

Agenda Item 6.2

Project Funding through ASCOBANS  
Prioritization of Projects Proposals

Document 6-02

**Project Proposals Received for  
Future Funding**

**Action Requested**

- Review proposals and internal activity list
- Take note of the results of the rating undertaken in advance of the meeting, to be presented by the Secretariat at AC19
- Provide advice to Administrative Session for overall priority rating of internal and external projects

Submitted by

Secretariat



**NOTE:**  
IN THE INTERESTS OF ECONOMY, DELEGATES ARE KINDLY REMINDED TO BRING THEIR  
OWN COPIES OF DOCUMENTS TO THE MEETING

## **Secretariat's Note**

The 18<sup>th</sup> Meeting of the Advisory Committee had instructed the Secretariat to compile all proposals received by the deadline and circulate them to Parties and Partners for their consideration and rating. The guidelines specify that only projects with a direct benefit for the conservation objectives of the Agreement can be supported. Projects covering more than one ASCOBANS Party should be favoured.

All proposals we received by the deadline (15 February) were sent out to National Coordinators and registered AC participants on 16 February. Recipients were requested to fill in a rating table, once for each country or observer organization represented on the Advisory Committee.

The Secretariat will then gather and compile the ratings in advance of the AC Meeting and present the resulting ranking to the meeting.

Overall priorities for spending the available resources, such as the amounts to be dedicated to internal financial needs of the Agreement and external projects, will be determined in discussions at the meeting.

## Project Proposals Received for Future Funding

1. Following a call for project proposals issued to ASCOBANS Parties and partner organizations on 22 December 2011, the attached funding applications were received by the Secretariat.
2. The 18<sup>th</sup> Meeting of the Advisory Committee had instructed the Secretariat to compile all proposals received by the deadline and circulate them to Parties and Partners for their consideration and rating. The Secretariat would then gather and compile the ratings in advance of the AC Meetings and present the resulting ranking to the meeting.
3. The AC retains the right to decide on the use of leftover funds, including assigning them to projects conceptualized during the meeting. Such ad-hoc proposals will be taken note of by the Secretariat throughout the meeting and a list will be compiled for the Parties' review. Parties will prioritize and decide on the funding of these projects before the end of the meeting.
4. If emerging issues are identified during the meeting for which no concrete proposals are available, Parties may wish to instruct the Secretariat to make a call for proposals on a specific subject.
5. The maximum funding allocation for external projects is 15,000 Euro. No such restriction exists for funding activities conceptualized during the meeting or ASCOBANS' own activities in need of financial support.
6. The celebration of the 20<sup>th</sup> Anniversary of the Agreement causes special financial needs for ASCOBANS in 2012. In addition, holding the 19<sup>th</sup> Meeting of the Advisory Committee back to back with the ECS conference in Galway, Ireland, is causing a severe overspend of the budget available for this meeting. Other activities requested by the AC or Jastarnia Group also require funding to be completed.
7. In order to meet the special needs in 2012, the Secretariat is making a call for additional funding. These needs could be met either by additional voluntary contributions from the Parties, or by allocating part of the surplus of the 2011 budget (in total estimated as 46,753 Euro) to the internal needs and activities shown in Table 1 below.

**Table 1:  
Funding Needs Related to Activities Planned for the Anniversary Year 2012**

<b>20<sup>TH</sup> ANNIVERSARY – TOP PRIORITY!</b>	
<b>Initiative</b>	<b>Total costs (€)</b>
<b>(1) Anniversary Celebration in the Margins of the 19<sup>th</sup> Advisory Committee Meeting and the ECS Conference</b>	
In order to engage the public in Galway with the two cetacean events taking place in their city, the Secretariat has made efforts to hold the whale and dolphin roadshow on the weekend 24-25 March, as well as in a smaller setting on 21 March for the AC participants to enjoy a reception celebrating the anniversary “with the whales”. Regrettably, to date these activities are not yet fully funded.	
Roadshow Event (including room rent, fee for the use of the exhibition and the artist's travel and accommodation)	~6,500
<b>Estimated Total</b>	<b>~6,500</b>

### (2) Production of 20<sup>th</sup> Anniversary Materials

On the occasion of the anniversary, which we hope will be celebrated with outreach events throughout the Agreement Area, material is needed to hand out to the interested public as a memento of the event and information. Also, giveaways for our meeting participants would be appreciated. Suggestions include pens, highlighters, notepads, cotton bags, key rings, stickers or mugs.

