000 km. Working on a regular grid of 0.1°x0.1° cell size, we calculate kriging values of observation rate (with R-cran) for both species in summer in the north western Mediterranean Sea. In parallel we developed the Ecological Niche Factor Analysis approach in order to define the preferential habitat of both species. On the other hand we built a database of shipping lanes of ferry and merchant vessels and we map the density of traffic (kilometres travelled per pixel). Lastly we cross both kind of information with ArcGis : kriging or ENFA results with the density of maritime traffic, to obtain high risk area of collision. Several maps of collision's risk were built, according to the speed class of the vessel (classical ferry versus fast ferry) and also according to daylight versus nigh time. The results show that fin whales were more at risk in high seas, merely by ferries travelling during night period, and sperm whales were more at risk by merchant vessel. Based on these "risk" maps, we propose some mitigation solutions to reduce ship strike potential for both species.

H05

STUDY ON THE CETACEANS-FISHERIES INTERACTIONS IN GALICIAN AND CANTABRIAN SEA WATERS (NORTHERN SPAIN) THROUGH FISHING TRIPS

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Since 2008 CEMMA has been involved in establishing communication links with the fishing sector to evaluate the impact of the interaction between them and cetaceans, in order to find solutions together. For two years (November 2008- November 2010) 180 fishing trips were carried out, controlling 500 net launches, and no accidental captures of cetaceans were observed. Fishing activity of trawlers, purse seiners and vessels using traps, longline, inshore drift gillnet ("xeito"), bottom trammel nets, and bottom set gillnets were sampled. The presence of three on-board observers allowed 75 sightings of cetaceans to be made, with 22 interactions (29.3%), of which 6 (27.3%) had a direct relationship with the fishing gear (in all cases, pair trawlers and purse seiners). Also 6 indirect interactions were registered, for example when firecrackers were used or when nets were broken by cetaceans in the "xeito" gear and bottom set gillnets. The only species involved in these indirect interactions was the bottlenose dolphin, *Tursiops truncatus*. In the case of "xeito" gear, it was possible to verify how the use of acoustic devices, like CPOD, were of great importance and usefulness in the collecting of nocturnal information concerning the presence of cetaceans in the fishing zone. Of the species implicated in the interactions, 50% belonged to *Tursiops truncatus*, 42.8% to *Delphinus delphis*, and 7.2% to *Globicephala melas*. It was demonstrated that the problematic interaction between the fishing sector and cetaceans is very complex, acquiring greater significance with certain fishing gear and with certain species. If we value the possibility of establishing reparations for the fishermen in gears such as "xeito" , and review the management systems and the commercialization of the fishing industry, as well as improving the direct collaboration within the sector as a whole, it will help in the conservation of cetaceans.

H06

BEHAVIOURAL RESPONSES OF RISSO'S DOLPHIN, *GRAMPUS GRISEUS*, TO REMOTE BIOPSY SAMPLING.

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Biopsy sampling from free-ranging cetaceans is a widespread method used in various biological studies. Since this is an intrusive research technique, it's important to determine its impact.
We examined the short-term behavioural reactions of Risso's dolphins, *Grampus griseus* (2.6-4m in length), off Pico Island, to remote biopsy sampling. Biopsies were conducted over a consecutive two year period using a crossbow with Finn Larsen bolts and tips. Sampling followed a number of precautionary rules, including taking samples only in calm seas, when animals were travelling; no more than 1-4 shots per group; and females with nursing calves were not exposed to sampling. Behavioural responses were analysed by visual observation using two scales of behavioural reactions: i) the reaction of the targeted individual, and ii) the reaction of the focal group to which the targeted individual belonged. We defined five categories of intensity of behavioural response (none, low, medium, high, very high) and five types of display response (quick dive, QD; diving & leaving, D&L; jumping, J; tail slapping, TS; and speeding away at surface, SS). A total of 189 shots were made (115 hits, 74 miss) during 61 survey days. Tissue was obtained in 83% of the hits. No significant differences were found between hits and misses in behavioural responses or types of display (Kruskal Wallis test). In 9% of the cases there was no visible reaction, while most (48%) behavioural responses were of low intensity. The frequencies of the display responses differed significantly from each other (chi-squared test). The types QD and D&L constituted 79% of the responses. Group reaction was observed during 1/5 of the shots, (main behaviour D&L-51%). Although biopsy sampling is an invasive method, our results indicate that if basic precaution rules are followed low intensity behavioural responses can be expected for half of the time.

H07

OBSERVATIONS OF OPERATIONAL INTERACTIONS BETWEEN THE PORTUGUESE SARDINE PURSE SEINE FISHERY AND CETACEANS

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Cetaceans are known to interact with numerous fisheries in many parts of the world resulting sometimes in detrimental effects for the animals (by catch and incidental mortality) and the fishery (reduction of catches, increasing fishing time, loss of gear, depredation). In Portugal, four of the 19 species of cetaceans found in continental waters overlap with the sardine purse seine fishery: *Phocoena phocoena*; *Delphinus delphis*; *Tursiops truncatus*; and *Balaenoptera acutorostrata*. In the present study, cetacean interactions with the fishery operating in different ports along the Portuguese coast were studied from Spring to Fall 2010. Observers monitored over 80 fishing trips and this at-sea work was complemented by an interview survey carried out to all the purse seine skippers operating off the Southern coast (Algarve). Only *Delphinus delphis* was observed to interact with fishing activities, which most frequently occurred in the Southern coast (Algarve). Mean fishing effort values decreased significantly in the presence of common dolphins while CPUE did not change significantly. Voluntary reports of accidental captures reveal that *Delphinus delphis* may be the species of most concern with variable survival after encirclement and release (25-76 %) within ports, while captures or interactions of *Phocoena phocoena*, *Tursiops truncatus* and larger cetacean species occur less frequently with increased survival success. Fishermen in most cases are indifferent (mix of positive and negative feelings) about the impact of cetaceans on their activities, although the most frequently cited negative effect is that dolphins may reduce catches (disperse fish). In the fishery, most of the captured cetaceans are released alive and voluntary mitigation measures (steaming to other fishing grounds or wait before shooting) take place frequently. Regional variability and annual fluctuations in the rate of interactions and accidental captures for the fishery requires increased and continued observation effort in order to attain better estimates of its impact.

H08

HOW MANY STRAND? OFFSHORE MARKING AND COASTAL RECAPTURE OF CETACEAN CARCASSES.

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The set up of stranding networks worldwide for last years had provided valuable data to examine different aspects of cetacean biology and to determine their main threats. However, the ratio between the number of carcasses that strand and are recovered throughout the coast, and the cetaceans that die at sea is still unknown. At present, CEMMA is conducting a research project that focuses on fisheries-cetaceans interactions in Galician waters (NW Spain) and that includes the design of a mark-recapture system to be applied to cetacean carcasses using plastic bridles. Between September 2007 and November 2010, three observers were placed onboard 95 fishing vessels (trawlers, purse seiners and vessels using traps, longline, inshore drif gillnet ("xeito"), bottom trammel nets, and bottom set gillnets) working in Galician waters, and by-caught cetaceans were marked onboard in tight collaboration with fishermen. During this research period, 30 by-caught cetacean carcasses (29 common dolphins, *Delphinus delphis*, and 1 long-finned pilot whale, *Globicephala melas*) were marked and released offshore. Eight of the marked common dolphins (26.7% of the total carcasses) were recovered later by the Galician stranding network, created in 1990 and managed by CEMMA along the 1190 Km of the Galician coast. On average, the carcasses were drifted ashore by the wind and oceanic currents at a mean speed of 15.5km/day, covering distances between 27 and 320 km. The annual average of cetacean strandings in Galicia is of 233 animals, from which 39.5% are definite or possible by-caught. This pilot and innovative study will allow us to evaluate more precisely the potential impacts of by-catch over the local cetacean community, and specially on the population of common dolphin, which is the species involved in this mark-recapture study.

H09

STUDYING THE INTERACTIONS BETWEEN CETACEANS AND FISHING IN GALICIA (NW SPAIN) THROUGH INTERVIEWS TO FISHERMEN.

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Interactions between cetaceans and fisheries are frequent, above all in areas such as the Galician waters, where an important cetacean community meets with a large fishing fleet. Occasionally, interactions mean negative effects for both fishermen and cetaceans. One of the main interactions related to the conservation of cetacean species is by-catch. In order to gather information about these interactions, between October 2008 and October 2010 CEMMA conducted a total of 907 interviews with fishermen of the Galician main ports and fishing gears. The interviews ranged from cetacean knowledge and perception to analysis, evaluation and possible solutions to reduce cetacean-fisheries interactions. Among the interviewees, 99.8% stated that they met with cetaceans during fishing activities, but only 25.6% identified species correctly. As the main damage caused by cetaceans, the answers varied depending on the type of gear, thus 66% of the fishermen working with purse seine gears consider thatcetaceans scatter fish away and hinder fishing, 96% of fishermen using inshore drift gillnets ("xeito") say that they damage the gear, whereas only 6% of trawler fishermen think that they interrupt or reduce fishing activity. Out of the interviewees, 55.9% stated that they had made by-catches. The most affected species are: common dolphin (*Delphinus delphis*) 75.0%, bottlenose dolphin (*Tursiops truncatus*) 7.0% and harbour porpoise (*Phocoena phocoena*) 4.0%. Cetacean mortality varies also according to the fishing gear: trammel nets ("miños") 92.1%, trawling 84.6% and purse seine 4.8%. Interview studies are an important means of analysis of the interactions between cetaceans and fisheries, complementing other more direct studies. Also, because of the contact with the fishing industry that the interviews require, they are a fundamental tool for the exchange of information and to raise awareness towards the conservation of cetacean species and the marine environment in general.