Design and Production of 20 <sup>th</sup> Anniversary material	any amount up to ~7,000
Purchase of copies of Anniversary Volume for free distribution	~5,000
<b>Estimated Total</b>	<b>~12,000</b>

### (3) Anniversary Celebration in the Margins of the 7<sup>th</sup> Meeting of the Parties

In the same week as our MOP7, two cetacean events will be taking place in Brighton, the World Whale Conference and WhaleFest. According to the organizer Planet Whale, this will be the largest get-together of whale and dolphin people (NGO's, partnerships, whale watch operators, commerce, and the public) there has ever been. The organizer has kindly offered to give maximum visibility to ASCOBANS.

The CMS Secretariat has kindly offered to host a reception for MOP participants in order to celebrate the Agreement's anniversary.

ASCOBANS activities and exhibition at WhaleFest (Brighton, 27-28 October)	~2,500
Travel costs Secretariat (per diem only to extend stay)	~1,000
<b>Estimated Total</b>	<b>~3,500</b>

### (4) Organization of Events to Commemorate the 20<sup>th</sup> Anniversary

Funding is needed to hold the whale and dolphin roadshow, an excellent way to engage the public and draw attention to ASCOBANS, also at other venues than in the margins of our own meetings.

Travel costs Secretariat (tickets & per diem)	~2,000
Costs of 2 events	~6,500
<b>Estimated Total</b>	<b>~8,500</b>

### ASCOBANS MEETINGS

In the absence of a host government for AC19, given the budgetary constraints of the United Kingdom and considering that no sufficient provisions for such meeting-related costs are made in the ASCOBANS triennial budget, routine meeting costs also need to be covered from extra-budgetary sources.

#### (5) Preparation of Proceedings of ASCOBANS Meetings in 2012 (AC19 & MOP7)

Consultant	~2,400
Travel costs (tickets & per diem)	~2,800
<b>Estimated Total</b>	<b>~5,200</b>

<b>(6) Costs Related to AC19 Meeting</b>	
Sound recording	~2,500
Coffee Breaks	~1,700
<b>Estimated Total</b>	<b>~4,200</b>

<b><u>OUTREACH TO SPECIFIC STAKEHOLDER GROUPS</u></b>	
<b>Initiative</b>	<b>Total costs (€)</b>
<b>(7) Development of a Web-based Live-Stranding Response Guide for the Public (Mandate AC18)</b>	
One of the ways in which the public can contribute to the conservation of small cetaceans is by administering first aid to a live-stranded individual and by alerting the responsible authorities. This is also the recommendation given in the ASCOBANS exhibition. The aim of this project is to develop a one sheet hand-out containing simple guidelines instructing laypersons how to react correctly. These would also include information on whom to contact in case of a stranding in each country. Outputs would be made available as hardcopies and on the website.	
Consultant	~3,500
Translation	~4,500
<b>Estimated Total</b>	<b>~8,000</b>

<b>(8) Development of Fisheries Pages on ASCOBANS Website (Mandate AC17)</b>	
AC17 endorsed a proposal to develop a section of the ASCOBANS website into a hub for information on bycatch-related issues in the ASCOBANS area. In addition, the Jastarnia Group had identified specific topics for which information should be gathered and made widely available. These are listed separately below. The website will be linked to the appropriate national pages and should be multi-lingual in order to reach the target audience foreseen.	
Synopsis of Bycatch-related Regulations of Relevance to Individual Fishermen (Mandate JG7)	~2,500
Synopsis of Studies on New Methods of Monitoring and Mitigating Bycatch (Mandate JG7)	~2,500
Web adaptation of new and existing material, including compilation of links to national information	~2,500
Translation of summary information into all languages of the Agreement Area	~4,500
<b>Estimated Total</b>	<b>~12,000</b>

### **Proposals Received in Response to the Call for the Year 2012**

8. In total, thirteen proposals were received by the deadline set (15 February). The detailed proposals and CVs of researchers, if provided, are attached in the annexes to this document. Table 2 gives an overview.

**Table 2:**  
**External Project Proposals**

Annex	Title	Applicant	Funding Requested
1	The effectiveness of a voluntary code of conduct in reducing vessel traffic around marine mammals in Pembrokeshire/ Wales	Carla Lange / Van Hall Larenstein University	4,300 EUR
2	Behavioural responses of bottlenose dolphins ( <i>Tursiops truncatus</i> ) to playbacks of pile driving sounds recorded during the construction phase of offshore wind farms	Sander van der Heul / Boudewijn Seapark Ron A. Kastelein / Sea Mammal Research Company (SEAMARCO)	15,000 EUR
3	Conservation genetics of functional loci for <i>Tursiops truncatus</i> populations in the ASCOBANS region	A. Rus Hoelzel / Durham University	15,000 EUR
4	Examine habitat exclusion and long term effect of pingers	Line A. Kyhn / Aarhus University	14,981 EUR
5	PAL: By-catch mitigation using harbour porpoise warning calls: Field Tests in the North Sea	Boris Culik F <sup>3</sup> : Forschung. Fakten. Fantasie	14,998 EUR
6	Enhanced detection of harbour porpoises prior to ramming, seismic blasts and ammunition clearance: design and construction of a PAL Porpoise Detector (PPD)	Boris Culik F <sup>3</sup> : Forschung. Fakten. Fantasie	14,566 EUR
7	Atlas of Cetacean distribution in north-west European waters	Tim Dunn / JNCC Peter Evans / Sea Watch Foundation Charles Paxton / St. Andrews University	15,000 EUR
8	Life history parameters of bottlenose dolphins ( <i>Tursiops truncatus</i> ) in European Waters	Graham J. Pierce & Fiona L. Read / University of Aberdeen	9,300 EUR
9	Changes in the distribution of cetaceans in the North Sea	The Rugvin Foundation	15,000 EUR
10	Cooperative and solitary foraging behaviour in the harbour porpoise ( <i>Phocoena phocoena</i> )	Magnus Wahlberg / Fjord&Bælt & University of Southern Denmark	13,000 EUR
11	SAMBAH – supplementing CPOD anchoring	Mats Amundin / Kolmardens Djurpark	16,560 EUR
12	Contaminant profiles in harbour porpoise foetuses	Martine van den Heuvel-Greve / IMARES Wageningen UR	15,000 EUR
13	Effects of stress in common dolphins – monitoring stress and reproductive hormone levels in blubber tissue	Sinéad Murphy, Paul Jepson & Rob Deaville / Zoological Society of London	8,770 EUR

**FORMAT FOR PROJECT PROPOSALS  
FOR THE CONSIDERATION OF THE ASCOBANS ADVISORY COMMITTEE**

Dear ASCOBANS Advisory Committee,

I know that this proposal is not completely worked out and has gaps. However it will be the project for my bachelor thesis and I do not have to hand in my final proposal until the end of March. I have a good idea of what I want to do and I am presenting you what I have worked out so far. I have (academic) support from a number of experienced people. However I need the financial means to make this project happen. I hope you can consider it even though the proposal is not finalized yet.