H10

CETACEAN WATCHING´S EVOLUTION IN THE STRAIT OF GIBRALTAR SINCE 2003-2010 SEASON

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The Strait of Gibraltar is situated in the South of Spain. It is the natural separation point between the Mediterranean Sea and the Atlantic Ocean and between Europe and the African continent. We can identify seven different species of cetaceans: common dolphin, bottlenose dolphin, striped dolphin, pilot whale, fin whale, sperm whale and killer whale.
In this work we have studied cetacean's evolution since 2003 to 2010 in the period from May to September on board the boats Jackelin and Dolphin Safari, owned by the whale watching company TURMARES TARIFA.
The data from 2846 registers, according to the Spanish Cetacean Society (SEC), was analysed. In order to obtain this registers it was necessary an effort of 2882.01 hours at sea and 48091.22 km travelled.
The results showed that the pilot whales, bottlenose dolphins and striped dolphins were the most sighted species. Common dolphins have decreased and most of them are now living in Algeciras's Bay and also a decrease in the sightings of fin whales and killer whales.
We conclude a decrease in the rate-meeting animals and the number of sightings from 2007. Probably this decrease is due to the new harbour opened in Tangier (Moroccan coast) with new maritime routes crossing several times every day in the middle of the study area were the animals live and the number of sightings of killer whales fell, probably due the reduction in catching level of tuna fish produced by the European Union.

H11

POSSIBLE CAUSES FOR A MASS STRANDING OF HARBOUR PORPOISE IN DANISH WATERS IN 2005

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An unprecedented 85 harbour porpoises stranded freshly dead along approximately 100 km of Danish coastline from 7-16 April, 2005. This is substantially above the mean weekly stranding rate (2.50 animals) and the mean stranding rate for April in other years (7.67) from 2003 to 2009 throughout Denmark from any cause of death. Bycatch was established as the cause of death for most of the 85 animals through typical indications of fisheries interactions, including loss of tail flukes, and net markings in the skin and around the flippers. Local fishermen then admitted unusually large porpoise bycatch in nets set for lumpsuckers and the mass stranding was attributed to an early lumpsucker season. However, Bayesian analysis of lumpsucker catches from 2003 to 2009 show that 2005 was not unusual in terms of season onset, peak or total catch. There was also no markedly unusual activity recorded for other fisheries in the area. Several other natural and anthropogenic contributing factors were thus considered. At the time, much speculation surrounded the role of the naval exercises that coincided in time with the strandings. Indeed, military vessels from various countries were in the area at the time of the strandings en route to the largest naval exercise in Danish waters to date (Loyal Mariner '05, 11-28 April). It is conceivable that many ships will have been testing their equipment, including sonar, prior to the main exercise and it cannot be determined from the information available if this was, or was not, acting as a contributing factor. It should be noted that the mass strandings did not continue into the exercise, although a survey conducted during the exercise observed unusually low harbour porpoise densities in the area. There has been no pile driving associated with wind farm construction in the area.

M01

THE USE OF COMPUTERIZED TOMOGRAPHY AND MAGNETIC RESONANCE IMAGING IN FORENSIC INVESTIGATION: NECROPSIES WITHOUT OPENING DOLPHINS?

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In the last decade, the increase in the use of imaging techniques such as computerized tomography (CT) and magnetic resonance imaging (MRI) on marine mammals has led to a parallel increase in the number of pathological cases reported with these procedures. More accessible equipment and more rapid data acquisition have facilitated their use in marine mammal medicine and research. Using CT and MRI, 10 very fresh dolphins and 10 dolphin's heads (*Delphinus delphis*, *Stenella coeruleoalba* and *Tursiops truncatus*) were examined in sagittal, coronal and axial planes. Images were treated and three-dimensional (3D) reconstructions made with Osirix® software. 3D images allowed virtual visualizations of the dolphin's external morphology, internal organs, systems or lesions in a vision very similar to that obtained from necropsies. During this study, CT and MRI scans permitted the diagnosis of pathological conditions, including bone lesions, parasite infestations, pneumonias, abscesses and tumours. Imaging techniques appeared to be superior to necropsies in revealing certain lesions, particularly in bony tissues. Furthermore, opening the cranial cavity to explore the brain and dissection of the ears or the paraotic sinuses are complex and time-consuming procedures during the necropsies. CT and MRI have demonstrated their utility as valuable tools for previous scanning in search of lesions in these locations. Despite this, CT and MRI didn't provide definitive diagnostics in most of the cases, and also doesn't allow sampling. The implementation of modern imaging techniques into forensic human and animal pathology is rapidly increasing, but these virtual and non-invasive approaches cannot replace direct examination and sampling for further analysis during the necropsies. Nevertheless, CT and MRI examinations previous to the opening of the carcasses are a very useful tool to search for some lesions, considerably improving post-mortem information and allow re-examination of the cases even many years later after the necropsy.

M02

TRAUMATIC INTERSPECIFIC INTERACTION BETWEEN A STING RAY AND A FALSE KILLER WHALE (*PSEUDORCA CRASSIDENS*)

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We report the case of a subadult male specimen (246 cm length) of false killer whale (*Pseudorca crassidens*) stranded alive on the beach of Papagayo, Lanzarote (Canary Islands). The animal was attended on the beach by tourists who tried to return it to the sea, the animal beached again and died. It was later transferred to the facilities of the Canary Cetacean Museum (Puerto Calero, Lanzarote), dependent on the Society for the Study of Cetaceans in the Canary Archipelago, where a complete necropsy was performed on the same day. The animal showed a poor nutritional status. Among the external lesions we highlight the presence of a large shark bite around the perimeter of the dorsal fin with associated hemorrhages in the tissue of the wound edges affecting skin, subcutaneous and muscular planes. Epaxial skeletal muscle showed marked atrophy. Aditionally, generalized atrophy, mixed multifocal myositis, severe degenerative changes, segmental hypercontraction and contraction band necrosis in fibers of smaller caliber were observed microscopically. The main macroscopic finding found was the presence of a ray sting causing a deep penetrating wound from the ventral surface through the right dorsal area of the tongue affecting the ceiling of the oral cavity in its caudal region (soft palate) with severe inflammatory reaction. Microscopic examination showed a necrotic and pyogranulomatous glossitis and stomatitis associated with a foreign body trauma and bacterial secondary infection. To our knowledge this is the first case of traumatic interspecific interaction affecting a false killer whale and a sting ray (only described in bottlenose dolphin and killer whale). Injuries resulting from the sting in the tongue and the oral cavity caused the inability of the animal to continue feeding provoking weight loss and progressive weakness and leading subsequently to the incidents of sharks attacks, stranding and finally, death of the animal.

M03

MORPHOLOGICAL IDENTIFICATION OF PARASITES FOUND IN THE STOMACH CONTENTS OF BYCAUGHT STRIPED DOLPHINS (*STENELLA COERULEOALBA*) FROM TURKISH EASTERN MEDITERRANEAN SEA COAST

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One of the causes for major health problems in marine mammals is parasites in their digestive systems. These parasites are common and result in various pathological disorders such as ulceration, obstructions, gastric and intestinal bleeding in cetaceans. In Turkey there have been studies on feeding ecology of cetaceans but still there is very little information on parasites, including those found in stomachs. In this study, macro parasites were collected and examined from the stomach contents of six striped dolphins (*Stenella coeruleoalba*) bycaught during the swordfish fishing off the Turkish coastal town Fethiye in the Eastern Mediterranean Sea in 2003 and 2004. All stomachs were infected by nematodes. These nematodes were preserved in70% ethanol and examined after cleaning and transparation by lactophenol. They were identified as Anisakis spp., Contraceucum spp., Otostrongulus spp., Streptocora spp. Their measurements were taken. There were different larval forms observed.This is the first study on parasites found in the stomach contents of striped dolphins in Turkey. It is, however, only the preliminary one, thus more samples should be collected and examined to understand the cetacean parasites in the Turkish waters.