<b>Title</b> The effectiveness of a voluntary code of conduct in reducing vessel traffic around marine mammals in Pembrokeshire/ Wales.	<b>Justification:</b> Conservation and Management Plan	<b>Project ID:</b> 2012/01
<b>Implementing Agency / Applicant</b>	Carla Lange (Van Hall Larenstein) In der Lohwiese 21 44269 Dortmund Germany Phone: 0049 15774490348 Email: Carla.Lange@wur.nl	
<b>Collaborating Agencies / Other Sponsors</b>	University of Applied Science: Van Hall Larenstein, Leeuwarden/ Netherlands Coastal Zone and Marine Environment Studies Research Unit (Malcolm Baradell, Powell Strong)  No other sponsors	
<b>Background / Problem</b>	The coast of Pembrokeshire in Wales is characterized by its high biodiversity including numerous species of cetaceans and other marine mammals. It has been classified as Marine Special Area of Conservation. The presence of one of the UK's busiest ports (Milford haven) and its popularity for outdoor activities and wildlife watching produce high amounts of marine traffic in and around the marine SAC. A voluntary code of conduct was introduced in order to protect marine mammals from disturbance and injury through vessels. However the code does not seem to be effective and is largely ignored. This raises the question whether voluntary codes are an effective tool to protect marine mammals and if not why and how the situation can be improved. Data on boat traffic in Ramsey sound has been collected in recent years but not evaluated yet.  This project is a new and independent one.	
<b>Objectives</b>	<ol style="list-style-type: none"> <li>1) <u>Test whether skippers follow the Pembrokeshire marine code.</u>                      Do vessels reduce their speed when approaching cetaceans?                      Do vessels keep the required distance from cetaceans?                      Do vessels stay out of designated zones?</li> <li>2) <u>Figure out why skippers ignore the code.</u></li> <li>3) <u>Discuss whether voluntary codes of conduct are an effective tool to protect marine mammals (specifically harbour porpoise (<i>phocena phocena</i>) in this case).</u></li> </ol>	

## ASCOBANS Project Proposal Format

	<p>4) <u>Make recommendations to improve the situation in Pembrokeshire. Improve the conservation of marine mammals on and off the Pembrokeshire coast</u></p>
<p><b>Relevance to ASCOBANS</b></p>	<p>The project complies with the 3<sup>rd</sup> Triennium objective: <i>“Continue to review the extent of negative effects of sound, vessels and other forms of disturbance on small cetaceans and to review relevant technological developments and best practices with a view to developing guidelines which Parties may use to reduce disturbance by noise “</i></p> <p>It goes with the Ascobans goals of:</p> <ul style="list-style-type: none"> <li>• <b>Habitat conservation and management:</b> protecting cetaceans off the Pembrokeshire coast from motorized marine traffic, physical as well as acoustic disturbance</li> <li>• <b>Surveys and research:</b> Investigate on the current situation, behaviour of skippers and reasons why, observations of cetaceans response to motorized traffic</li> <li>• <b>Improving legislation:</b> investigate the effectiveness of a voluntary code and develop recommendations for an improvement of rules and regulations</li> <li>• <b>Information and education:</b> Investigate how the voluntary code is being broadcasted, how well it is known and what information it carries</li> </ul> <p>The projects meets the goal no. 4 of ASCOBANS Conservation Plan for Harbour Porpoises in the North Sea as adopted at the 6th Meeting of the Parties to ASCOBANS (2009):</p> <p><i>“(4) Implementation of mitigation measures for known threats, including monitoring the implementation and collecting data to assess efficacy;”</i></p> <p>Indirectly the project aims towards a reduction of underwater noise which is one of the priority goals of the Triennium Work Plan 2010-2012</p> <p>I understand that the research area is not officially part of the North Sea as defined at the International Conference on the Protection of the North Sea in March 2002. However it is part of the extension that was introduced in 2008.</p>
<p><b>Activities</b></p>	<p><b>Methodology:</b></p> <p>The study will include land based observations of vessel presence and activities and cetaceans presence and activities in Ramsey Sound/ Pembrokeshire.</p> <p>Vessel activities will include speed, travel direction, proximity to cetaceans if present, and changes in behaviour throughout observation period. (Theodolite tracking, Photogrammetric Methods)</p> <p>Animal activities will include number and location of animals, activity (resting, travelling, foraging), response to vessels (if detectable)</p> <p>The observer will collect data in April and May 2012 whenever weather conditions allow it.</p> <p>Interviews with boat operators to reveal whether they are informed about the code and why they do or do not follow it.</p> <p>Data will be compared to existing data collected in 2008-2011 on boat movements, collected by Malcolm Baradell</p>

## ASCOBANS Project Proposal Format

	<p><b>Personnel:</b> Observations will be conducted by one individual or preferably with the help of volunteers (if available)</p> <p><b>Equipment:</b> Good quality binoculars, potentially equipment or software to measure speed of boats and distance between boats and animals (Camera, theodolite, software for photogrammetric measurements)</p> <p><b>Location:</b> Ramsey Island, Pembrokeshire/ Wales</p> <p><b>Duration:</b> 8 h observation/ day 1- 2 days/ week: Interviews, conversations with skippers</p>																		
<b>Outputs</b>	Report on whether or not the Pembrokeshire Marine Code is being followed and reason why the code is not effective. Recommendations for the improvement of the situation.																		
<b>Work Plan and Timetable</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #cccccc;"> <th style="width: 25%;">Period</th> <th style="width: 45%;">Activity</th> <th style="width: 30%;">Responsible person</th> </tr> </thead> <tbody> <tr> <td>01.02.- 01.04.2012</td> <td>Development proposal</td> <td>Carla Lange</td> </tr> <tr> <td>02.04.-31.05.2012</td> <td>Fieldwork: Observation (depending on the weather, preferably 5-6 days/ week)</td> <td>Carla Lange</td> </tr> <tr> <td>01.06.- 31.07.2012</td> <td>Analysis of data and writing of the report</td> <td>Carla Lange</td> </tr> </tbody> </table>	Period	Activity	Responsible person	01.02.- 01.04.2012	Development proposal	Carla Lange	02.04.-31.05.2012	Fieldwork: Observation (depending on the weather, preferably 5-6 days/ week)	Carla Lange	01.06.- 31.07.2012	Analysis of data and writing of the report	Carla Lange						
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<b>Project Personnel</b>	<p><b>Head project:</b> Carla Lange, student Coastal and Marine Management (bachelor) Van Hall Larenstein.</p> <p><b>Advice from:</b> Peter Hoffman (Lecturer Van Hall Larenstein) Malcolm Baradell: Researcher Coastal Zone and Marine Environments Studies Research Unit</p>																		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #cccccc;"> <th style="width: 30%;">Purpose</th> <th style="width: 40%;">Details</th> <th style="width: 30%;">Costs</th> </tr> </thead> <tbody> <tr> <td>Travelling</td> <td>Dortmund-Leeuwarden- St Davids Gas, Ferry</td> <td>600 €</td> </tr> <tr> <td>Living costs</td> <td>5 months research period, accommodation &amp; food</td> <td>3000€</td> </tr> <tr> <td>Binoculars</td> <td></td> <td>300€</td> </tr> <tr> <td>Potentially rental theodolite &amp; purchase of software</td> <td></td> <td>500€</td> </tr> <tr> <td><b>Total</b></td> <td></td> <td><b>4300€</b></td> </tr> </tbody> </table>	Purpose	Details	Costs	Travelling	Dortmund-Leeuwarden- St Davids Gas, Ferry	600 €	Living costs	5 months research period, accommodation & food	3000€	Binoculars		300€	Potentially rental theodolite & purchase of software		500€	<b>Total</b>		<b>4300€</b>
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**FORMAT FOR PROJECT PROPOSALS  
FOR THE CONSIDERATION OF THE ASCOBANS ADVISORY COMMITTEE**