M04

SYMPTOMS OF IMMUNOLOGICAL DECREASE IN BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) AND SHORT-FINNED PILOT WHALES (*GLOBICEPHALA MACRORHYNCHUS*) IN THE SOUTH WEST OF TENERIFE

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Resident populations of bottlenose dolphins (*Tursiops truncatus*) and short-finned pilot whales (*Globicephala macrorhynchus*) can be observed during all year round in the SW of Tenerife Island. During the last two decades this area has experienced a significant anthropogenic impact related to the increase of different activities. 5 aquaculture fish-farms, two maritime lines, an uncountable number of fishing and aquatic-sports' platforms, more than 30 Whale Watching and charters' boats visiting the animals every day, together with the uncontrolled discharges of submarine emissaries take place in these waters. Their impact on the animals remains unknown. From September 2008 to October 2009, we developed a preliminary study about the health status of the resident cetacean species, focusing our research on the identification of skin diseases, which have been extensively related to immunological decrease. 52 surveys on board opportunistic Whale Watching boats and an inflatable boat were developed. 14.817 pictures were taken with a Canon EOS 30D and two lenses (SIGMA 55-200mm and Canon 70-200mm). Bottlenose dolphins were opportunistically photographed. When possible, 4 pictures of both sides of the short-finned pilot whales were taken, shooting from head to fluke in 4 frames. Digital pictures were analyzed with the software Canon ZoombrowserEX. Natural marks and scars were disregarded and skin affections were classified by their shape, length, colour and severity. They were widely distributed on the animals. Adults and sub-adults of both species and juveniles of short-finned pilot whales showed tattoo-like skin diseases. Severe affections were found in adult short-finned pilot whales and in associated to fish-farms bottlenose dolphins. These results point to clear symptoms of immunological decrease in cetaceans in the area, probably related to human impact. Further studies focused on the follow-up of these affections and the determination of their causes are highly recommended.

M06

INFECTION WITH *BRUCELLA CETI* AND HIGH LEVELS OF POLYCHLORINATED BIPHENYLS (PCBS) IN BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) STRANDED ON THE SOUTHWEST COAST OF ENGLAND

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Brucella species was first identified in marine mammals in Scotland in 1994. Since then Brucella infection has been found in many species of marine mammals on a global basis. Evidence of Brucella infection in bottlenose dolphins (*Tursiops truncatus*) is, however, particularly scarce. Between June 2004 and December 2007 a total of eight bottlenose dolphin carcases that stranded in Cornwall UK were examined using standardised necropsy and bacteriological methods. Evidence for Brucella species infection was found in 4/8 dolphins on culture. In addition, 6/8 dolphins tested positive (n=4) or weakly positive (n=2) for antibodies to Brucella sp. on serological analyses of pericardial fluid using a competitive ELISA and two indirect ELISAs. High or very high levels of the sum 25 individual chlorobiphenyl congeners (sum25CBs) were also determined in blubber samples from 2/2 of these bottlenose dolphins (45.5 and 446.6 mg/kg lipid weight, respectively). Such high exposure to potentially immunosuppressive pollutants may play a role in the pathogenesis of brucellosis in this species and pose an ongoing threat to the conservation status of small inshore bottlenose dolphin populations in UK and other waters.

M07

APPROXIMATION TO THE PATHOLOGY AND CAUSES OF DEATH OF STRANDED CETACEANS IN THE SOUTHWESTERN COAST OF SPAIN (2001 - 2005)

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In order to establish an approximation to the pathology and causes of death of existing species in the southwest coast of Andalusia (Spain), forty-seven stranded cetaceans were studied between 2001 and 2005. The animals recovered were: fifteen common dolphins (*Delphinus delphis*), eight striped dolphins (*Stenella coeruleoalba*), seven bottlenose dolphins (*Tursiops truncatus*), six minke whales (*Balaenoptera acutorostrata*), five harbour porpoises (*Phocoena phocoena*), two fin whales (*Balaenoptera physalus*), one long-finned pilot whale (*Globicephala melas*) and three more delphinids that could not be identified. The study was performed using a systematic standardized necropsy and histopathological protocol. Because of the decomposition status of the carcasses, a complete or partial necropsy was done to twenty-eight animals (59.57%), and samples were collected from twenty-three of them (48.94%) for its histopathological study. Causes of death (defined as pathological entities) of twenty-six animals (55.32%) could be diagnosed. Most of the necropsied cetaceans (84.62%) were diagnosed as natural pathological entities that included consumptive (46.15%), non consumptive (23.08%) and neonatal/perinatal (15.38%) pathologies. The remaining animals were diagnosed as anthropogenic origin pathological entities (15.38%) that included fishing interaction (11.54%) and ship collisions (3.84%). The most frequently observed lesions were those related to infectious diseases, active stranding and advanced age of animals. This study supports the usefulness of pathological studies in stranded animals for health population management.

M08

CONSIST OF MICROFLORA OF THE UPPER RESPIRATORY TRACT OF THE BLACK SEA BOTTLENOSE DOLPHIN (*TURSIOPS TRUNCATUS*) IN CAPTIVITY CONDITION.

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As a rule in the dolphinariums microbial pollution and species composition of microorganisms of the environment (water, air and other objects) are above and different, than in natural areas of dwelling of wild cetaceans. Therefore even clinically healthy and adapted dolphins are exposed to risk of occurrence of infectious diseases. It is known, that the specific composition of microbial associations in animal and human organisms in directly dependent on physiological state of macroorganism. So it is necessary to studying the consist of microflora of the upper respiratory tract of the Black Sea bottlenose dolphins containing in the captivity conditions for an estimation of their status of health. But now the species composition of normal microflora of the organisms of the different cetaceans is studied insufficiently. Therefore investigation of structure of microbial associations of upper respiratory tract of clinically healthy adapted animals containing in the captivity condition and definition of sanitary-indicative microorganisms of water and air for dolphinariums were our primary goals.
In August 2009 we surveyed 8 Black sea bottlenose dolphin (*Tursiops truncatus*) in the Odessa dolphinarium. For microbiological investigations we take smears from the upper respiratory tracts of the animals by sterile swabs and samples of water. For an estimation of a physiological condition of animals conducted hematological and immunological researches.
From each dolphin we isolated 3 - 5 different species of microorganism. More of them were from family Enterobacteriaceae, first of all next generals: Escherichia, Providencia, Enterobacter, Proteus. The Staphylococcus, Enterococcus, Pseudomonas has been isolated in insignificant quantity. All of isolats of microorganisms did not have pathogenic factors. We have defined sanitary-indicative microorganisms for water of a dolphinarium and we consider that it not only Escherichia coli and Enterococcus but also hemolytic Staphylococcus and Streptococcus.

M09

MOLECULAR CHARACTERIZATION OF *TOXOPLASMA GONDII* ISOLATES FROM MENINGO-ENCEPHALITIS AFFECTED STRIPED DOLPHINS (*STENELLA COERULEOALBA*)*

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Toxoplasma gondii is a parasitic protozoan of increasing concern for both free-ranging and captive cetaceans. Nevertheless, information on epidemiology, biology, genetics and pathogenic potential of *T. gondii* for aquatic mammals is incomplete. This work reports the molecular characterization of T. gondii isolates recovered from the brain tissue of three striped dolphins (*Stenella coeruleoalba*) found stranded in 2007-2008 along the Ligurian Sea coast of Italy. These animals showed a severe, subacute to chronic, non purulent, multifocal meningo-encephalitis, with the cerebral parenchyma of two dolphins also harboring protozoan cysts and zoites immunohistochemically identified as *T. gondii*. The three animals scored positive upon PCRs for B1, uprt1 and gra6 T. gondii genes. Specifically, two isolates resulted identical to each other (TSL2 and TSL6 isolates), while the third isolate (TSL3) showed a different molecular profile. In spite of the different molecular patterns characterizing the above *T. gondii* genotypes, the brain lesions observed in the three animals showed common microscopic features. Although immunohistochemical, biomolecular and serological investigations against Morbillivirus as well as microbiological and serological examinations against Brucella spp. yielded negative results in all three dolphins, the limited number of specimens investigated herein does not allow to definitively establish a primary role of *T. gondii* in causing meningo-encephalitis in these stranded cetaceans. Hence, further studies are needed to elucidate a number of epidemiological, biological and pathogenetic features of *T. gondii* infection in free-ranging cetaceans, with special emphasis on "pelagic" species such as striped dolphins.

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M10

ESTABLISHING POLLUTANT-INDUCED BIOMARKERS IN SEALS: MRNA EXPRESSION LEVELS OF AHR, ARNT AND PPAR ALPHA IN BLOOD SAMPLES

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Harbour seals and grey seals are top predators in the marine food web, accumulate pollutants and can be considered as bio indicators for effects of anthropogenic impacts in the marine ecosystem. In recent decades, the harbour seal population in the North Sea experienced high prevalences of parasitism and PDV outbreaks. The grey seal population in the Baltic Sea experienced reproductive problems and osteoporosis as well as intestinal parasitism and colon ulcers. Environmental contaminants were suspected as causal or contributing factors in both species. To assess the impact of anthropogenic stressors on the health status and immune system of seals molecular methods were developed. Our aim was to measure mRNA expression levels of proteins that are relevant for immuno-modulatory functions and that regulate relevant physiological mechanisms in the seal metabolism. In this study RNA was isolated from blood samples of 16 live caught harbour seals from the North Sea in 2009/2010 and 8 live grey seals being released from Marine Station Hel at the Baltic Sea coast in 2010. Expression levels of cytokines (IL10, IL2), acute phase protein haptoglobin (HP) and heatshockprotein (HSP70) were measured using quantitative PCR with ß-actin, YWHAZ and ß2M as housekeeping genes. Additionally the dioxin-related markers AHR and ARNT together with PPARalpha were established as new pollutant-induced biomarkers in harbour and grey seal blood for the first time. Expression levels were compared between species, correlated to sex, age, weight and length of the seals and to the results of routine haematology. The results show significant differences in mRNA expression levels of the parameters in harbour seals between the two years. The bioanalytical methods used in this study have produced baseline data for the two seal species and relatively non invasive biomarkers as a potentially valuable means of monitoring marine mammal populations exposed to elevated levels of contaminants.