<p><b>Title</b> <b>Behavioural responses of bottlenose dolphins (<i>Tursiops truncatus</i>) to playbacks of pile driving sounds recorded during the construction phase of offshore wind farms</b></p>	<p><b>Justification:</b> Conservation and Management Plan Res.6.2</p>	<p><b>Project ID:</b> 2012/02</p>
<p><b>Implementing Agency / Applicant</b></p>	<p>Sander van der Heul Bsc.; Head of research / Senior trainer marine mammals; Dolfinarium department Boudewijn Seapark; A. de Baeckestraat 12, 8000 Bruges, Belgium. Office 0032 50 408415; Cell 0032 496 153613; Mail sander.van.der.heul@telenet.be</p> <p>Dr. ir. Ron A. Kastelein; Owner / Director Sea Mammal Research Company (SEAMARCO); Julianalaan 46, 3843 CC Harderwijk, The Netherlands. Office 0031 341 456252; Cell 0031 6 46113872; Mail researchteam@zonnet.nl</p>	
<p><b>Collaborating Agencies / Other Sponsors</b></p>	<p><b>Collaborating agencies</b></p> <ul style="list-style-type: none"> <li>• Boudewijn SeaPark, Bruges, Belgium</li> <li>• Sea Mammal Research Company (SEAMARCO), The Netherlands</li> <li>• TNO Science and Industry, The Netherlands</li> <li>• Dotmoth.com, The United Kingdom</li> </ul> <p><b>Other sponsors</b></p> <ul style="list-style-type: none"> <li>• Boudewijn Seapark, Bruges, Belgium</li> <li>• Sea Mammal Research Company (SEAMARCO), Netherlands (by reduction of hourly rate by 50%)</li> <li>• Possibly the Centre for Environment, Fisheries &amp; Aquaculture Science (CEFAS), United Kingdom</li> </ul>	
<p><b>Background / Problem</b></p>	<p>Greenhouse gas emissions are a hot topic, and to reduce this emission many countries develop offshore wind farms. During the last couple of years the number of offshore wind farm projects is increasing exponentially. In Belgium two wind farms are in operation, and four more, and an extension of the existing ones, is planned. The offshore wind farm on the Bligh Bank is currently the one built furthest from the coast.</p> <p>There are mainly three phases in the project development: the construction phase, the operational phase and the removal phase. About the last phase very little is known. The construction phase will probably have the biggest impact on marine mammals: pile driving is known to cause very high pressure changes in the water column. As such, it may disrupt the behaviour of marine mammals at distances of many kilometres, with hearing potentially impaired at closer range (Madsen <i>et al.</i>, 2006). Each pile may take approximately 2 hours to drive. Underwater noise during their piling reaches peak to peak levels in excess of 250 dB re 1µPa @ 1m (Nedwell <i>et al.</i>, 2008)</p> <p>The bottlenose dolphin (<i>Tursiops truncatus</i>) is also found in the southern North Sea, although not as frequently as the common seal (<i>Phoca vitulina</i>), grey seal (<i>Halichoerus grypus</i>) and harbour porpoise (<i>Phocoena phocoena</i>)</p>	