M11

SEVERE THORACIC KYPHOSCOLIOSIS IN A SUBADULT COMMON DOLPHIN (*DELPHINUS DELPHIS*) BY-CAUGHT IN NORTHERN PORTUGAL

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Few different types and degrees of vertebral column malformations have been described in wild and captive cetaceans. Kyphosis (abnormal curvature in sagittal plane) and scoliosis (in coronal plane) as well as some variations and/or combinations, can be externally visible even in early developmental stages. On April 2009, a sub-adult male common dolphin (*Delphinus delphis*) 2-3 years old (161cm) with a prominent deformity of the dorsal thoracic area was stranded dead in northern Portuguese coast. The animal's nutritional condition was moderate to thin, and multiple external net marks, a light verminous pneumonia and a vertebral column deformity were the most profound findings at the necropsy. By-catch was established as the most plausible cause of death. The complete skeleton was cleaned and prepared to allow a detailed study. Multiple exostosis and osteophytes, as well as deformations and deviations from normal anatomic conformation were observed in several thoracic vertebrae (T5 to T8 and T13 to T17), specially located in the right articular facets of the mammillary process, the vertebral arch and the spinous process. Nevertheless, the core of the deformation was located between T9 and T12, which presented a total fusion of the vertebral bodies due to a proliferation of bony tissue and a severe anatomic deformity. This portion of the column rotated upward at a 45 degree angle (T9-T11) and then shifted 90 degrees clockwise (T12-T13), for finally re-take the direction (T14) to backwards. Etiologies of column deformities are difficult to determine, especially in stranded cetaceans without anamnesis and a complete clinical history. Regardless of whether the kyphoscoliosis described in this case was congenital or acquired, the death of the dolphin due to by-catch and its almost healthy status confirm the extraordinary capacity of those species to develop normal life with such structural deformities.

M12

SUN-INDUCED SKIN LESIONS AND ASSOCIATED RESPONSES IN CETACEANS

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Although global ozone over the poles is no longer decreasing, signs of recovery are still unclear and each year large amounts of solar ultraviolet radiation (UVR) continue to reach our biosphere. The harmful effects of these UVR have been widely studied in human and laboratory animals but remain mostly unknown in wildlife species. While most species have fur, feather or keratinized plates that protect them from UVR, cetaceans do not. We aimed to demonstrate that cetaceans, which are constantly exposed to the sun, are affected by UVR, particularly those species with light skin and spending longer time at the surface. Using histological analysis of biopsies and high-quality photographs, we characterized and quantified skin lesions in three cetacean species (blue whale, fin whale and sperm whale) in the Gulf of California. To examine the molecular pathways that whales use to limit and resolve UVR-induced DNA damage, levels of expression of genes involved in DNA damage repair were quantified. We not only found evidence of skin lesions characteristic of acute sunburn but also that these were significantly higher in blue whales, the lightest species and in sperm whales, which spend longer at the surface. Sperm whales also showed significantly higher levels of HSP70 expression, an indication of cell stress. Moreover, individuals with more melanocytes showed fewer lesions and more apoptotic cells, suggesting that darker pigmentation is advantageous to whales. Unexpectedly, paler skin individuals had lower expression of Kin17, a DNA damage repair gene, implying that alternative mechanisms to counter UVR damage might occur. This study adds knowledge on our understanding of the relevance of UVR damage on cetaceans and suggests an evolutionary significance of cetacean pigmentation and damage repair.

M13

HEALING OF SKIN BURN INJURIES AFTER HOT IRON BRANDING IN STELLER SEA LION PUPS

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The long-term monitoring of demographic parameters in Steller sea lions requires permanent marking of individuals within the population. The application of unique marks with hot-iron branding has been shown to be the only reliable method for permanent marking. However, skin injuries caused by the burning might negatively affect the health of the animals. We examined the healing of brands applied to 100 Steller sea lion pups in July-August 2010, at Medny Island (Commander Islands). Depending on working conditions at the rookery, the skin burns were thermal (if the hair during branding was dry), or thermal and steam if the hair was wet. We found significant differences in rates of burn healing among pups branded with dry versus wet fur. The symptoms of inflammation began on 6,5±0,7 days among pups with dry hair and on 4,6±0,3 days among pups with wet hair (ANOVA, $p<0,001$). The burned skin sloughed off on 6,5±0,7 days among dry (groups 1 and 2) and on 10,0±0,3 days among wet (group 3 and 4) pups (ANOVA, $p<0,001$). Granulation tissue in pups with dry fur formed about one day earlier than among pups with wet fur (t-test, $p <0,01$), and scar tissue in pups with dry hair appeared almost three days earlier (19,6 ± 2,24 vs 22,0 ± 1,0 respectively; t-test, $p <0,0001$). We found no significant difference in duration and quality of burn healing relative to the sex of pups. Local action of the antibiotic oxytetracycline in an aerosol application with a single treatment had a positive effect in 26% of pups with dry hair only. Cases of rapid deterioration of animal health or death associated with burns were not observed. The inflammation after the brand application appeared to be local and we found no apparent negative health effects. Research funding provided by NMFS/NOAA.

M14

EVIDENCE OF EXTRAPINEAL MELATONIN PRODUCTION IN THE BOTTLENOSE DOLPHIN (*TURSIOPS TRUNCATUS*)

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The unequivocal existence of a pineal gland in cetaceans is still a matter of debate, being documented in some species but unclear in others. The main hormone produced by the pineal, melatonin, is involved in many physiological actions and especially in the regulation of circadian rhythms. Melatonin was recently quantified by our group for the first time in a cetacean species, the bottlenose dolphin. Concentrations were determined in samples of circulating blood from two groups of captive specimens, during a period of seven months. Our results showed a significant variation among months, indicating a circannual fluctuation, while a circadian variation was present but not significant. Gross dissection of a series of twenty-four bottlenose dolphin brains did not reveal the presence of a pineal gland (with one doubtful exception), so we investigated the presence of melatonin production in other tissues reported in literature, focusing on the retina, the Harderian gland and the gut. Hydroxy-indole-O-methyl-transferase (HIOMT) was chosen as a molecular biomarker, since it is the ultimate enzyme involved in melatonin synthesis and therefore highly specific for melatonin-producing tissues. We used a validated primary antibody (courtesy of Dr. Fukuda, Jikei University School of Medicine of Tokyo) raised in rabbit against human HIOMT to find immunoreactive cells. Positive controls were represented by bovine pineal glands. Ongoing investigations are currently trying to identify eventual melatonin producing neural cells in the dorsal thalamus and pericallosal region in a series of bottlenose dolphin brains, using pineal molecular markers reported in literature.

M15

CHARACTERIZATION OF THE ARYL HYDROCARBON RECEPTOR (AHR) IN STRIPED DOLPHIN (*STENELLA COERULEOALBA*) AND IMPLICATIONS IN HALOGENATED AROMATIC HYDROCARBONS RESPONSE SUSCEPTIBILITY

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The aryl hydrocarbon receptor (AHR) is a highly conserved protein which plays a fundamental role in cell defence against external toxicant because of the ability of the receptor to control the expression of drug-metabolism enzymes, in particular planar halogenated (PHAHs) and polycyclic aromatic hydrocarbons (PAHs).
As marine mammals are strongly exposed to PHAHs contamination, knowledge on the mechanism of action of the AHR is therefore required for a correct risk assessment and for understanding the sensitivity of different species to response to toxic chemicals mediated by AHR.
In this work, the full length coding sequence of the striped dolphin (*Stenella coeruleoalba*) AHR was obtained, measured its ability to bind TCDD comparing several other cetacean species and tested the transcriptional activity by means of transient transfection assay.
The deduced amino acid sequence of the AHR described in this study presents high levels of homology with the other sequence of mammalian species. The striped dolphin exhibits the lowest affinity to [3H]TCDD among the other species considered in the assay, although the results show the ability of specific binding to the dioxin. This put the striped dolphin in a position of lower potential sensitivity to dioxin effects compared to the other cetaceans species considered. Interestingly, trans-activation of the receptor demonstrated that the AHR in striped dolphin is activated by the binding with TCDD, hence showing higher levels of constitutive AHR than the other species taken into examination. The ability to accumulate high concentration of POPs and the high TCDD-binding affinity demonstrated that cetaceans are particularly exposed at toxicological risk. Since a wide variability and inter-specific diversity in the efficiency and binding affinity of the AHR is known, the functional characterization of the receptor in different species could be useful to understand the different sensitivity of the species to PHAHs.

M16

PARAMETRIC MODELING OF DOLPHIN DORSAL FIN

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Description of the dorsal fin shape is used in different studies of dolphin's biology, including population dynamics, migrations, and social behaviour. A general parametric scheme in modeling of the dorsal fin shape in small cetaceans is proposed. The parametric model is based on the equations defining the difference in growth of the leading and trailing edge of the fin. Validation of the model was carried out on 25 photographs of 5 species of dolphins. To assess the ability of the model to fit original fin outline, the Ym coordinates of the model were compared with the Yf coordinates of the fin outline at the same set of the X coordinates. Correlation coefficient r, error Sr of the correlation coefficient, difference in means, as well as difference in standard deviation was used for the comparison. It was shown that model can reproduce the different fin outlines with high accuracy. The scheme of the fin shape parameterization allows a wide range of modification of the initial outline. It exceeds the limits of species-specific fin shape as virtually any outline can be modeled by altering the model parameters. Utilization of the parametric model revealed similarity in curvature pattern of the fin outline in representatives of different genera of dolphins. The results obtained can be used in studies of external morphology of dolphins.

M17

ACUTE STRESS INDUCED CARDIOMYOPATHY IN CETACEANS STRANDED ALIVE: A HISTOPATHOLOGIC CHARACTERIZATION.

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The goal of the present work is to describe the cardiac lesions found in cetaceans stranded alive. Active strandings are known to be very stressfull situations. We report the microscopical pathological changes found in 64 animals of 16 different species that stranded alive along the coast of Canary Islands from 1992 to 2010. Heart tissue samples were collected, fixed in 10% neutral buffer formalin and embedded in paraffin wax. Sections were stained with Hematoxylin-Eosin, Mallory's Phosphotungstic Acid-Hematoxylin (PTAH), Masson's Trichrome and Periodic Acid-Shiff (PAS). With these stainings we observed cardiac lesions consisting with acute degenerative changes like Contraction Band Necrosis (CBN), cytoplasmic fragmentation, myocytolysis and loss of cross striations. CBN develops after transient ischemia, and it is the characteristic myocardial lesion associated with elevated endogenous catecholamines. On the other hand, immunohistochemistry of the same sections was performed using polyclonal primary antibodies including myoglobin, fibrinogen and c-fos. Degenerated cardiomyocytes showed depletion of myoglobin, deposition of fibrinogen and intranuclear expression of c-fos. Acute ischemia produces early myocardial cell membrane rupture, causing depletion of cytoplasmatic myoglobin and deposition of plasma proteins, such as fibrinogen, in myocytes. Additionally it's known that immunodetection of c-fos in cardiomyocytes is an indicator of catecholamine-mediate cardiomyopathy in human being. The cardiac lesions found were interpreted as physiological stress related to stranding and transportation. Our observations may explain why these animals die suddenly from handling and transportation when stranded alive and why the mortality of rescued cetaceans is very high.

M18

IS IT POSSIBLE TO SEX LONG-FINNED PILOT WHALES FROM PROPORTIONS OF THEIR DORSAL FIN?

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An important parameter in life history parameter estimations is to be able to distinguish males from females. It is commonly thought that long-finned pilot whales males have different size and shape of dorsal fin than females. In the Strait of Gibraltar we sexed 44 adult individuals genetically (17 females and 27 males) for which we had high quality pictures of the entire dorsal fin at a perfect perpendicular angle. A mean of 5 pictures per animal (range 1-12) was available. A total of 4 measurements in pixels (base length, height length, total length and tip length) and 2 angles (front to tip from the base and back to tip from the base) were realised on all the pictures. The 6 ratios of the measurements and both angles were compared between sexes to look for differences. A Factorial Discriminant Analysis was realised with cross validation. A good classification could be made only for 70.4% of the data which is not sufficient to clearly classify a dorsal fin as either male or female based on any of the measurements used. These results indicate that the difference between sexes taken solely from the dorsal fin shape and proportion is not possible or at least not reliable for all the adults. Although a very large male can easily be sexed in the field, this study shows that sex can not be deducted simply from a picture of the dorsal fin.

M19

COMPLEX POLYSACCHARIDE INCLUSIONS IN SKELETAL MUSCLE OF STRANDED CETACEANS RESEMBLING EQUINE POLYSACCHARIDE STORAGE MYOPATHY: NECROPSY STUDY OF 148 SPECIMENS IN THE CANARY ISLANDS.

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Equine polysaccharide storage myopathy (EPSSM) is a metabolic myopathy characterized by abnormal accumulation of glycogen and glycogen-related polysaccharide in skeletal muscle fibers of affected animals. The presence of chronic myopathic changes (fiber size variation and internal nuclei) is also considered criteria diagnostic.

Skeletal muscle of small and large odontocetes and misticetes (148) of 19 different species was examined. The animals were of both sexes and ranged from neonatal to old age stimated by length and histopathological findings.

Samples were obtained during necropsy procedure, fixed in 4% neutral buffered formalin, routinely processed and stained with hematoxylin and eosin (HE) and periodic acid-Schiff (PAS) for glycogen. In addition, skeletal muscle samples were immunostained to detect ubiquitin and fast and slow myosin heavy chain isoforms, type II and type I, respectively, using the avidin-biotin-peroxidase method.

Sections were examined for abnormal glycogen content, amylase resistant complex polysaccharide and chronic myopathic changes.

A total of 26 cetaceans (14 females and 12 males) with lesions of polysaccharide storage myopathy were identified. Affected animals belonged to 11 different species with the highest incidence recorded in family Delphinidae. The histopathological diagnosis was made for samples containing few to multiple intramyofiber inclusions of blue (basophilic) material with HE stain. These inclusions were intensely PAS positive and amylase resistant, which replaced all or part of the fiber segment. The number of affected fibers ranged from few to many, which most often occurred singly or in small cluster at the periphery of fascicles.

Even if type II fibers, immunostained against fast-myosin antibody, were preferentially involved, type I fibers were also affected in some cases.

All amylase resistant inclusions contained ubiquitin, while this protein was not detected within normal myofibers, as has been previously reported in affected horses.

Results of this study are the first description of skeletal muscle complex polysaccharide inclusions resembling EPSSM in cetaceans.

M20

THE PRODUCING AND THE USING THE ANTISERUM AGAINST THE IMMUNOGLOBULIN G OF THE STELLER SEA LION (EUMETOPIAS JUBATUS) IN ORDER TO CONDUCT IMMUNO-ECOLOGICAL INVESTIGATIONS OF MARINE MAMMALS.

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The investigation of the immune system of marine mammals is of special interest evolutionarily as a group of secondarily aquatic mammals, and also ecologically as representatives of the aquatic fauna of the upper trophic levels and those the most exposed to the effect of environmental factors (toxicants, impoverishment of forage resources, epizootic). The disturbance of immune mechanisms at the organism level reduces substantially adaptivity of the individual, and increases the probability of its mortality and affects the population processes.

The investigation of the immunological parameters envisages the application of some special species serological reagents, which need to be obtained individually, for each biological species.

In 2004, 98 pups of the Steller sea lion were examined, ages 2-3 weeks, from 4 rookeries: St. Iony Island (Okhotsk Sea) - 31, Yamskie Islands (Okhotsk Sea) - 28; Medniy Island (Commander Islands) - 26; Kozlov's Cape (Kamchatka Peninsula) - 13. The antiserum to Steller sea lion immunoglobulin G (IgG) was obtained in 4 stages: 1. Isolation of IgG from the blood serum by methods: precipitation of gamma globulins and lipoproteides, gel-filtration by Sepharose® 6B, ion-exchange chromatography by DEAE-32; 2. Determination of specificity by the immunoelectrophoresis with preliminary obtained antiserum to blood proteins of the Steller sea lion; 3. Antiserum to IgG was obtained by the method of the repeated immunization of rabbits with the isolated fraction of IgG; 4. The amount of IgG in the blood serum was determined in the reaction of simple radial immunodiffusion by the Mancini method.

The level of IgG in the Steller sea lion pups of 2-3 weeks of age was determined - 12.4 mg/ml + 1.25 (n=98). Analysis of the indices of the IgG level in the pups revealed no statistically significant differences by sex and also by geographical location of the habitat.

Our findings may prove useful in developing integrated ecological programs.

M21

HEALTH SURVEILLANCE ON CETACEANS STRANDED ALONG THE LIGURIAN SEA COAST OF ITALY*

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In August 2009, a research project funded by the Italian Ministry of Health was started in order to create an Italian surveillance network focused on monitoring the disease conditions affecting cetaceans found stranded along the Ligurian Sea coast. Indeed, the study of stranded cetaceans provides a great opportunity to monitor their health status.
This work reports the organizational flow adopted in cases of cetacean strandings along the Ligurian coastline. Intervention on a case of stranding is an organized action requiring equipment, personnel and support services and needing the collaboration of local authorities (navy, coastguard, etc.), veterinary institutions and research groups.
Specific protocols for intervention on site and collection, transportation and storage of biologic specimens and samples are described herein.
Prior to samples collection, some very relevant biologic parameters (stranding location and date, size/species of stranded animals, state - dead or alive -, injuries/decomposition code) have to be collected. Post-mortem examinations and general tissue and biologic samples collection are routinely carried out at Imperia, at the local seat of Istituto Zooprofilattico Sperimentale del Piemonte, Liguria e Valle d'Aosta. Moreover, specific training courses on necropsy protocols and techniques, as well as on the pathology and biologic samples collection from stranded cetaceans are periodically organized.
In conclusion, the experience on cetaceans found stranded along the Ligurian Sea coast of Italy can be considered a starting point for the creation of a national surveillance network aimed at both monitoring the health status of free-ranging marine mammals and protecting public health.