**ASCOBANS Project Proposal Format**

	<p>(Van der Meij &amp; Camphuysen, 2006). As earlier described; No studies look directly at impacts on any cetacean species other than the harbour porpoise (<i>Phocoena phocoena</i>) (Simmonds M.P. <i>et al.</i>, 2008). However, as the coastal bottlenose dolphin is threatened along the shores of the north-east Atlantic Ocean, and that offshore wind farms will be constructed mainly in the shallow areas it inhabits, or used to inhabit, it is very important that effects of pile driving are assessed also on this cetacean species, more threatened with local extinction than the harbour porpoise.</p> <p>The team presenting this project has already performed scientific research using the bottlenose dolphins of Boudewijn Seapark, Bruges, Belgium. The study aimed at jamming dolphin sonar so that they could not follow fish inside the fishing net. This psycho-acoustic study was part of the EU funded “Necessity” project, which aimed at reducing by-catch of small cetaceans in trawler fisheries in European waters.</p>
<b>Objectives</b>	<p align="center">Will pile driving sounds affect the behaviour bottlenose dolphins?</p> <p>To be able to answer this question we will conduct a behavioural experiment with the bottlenose dolphins of Boudewijn Seapark:</p> <p align="center">Determine behavioural changes like swimming pattern, swimming speed and respiration rate during playbacks of pile driving sounds (during the experiments the well-being of the animals is taken in consideration).</p> <p>Questions to be answered are:</p> <p>What exposure level of pile driving sounds causes no behavioural changes?          What exposure level of pile driving sounds causes small behavioural changes? (increased respiration rate; i.e. increased energetic need)          Will there be a displacement of the animals during playbacks of pile driving sounds? (i.e. potential reduction of the foraging area in the wild)          How long after the test session with the pile driving noise will it take for the animals’ behaviour to return to normal?</p>
<b>Relevance to ASCOBANS</b>	<p>As mentioned before, the number of offshore wind farms has grown very fast, and many more are planned. Already during the fifth meeting (2006) of ASCOBANS, the Parties called for research on the effects of wind farms on small cetaceans (Resolution 4) A year later, during April 2007, a workshop was held in Spain: <i>Offshore wind farms and marine mammals: impacts &amp; methodologies for assessing impacts</i>.</p> <p>A lot of research has been conducted to study the effects on common seals (<i>Phoca vitulina</i>), grey seals (<i>Halichoerus grypus</i>) and harbour porpoises (<i>Phocoena phocoena</i>). This was done especially through field surveys, by acoustic recordings, radio telemetry and land-based observations. Small cetaceans, as mentioned above, in captivity have also been the subject of studies. Wind farms are already being or will be built in coastal waters, inhabited by the bottlenose dolphin (<i>Tursiops truncatus</i>). Especially coastal and inshore regions are at stake. That’s why it is important to look further into the impact on these cetaceans by the construction of wind farms. Especially as the bottlenose dolphin is one of the many species under conservation by</p>

**ASCOBANS Project Proposal Format**

	<p>ASCOBANS.</p> <p>The proposed project will be beneficial to the aims of ASCOBANS in several ways:</p> <ul style="list-style-type: none"> <li>- Attention within ASCOBANS has, up to now, been virtually limited to the harbour porpoise. It has been agreed that more attention should be paid to other species, and especially now since the ASCOBANS area has been expanded.</li> <li>- ASCOBANS, at its last Meeting of Parties, adopted a resolution on noise, which is very relevant to pile driving.</li> <li>- It should be acknowledged that the conservation status of the bottlenose dolphins in the north-east Atlantic Ocean, especially of the coastal type (of which it is uncertain to which extent it interbreeds with the offshore type) is vulnerable, with populations having disappeared from large areas, and other populations going down.</li> <li>- This study will address a key element (no. 3) in the ASCOBANS Advisory Committee's Triennial Activity Work Plan.</li> <li>- Information on the project itself, including information on bottlenose dolphins and the aim of the study, will be made public at the Boudewijn Seapark, and ASCOBANS will be mentioned. ASCOBANS (parties, secretariat) are invited to provide information about aims and background on noise impact and bottlenose dolphin conservation needs.</li> <li>- The ACOBANS Advisory Committee will be regularly informed about the progress of the project and be enabled to comment upon it.</li> <li>- The information obtained will be widely disseminated to other ASCOBANS Parties, enhancing their ability to take into account potential impact of planned wind farms on bottlenose dolphins in their management area</li> </ul>												
<p><b>Activities</b></p>	<p>Title: <i>Behavioural response of bottlenose dolphins to playbacks of pile driving sounds</i></p> <ul style="list-style-type: none"> <li>• Study area The study will take place in the main front pool of the Dolphin department of Boudewijn Seapark. The front pool is 36 m x 13 m, sides 4 m deep and centre 5.6 m deep. The volume of the main pool is 1649 m<sup>3</sup>. The salinity is around 22 ‰. The water is very clear.</li> <li>• Animals</li> </ul> <table border="1"> <thead> <tr> <th>NUMBER OF DOLPHINS</th> <th>SEX</th> <th>AGE</th> <th>WEIGHT</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>Female</td> <td>8-46</td> <td>180-210 kg</td> </tr> <tr> <td>2</td> <td>Male</td> <td>8-26</td> <td>200-250 kg</td> </tr> </tbody> </table>	NUMBER OF DOLPHINS	SEX	AGE	WEIGHT	5	Female	8-46	180-210 kg	2	Male	8-26	200-250 kg
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5	Female	8-46	180-210 kg										
2	Male	8-26	200-250 kg										