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M22

BLOOD GAS AND SERUM ANALYSIS: A NEW APPROACH TO ESTIMATE SURVIVAL CHANCES OF HARBOR SEAL (*PHOCA VITULINA*) PUPS IN THE GERMAN NORTH SEA

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Facing numerous challenges, such as illness, storms or human disturbance, some harbor seal (*Phoca vitulina*) pups lose contact to their dams and are found abandoned along the North Sea coast. Designated seal rangers are authorized to decide about their treatment in accordance with the animal welfare act. Pups with rather good health condition and prospects to survive rehabilitation and reintroduction into wilderness are admitted to the Seal Center Friedrichskoog for rehabilitation. Despite elaborated clinical health assessments on admission including differential hematology, in 2010 one sixth of 108 admitted pups did not survive the first 20 days. The present study aims to extend the set of health parameters determined on admission to estimate survival chances. Blood gas and serum analyses were performed for 99 pups using venous blood to detect potential metabolic dysfunctions, such as nutrient malabsorption or malassimilation. Blood gas parameters included total CO_2, pH, partial CO_2 pressure, HCO_3^-, base excess and anion gap as well as glucose, urea nitrogen, sodium, potassium and chloride. Moreover, total serum protein and fat (triglyceride) concentrations were measured for all pups on admission. Repeated measurements of 12 randomly selected individuals revealed a typical pattern of triglyceride concentrations over time. Regression analysis performed on all parameters showed no significant correlations between body condition and blood gas parameters. Tests comparing genders as well as survivors and non-survivors revealed no significant differences. For the first time blood gas values are reported in this study for a large sample size (N=99) of seals. Nevertheless, further interpretation requires more investigations. The ranges calculated from the data can serve as a stepping stone towards the establishment of reference values. The development of blood gases in harbor seals with different health conditions and ages over time could be subject of future investigations.

M23

MAJOR BEAK DEFORMITY IN AN ADULT COMMON DOLPHIN (*DELPHINUS DELPHIS*) ENTANGLED IN A LONG-LINE IN NORTHERN PORTUGAL

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Descriptions of cetacean bone lesions in mandible or maxilla are mainly related to dental anomalies or fractures. Moreover, post-mortem reports describing anatomical deformities of the cetacean mandible or maxilla are scarce, and often associated to diverted ossification of fractures. This work describes the case of an adult female (9 years old) common dolphin entangled in a long-line in northern Portugal, who showed a major deformity in the maxilla-mandible complex. The dolphin was found live but died within hours after detected and a full necropsy and sampling were immediately carried out. The head was separated from the body and frozen for further imaging analyses (Computerized Tomography, CT, and Magnetic Resonance Imaging, MRI). Main necropsy findings demonstrated a healthy condition, and pointed out stress due to by-catch in long-lines and human interaction as the most plausible cause of death. Nevertheless, the most notable finding was a considerable deformity of the beak. The rostral portion of the mandible was deformed to the left side and upwards. Furthermore, the maxilla was more significantly deformed than the mandible, turning right and down from its middle portion to the rostrum. The imaging examination of the head by means of CT and posterior 3D reconstruction of the scans allowed a complete visualization of the skull. The deformity appeared clearly defined, but a detailed analysis scan-by-scan as well as the whole image didn't provide any information related with the cause of the deformity. Although that, the importance of the case is actually because of the healthy status of the dolphin. Regardless of whether the deformity was present at birth (congenital) or not, it is difficult to explain how the dolphin managed some vital activities such as look for preys (echolocation), feeding or communication, with such a beak deformity.

S01

POST-MORTEM INVESTIGATIONS ON CETACEANS FOUND STRANDED ALONG THE LIGURIAN SEA COAST OF ITALY (2007-2010)*

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Cetacean strandings provide not only relevant scientific information but also the key to cetacean conservation, being an extremely valuable source of biological and scientific data. Aquatic mammals could act as the reservoirs for potentially zoonotic pathogens. Knowledge on cetaceans' pathology comes almost exclusively from studies on stranded animals.
Stranded cetaceans reported along the Ligurian Sea coast of Italy since January 2007 to August 2010 were examined to establish which factors contributed to their death.
The present work reports the results of anatomo-histopathological, immunohistochemical, microbiological, parasitological and sero-epidemiological investigations on 20 stranded striped dolphins (*Stenella coeruleoalba*) and 1 bottlenose dolphin (*Tursiops truncatus*). A complete post-mortem examination was possible on 18 entire and well preserved animal carcasses.
Parasites were often found in most of the examined organs and tissues. The most frequently detected lesions were pneumonia, hepatitis, myocarditis and enteritis; one animal showed an adrenal gland adenoma. Non-suppurative meningoencephalitis was observed in 6 striped dolphins, with 2 of these animals also harbouring in their brain tissue protozoan cysts and zoites which were immunohistochemically identified as Toxoplasma gondii. Furthermore, Morbillivirus infection was diagnosed in one striped dolphin by means of immunofluorescence and RT-PCR. No anti-Brucella spp. antibodies were detected in the blood serum from any of the examined animals.
In conclusion, the present study shows that investigations on stranded cetaceans are very useful for the surveillance against potentially zoonotic infections. Studies on the presence of zoonotic agents in aquatic mammals are rapidly progressing but very little is known about the potential impact of these agents on both aquatic mammals' and human health.
Therefore, an adequate surveillance system is necessary both to monitor aquatic mammals' pathologies and to protect human health.

S02

THE ROLE OF PATHOLOGY IN DEFINING LIVE CETACEAN STRANDINGS RESPONSE IN THE UK

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UK-stranded cetaceans are retrieved for necropsy under the Defra funded Cetacean Strandings Investigation Programme (CSIP). Of particular value are those that originally strand alive because they have minimal decomposition. Their examination also provides information that has helped define UK rescue protocols which, with no suitable rehabilitation facilities, have been based on refloatation or euthanasia since the mid nineties. Between 1995 and 2009, British Divers Marine Life Rescue responded to 138 live stranded cetaceans. Ninety two animals died or were euthanased, of which 77 were retrieved for post mortem examination. No option was possible for 24 animals that died during assessment or where intervention was impractical. Euthanasia was elected for 46 animals, largely due to malnutrition and maternal dependency and only once did the necropsy not support this decision. Rescue was attempted in 68 animals and strandings related pathology was the most common finding in the 22 that failed to survive the attempt. This was particularly marked in deep diving species, *e.g.* northern bottlenose whales (Hyperoodon ampullatus), and has led to a revision of the triage used for live stranded deep diving cetaceans. Although a proportion of the 46 refloated cetaceans not found restranded may have survived, this can only be assumed until long-term post release monitoring is in place. The use of refloatation has been justified partly on evidence from the post mortem examination of live stranded cetaceans in the UK; of 654 cetaceans examined by the CSIP between 1990 and 2008, known or suspected to have stranded alive, 318 (48%) had no significant pathology that could explain the stranding. The majority were pelagic species, suggesting that a significant proportion may be medically suitable for refloatation, with prompt action and careful assessment.

S03

SPERM WHALE MASS STRANDING IN ITALY: GAS AND FAT EMBOLI ANALYSES.

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On the 10th of December of 2009, seven sperm whales were found beached in Gargano coast, Italy. There was a fast and coordinated stranding response that enabled a multidisciplinary study with the collaboration of several scientific institutions. Many hypotheses were considered and analyzed including the “gas and fat embolic syndrome”. For the first time, a standardized methodology for the study of gas embolism was applied to a mass stranding of sperm whales. Because of field work-conditions, complete necropsies, were only performed in the three sperm whales that stranded alive and survived beached for several hours. Gas bubbles were only found in the coronary veins. Bubbles were sampled with an insulin syringe and stored in a 5 ml vacutainer without additives. Analyses were done by gas chromatography. Results showed a composition of 70% of N_2, 15% of CO_2 and 15% of O_2 in the freshest animal, in contrast with 30% of N_2, 30% of CO_2, 6% of O_2 and 33% of H_2 in the most decomposed animal. These results excluded putrefaction as the sole source of gas formation and dissection as artifact, since composition was not the same as the atmospheric air and bubbles were not found in other veins. Bubbles were not widely distributed, nor either massively, through out the rest of the body as described in the “gas and fat embolic syndrome”. Fat embolism was excluded because lung samples from all three sperm whales showed very few or none fat emboli (grade 0 or 1). These results on fat emboli confirmed that this evidence is not commonly found in stranded cetaceans, even if they spent hours stranded alive on the shores, differentiating this event with atypical mass stranding related to sonar exposure. Thus the “gas and fat embolic syndrome” was ruled out as the cause of the stranding.

S04

CONCENTRATIONS OF HEAVY METALS, PAHS AND PCBS IN SEVEN MALE SPERM WHALES STRANDED IN THE ADRIATIC SEA (MEDITERRANEAN SEA)

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Seven male sperm whales stranded on in the Adriatic coast of Southern Italy on December 2009.
Mass strandings of this species remain peculiar and rather unexplained events which rarely occur in the Mediterranean Sea, and for this reason started a strong collaboration between academic institution worldwide. In particular, in the laboratory of environmental hygiene of the University of Catania, were carried on analysis of trace elements and POPs in muscle and blubber tissues.
Trace elements were extracted by acid digestion with a microwave oven (Milestone), and the reading was performed with an ICP-MS Elan DRC-e (Perkin Elmer). PCBs were analyzed after a separatory funnel extraction using a dichloromethane/hexane 3/1 solution, cleaning on Florisil, and the reading was performed with a GC2010-ECD (Shimadzu). PAHs were analyzed after a sonication extraction using a dichloromethane/acetone 1/1 solution, cleaning on Bond Elut C18 columns, and measured with an HPLC UV-FL (Varian).
Among analyzed metals we found Hg concentrations considerably higher than the ones revealed by Capelli R. *et al.* (2008) and Holsbeek L, *et al.* (1999), the same for POPs levels, in particular PCBs, higher than in other sperm whales mass strandings (Evans K. *et al.*, 2004; Holsbeek L. *et al.*, 1999).
Considering the high levels of contaminants found in the tissues analyzed, it is possible but not certain, that they are involved in the causes of the stranding event. It's well known, in fact, the neurotoxic and immunotoxic effects of many of substances analyzed, and probably the combined effect with others unknown causes, led the group of whales to the coast of the lower Adriatic sea, ecologically an unsuitable habitat for this species, representing a potentially dangerous trap.

S05

RISSO'S DOLPHIN STRANDINGS IN THE BRITISH ISLES

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Between 1990 and 2009, there were 206 confirmed strandings of Risso's dolphins (*Grampus griseus*) around the UK, Ireland and Isle of Man. Risso's dolphins strand annually in small numbers in the UK, mainly in Scotland. Where known, cause of death was anthropogenic in some cases. Sightings data are needed to confirm strandings records correlate with distribution and threats need to be better understood.

S06

MONITORING THE HEALTH STATUS OF MARINE MAMMALS IN THE ANDALUSIAN COAST

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Along the last quarter of 2007, the Andalusian Environmental Council started the marine mammal and sea turtle stranding emergency service. The main goals are stranding monitoring, paying specific attention to causes of death and evolution of Morbillivirus epidemic pattern, veterinary clinical care, and when possible, rehabilitation and release. During the period 2007-2010 necropsies were performed and samples were analyzed for microbiology, parasitology, virology (Inmunohistochemistry for Morbillivirus detection) and hematology/biochemistry. Between 2007 and November 2010 more than 600 cetaceans were found stranded along the Andalusian coast. The main species affected were the striped dolphin (*Stenella coeruleoalba*), the common dolphin (*Delphinus delphis*) and the bottlenose dolphin (*Tursiops truncatus*). The results showed the differences between natural causes of death, human interaction deaths and undeterminated causes. Regarding the Morbillivirus epidemic evolution, after the outbreak in 2007, this study presents the results from 2008 until 2010 as well as the disease actual chronical pattern status in the Andalusian coast. Pinnipeds stranding causes are also evaluated, as a continuous but sporadic arrival of different seal species, including hooded seal, harbour seal and harp seal detected in the last years along the studied coast.

S07

UK CETACEAN STRANDINGS INVESTIGATION PROGRAMME: 20 YEARS OF CONTAMINANT STUDIES

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The seal epidemic of 1988 caused by phocine distemper virus led to the death of over 17,000 common seals around the coasts of Europe. Media reports at the time, and subsequent literature, suggested that the severity of the outbreak was the result of North Sea pollution. No comparable data had been published for marine mammals sampled later than 1978, and so there was no basis on which to assess possible effects. Under the Cetacean Strandings Investigation Programme, started in 1990, contaminant levels have been determined in over 1,000 samples from twenty whale and dolphin species. Contaminants studied have included trace elements, butyltin compounds, organochlorine pesticides, polychlorinated biphenyls, brominated flame retardants (BFRs) and perfluorinated compounds. The results from these studies have allowed the current levels of contaminants in cetaceans from UK waters to be established, and for time-trends on concentrations to be studied. In addition, links have been established between concentrations of some contaminants (mercury and PCBs) and infectious disease mortality in harbour porpoises. For PCBs, it has also been possible to estimate the increased level of risk of infectious disease mortality with increasing PCB concentrations. Concentrations of PCBs in UK porpoises declined initially following bans beginning in the 1980s, but have now stabilised at toxicologically significant concentrations (from 1998-2005). Novel contaminants have also been studied. In the 1990s we found increasing concentrations of BDEs (a group of BFRs) in UK porpoises as a result of increasing use of the penta-mix product. These data fed into an EU risk assessment and contributed to the 2004 ban and concentrations are now declining. A baseline has also been set for PFOS (perfluorooctane sulphonate) against which the success of the OSPAR Hazardous substances strategy can be assessed.

S08

A MULTIDISCIPLINARY INVESTIGION OF A SPERM WHALE (*PHYSETER MACROCEPHALUS*) MASS STRANDING IN ITALY

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Mass strandings of sperm whales (*Physeter macrocephalus*) remain rather unexplained phenomena which rarely occur in the Mediterranean Sea. Many hypothesis have been advanced to explained them, both natural and induced by human activities. In December 2009, a group of seven young male sperm whales stranded on the Adriatic coast of Southern Italy.
Complete necropsies or limited samplings were performed on the animals depending on the body condition. Natural causes and pathological changes associated with anthropogenic sonar activities were ruled out. Environmental pollutant s levels in sampled body tissues were relatively high, in particular organochlorinated substances (PCBs and DDT metabolites). Gastric content evaluation, coupled with morphologic tissue examination, showed a prolonged fasting which likely caused, at its turn, the mobilization of lipophylic contaminants from the adipose tissue. Chemical compounds subsequently entered the blood circulation impairing immune and nervous functions. Seismic surveys should be also regarded as potential co-factors, even if no evidence of direct impact has been assessed.
Evaluation of meteorological and geographical data-set and historical records indicate that the group of young male sperm whales may have followed an erroneous path entering the Adriatic Sea. Guidelines useful to scientist for biologists and veterinarians facing similar circumstances raised from data obtained and the experience gained on the field.

S09

STRANDINGS OF CETACEANS IN THE PORTUGUESE SOUTHERN COAST (ALGARVE): EVALUATION OF THE PORTUGUESE STRANDING DATABASE AND CONTRIBUTIONS OF A RECENTLY IMPROVED STRANDING NETWORK.

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This study aimed to examine data (species composition, temporal and spatial variation and main cause of death) obtained from a twenty year stranding database and a recently improved cetacean stranding network along the Portuguese Southern coast (Algarve). The analysis of the Portuguese stranding database for the period of 1991 to 2009 showed 341 stranded cetaceans in the Algarve, with a high percentage of unidentified species (>35 %), followed by *Delphinus delphis* as the most frequently stranded species (28%). Examination of seasonal patterns suggests peak strandings in March and August, while spatial patterns show evenly distributed strandings along the Algarve South coast, whereas high stranding peaks were observed in late Summer and during Fall season for the Algarve Western coast. Species stranding patterns showed peaks in the Spring (March-June) for minke whales (*Balaenoptera acutorostrata*), while strandings of smaller cetaceans (*Delphinus delphis*, *Phocoena phocoena*, *Tursiops truncatus* and *Stenella coeruleoalba*) are evenly distributed throughout the year. Yet, analysis of this database may have some limitations caused by the fact that collection of stranding data was not systematic and standardized (a low average of annual strandings indicate that some events may have been missed), and much biological information was not collected, thus its ecological potential could be reduced. Further, evaluation of causes of death was also limited. As a response to these limitations, in 2010, an improved stranding network was implemented where alerts were channeled to a specialized local team. As a result, the annual number of observed stranded animals increased substantially (double the average annual number for 1991-2009) and data also suggest an improvement in several aspects of data collection such as the determination of causes of death, showing that fishery interactions could be responsible for up to 65% of mortalities (24% confirmed bycatch and 41% probable bycatch).

S10

STOMACH CONTENTS OF BOTTLENOSE DOLPHIN STRANDED ALONG THE COASTS OF TUSCANY (NORTH WESTERN MEDITERRANEAN SEA)

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The stomach contents of 5 bottlenose dolphins, *Tursiops truncatus*, stranded along Tuscany coast, within the Pelagos Sanctuary for marine mammals, were examined to investigate diet. This analysis about food web is part of a wider project called Governance and Integrated Observation of Marine Natural Habitat (GIONHA). The identification of food items from the stomach content was done using hard parts (*i.e.* fish otoliths and cephalopod beaks) and fresh remains. Items were identified to the lowest taxonomic level using taxonomic keys for fish and cephalopod lower beaks; both were also compared with local reference collections. Diet was described by the indices of occurrence, relative abundance, calculated biomass and diversity. The main diet component was fish and the rest were followed by cephalopods. The most important prey was Merluccius merluccius, although several other fish species were found, including Spicara flexuosa, Diplodus annularis and some different species of the family of Gobiidae. Among cephalopods was noticeable the presence of Eledone chirrosa. There was a correspondence between the prey species found in the stomach content and those typical of the marine habitat in the stranding area, this confirm the opportunistic diet of this predator as already observed and reported in literature.

S11

CAN PRESS PROVIDE SOME INSIGHTS ON THE CETACEAN STRANDINGS ON THE TURKISH COASTS?

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Stranding cases are important indicators of cetacean population health and each stranding carries with it strong conservation messages as some are related to anthropogenic causes such as boat collisions or entanglements. Globally in most stranding cases, the cause of the stranding is unknown, but some identified causes have included disease, parasite infestation, harmful algal blooms, injuries due to ship strikes or fishery entanglements, pollution exposure, trauma, and starvation.
Every year, tens of marine mammals wash ashore in Turkish coasts, which stretch along more than 8000 kilometres. The purpose of the study is to collect data for representing frequency and distribution of strandings in Turkey, by using all local media including newspaper clippings, television news headlines and websites of relevant groups.
According to the data, whales represents %6.2 of the records, while %93.8 of the records are delphinids. Also %32.1 of strandings is from Black Sea while %23.5 from Sea of Marmara, %19.8 from Aegean Sea and %24.7 from Levantine Sea.
Although results represent the distribution of strandings round Turkey, it is important to take into account that there should be more stranding cases, which we are not aware due to lack of interest of media. Since there are no any stranding information networks in Turkey, identifying species may not be always possible but as far, the composition of delphinid species are %18.5 *Phocoena phocoena,* %14.8 *Tursiops truncatus*, %11.1 *Delphinus delphis*, %1.2 *Stenella coeruleoalba* while composition of whale species are %2.5 *Balaenoptera physalus,* % 1.2 *Mesoplodon bidens* and % 1.2 *Ziphius cavirostris*. %49.4 of total stranding records remain unidentified. Reported frequencies of stranding cases are increasing by years, this may be caused by increased interest of people and rising internet sources.

S12

CETACEAN STRANDINGS' PATTERNS ON THE PORTUGUESE COAST FROM 1979 TO 2009

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Strandings of cetaceans on the Portuguese coast are registered since, at least, the 16th Century. These events and respective records are continuous over the years but more consistent in recent times, since a national stranding network was implemented. Our goal is to characterize the distribution patterns of cetaceans strandings on the Portuguese coast through a descriptive analysis. In this study we focus on continuous data from 1979 to 2009. During these 30 years a total of 3522 cetaceans' strandings were recorded and 21 different species were documented in the strandings records. The most frequently recorded species was the common dolphin (46,5%), harbour porpoise (7,13%), striped dolphin (4,66%), bottlenose dolphin (4,37%) and minke whale (2,41%). The number of strandings increased annually, most probably reflecting an increased observer effort. Considerations about a possible measure of effort were made, referring the number of different institutions involved in collecting stranding data over time. Strandings records were higher in February, March and April and were more common in the North and Central Portugal. During the study period 3,5 % of the strandings were proven incidental captures and 19,3% showed signs of by-catch; all the remain were of unidentified causes. We analyzed long term interannual trends in cetacean strandings by area in the Portuguese coast. Relations between strandings and temperature were analyzed and a seasonal pattern was detected. Perspectives of further research were recognized based in the strandings analysis and the roll of these studies in conservation.

DICTIONARY

Conference Center	Palacio de congresos

Fundamentals / Bases

ENGLISH	ESPAÑOL
Yes	Si
No	No
All right	Vale
Please	Por favor
Thank you	Gracias
I'm sorry / Excuse me	Lo siento/Perdona
Good morning	Buenos días
Good afternoon	Buenas tardes
Good night	Buenas noches
See you, goodbye	Adios, hasta luego
How are you?	¿Como estás?
Very well, thank you.	Muy bien, gracias
What is your name?	¿Como te llamas?
My name is …	Me llamo ...
Where is…? / I am looking for …	¿Dónde está? … ? / Busco …
How far is it …?	¿Está muy lejos …?
…by bus	…en autobus
…by foot	…andando
…by bicycle	…en bici
Which direction should I take?	¿Hacia dónde tengo que ir?
…to the left	…hacia la izquierda
…to the right	…hacia la derecha
…straight ahead	…todo recto
…back there	…hacia atrás
Could you please show me on the map …	¿Por favor, me podría indicar en el mapa …?
Could you please help me?	¿Me podría ayudar por favor?
Welcome	Bienvenido
Hello	Hola
Where are you from?	¿De dónde eres?
I am from ...	Soy de...
Nice to meet you	Encantado/a
Good luck	¡Suerte!
Have a nice day	Que tengas un buen día
I don´t understand you	No entiendo
How much is it?	¿Cuanto vale esto?
Excuse me?	Perdona?
Could you please write it down for me?	Me lo podría escribir por favor?
My address is...	Mi dirrección es...
My phone number is...	Mi numero de telefono es...

SIGN / CARTELES

Entrance	Entrada
Exit	Salida

Pull	Tirar
Push	Empujar
No Smoking	Prohibido fumar
No Admission	Prohibida la entrada
Emergency exit	Salida de emergencia
Elevator	Ascensor
Up	Arriba
Down	Abajo
Stairs	Escalera

Numbers / Numeros

NUMBERS / NUMEROS		CARDINAL NUMBERS / ORDINALES	
0	Cero		
1	Uno	1.	Primero/a
2	Dos	2.	Segundo/a
3	Tres	3.	Tercero/a
4	Cuatro	4.	Cuarto/a
5	Cinco	5.	Quinto/a
6	Seis	6.	Sexto/a
7	Siete	7.	Septimo/a
8	Ocho	8.	Octavo/a
9	Nueve	9.	Noveno/a
10	Diez	10.	Décimo/a
11	Once		
12	Doce		
13	Trece		
14	Catorce		
15	Quince		
16	Dieciseis		
17	Diecisiete		
18	Diecicho		
19	Diecinueve		
20	Veinte		
30	Treinte		
40	Cuarenta		
50	Cincuenta		
60	Sesenta		
70	Setenta		
80	Ochenta		
90	Noventa		
100	Cien		
200	Doscientos		
300	Trescientos		
400	Cuatrocientos		
500	Quinientos		
600	Seiscientos		
700	Setecientos		
800	Ochocientos		
900	Novecientos		
1000	Mil		
2000	Dos mil		
5000	Cinco mil		
10000	Dies mil		
100000	Cien mil		
1000000	Un millón		

Transportation / Transporte

TRAIN / TREN

Station	Estación (de ferrocaril)
Central station	Estación central
Tourist information	Oficina de turismo
Ticket office	Taquilla
Ticket	Billete
Reduced ticket	Billete descuento
Platform / track	Andén
Timetable	Horarios
Departure	Salida
Arrival	Llegada
Waiting room	Sala de espera
Delay	Retraso
Direct train	Trén directo
Express train	AVE
Slow train	Tren de cercanía
First / second class	Primera / Segunda clase
Reserved seat	Plaza reservada
Luggage rack	Guarda maleta
Restroom	Baños/aseos/servicios
A single ticket to …, please.	Un billete de ida para... por favor
A return ticket to …, please.	Un billete ida y vuelta para …. Por favor
How much is a single ticket to …?	¿Cuanto vale un billete de ida para...?
At which track does the train to … leave?	¿En que andén sale el tren para …?
Excuse me, is this seat occupied?	¿Perdona, esta plaza está ocupada?

COACH / AUTOBUS

Where is the bus station?	Dónde está la estación de autobuses?
How can I get there?	Como llego ahí?
Is there a bus to the …	Hay un autobus para…
The center	El centro
The conference center	El palacio de congresos
At which time does the bus to … leave?	Cuando sale el autobus para…?
At which time will we arrive at…?	A qué hora llegaremos a...?

Accomodation / Alojamiento

Hotel	Hotel
Guest house	Hostal
Youth hostel	Albergue juvenil
Reception desk	Recepción
Bathroom	Baño
Showers	Ducha
I have booked a room on the name...	He reservado una habitación con el nombre...
I would like a room	Quiero una habitación..
a single room	Para una persona
a double room	Para dos personas

a three-bed room	Para tres personas
Could I have a room with a bathroom?	Me puede dar una habitación con baño privado?
Ash-tray	Cenicero
Coat rack	Ropero

Meal / Comer

Bottle	Botella
Cup	Taza
Fork	Tenedor
Knife	Cuchillo
Spoon	Cuchara
Teaspoon	Cucharilla
Glass	Vaso
Breakfast	Desayuno
Lunch	Comida
Dinner / supper	Cena
Menu	Carta
Table	Mesa
Napkin	Servilleta
Plate	Plato
Matches	Cerilla
Toothpick	Palillo de dientes
Tip	Propina
Self service	Auto-servicio
Tea	Té
Beer	Cerveza
(red, white, rosé) wine	Vino (tinto, blanco, rosado)
Ice cream	Helado
Pepper	Pimienta
Salt	Sal
Bread	Pan
Butter	Mantequilla
Yogurt	Yogur
Cheese	Queso
Appetizer	Aperitivo
Meat	Carne
Fish	Pescado
Salad	Ensalada
Vegetable	Verdura
Vegetarian	Vegetariano
Sandwich	Bocadillo/Sandwich/montadito

Time / Zeit

Hour	Hora
Minute	Minuto
Second	Segundo
What time is it?	¿Qué hora es?
It is 1 o'clock/it is … o'clock	Es la una/son las ...
At what time?	¿Cuando? A qué hora?

How long will it take?	¿Cuanto dura?
In the morning	Por la mañana
At noon	Al medio día
In the afternoon	Por la tarde
Evening	Tarde/noche
At Night	De noche
At Day	De día
Week	Semana
This week	Esta semana
Today	Hoy
Tomorrow	Mañana
Monday	Lunes
Tuesday	Martes
Wednesday	Miércoles
Thursday	Jueves
Friday	Viernes
Saturday	Sábado
Sunday	Domingo

NOTES

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