<ul style="list-style-type: none"><li>• Test stimuli Recordings of pile driving sounds will be used, which were recorded in the North Sea during a pile driving of a monopile for a wind generator by TNO, the Netherlands. The sounds were recorded at a specific distance from the source.</li> <li>• Determination of the source level During pre-tests the source level of the pile driving sounds will be determined. We hope to be able to find two different kinds of source levels; one with just no behavioural changes, and one which causes an increased respiration rate and avoidance behaviour away from the sound source.</li> <li>• SPL distribution measurements To determine the sound distribution in the pool, we will use the same grid as with the behavioural recording. The SPL will be measured at several locations and depths. There will be a sound level gradient in the pool; high near the transducer, and lower at the opposite side of the pool from the transducer.</li> <li>• Experimental procedures Thirty minutes before the session, the underwater transducer will be placed in position. The dolphins will be in the main front pool. There will be a 15 minute baseline (no sound), after that a 15 minute test period (continuous pile driving sound with a normal strike rate) and at last a 15 minute post-test period (no sound). During the tests, an aerial camera(s) with a wide angle lens will be recording the animals from above. There will be no staff allowed near the study area. We will conduct one session per day for 5 days per week.</li> <li>• Analysis Two objective behavioural parameters will be used; the surfacing location of the dolphins in the pool and the number of surfacings. During analysis of the recorded data, a grid will be put on the computer screen. The grid will correspond with markers around the pool, which will be recorded with the camera. With the grid, we will be able to calculate the distance between the dolphin and the transducer. We will compare the locations and the number of surfacings from the test period and post-test period with the baseline period. Three of subjective behavioural parameters will also be recorded; the swimming speed, the respiration force and the number of jumps.</li> <li>• Materials One/two aerial camera(s) with wide-angle lens above the main pool. Analog to digital converter Video/audio recording equipment Monitor for operator Laptop for the sound files Power amplifier Underwater transducer(s) Underwater hydrophone Hydrophone pre-amplifier External hard disc to record the audio and video recordings.</li></ul>
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**ASCOBANS Project Proposal Format**

	<p>Speaker Bat detector Oscilloscope Volt-meter</p> <p>Computer analysis</p>																																
<b>Outputs</b>	<ul style="list-style-type: none"> <li>• A written report to ASCOBANS</li> <li>• The ACOBANS Advisory Committee will be regularly informed about the progress of the project and be enabled to comment upon it</li> <li>• A scientific publication in for instance Marine Environmental Research, or Journal of the Acoustical Society of America</li> <li>• Educational flyers for the visitors of Boudewijn Seapark (exhibition space of dolfinarium and on internet site of park)</li> <li>• Publications in media (TV/radio/newspapers/magazines)</li> <li>• Presentation of research during conferences (Special symposia related to ecological impacts of wind parks / European Cetacean Society / European Association of Aquatic Mammals / International Marine Animal Trainers Association / Society for Marine Mammalogy)</li> </ul>																																
<b>Work Plan and Timetable</b>	<p>Research; <i>Behavioural response of bottlenose dolphins to playbacks of pile driving sounds</i></p> <table border="1"> <thead> <tr> <th>PERIOD</th> <th>DESCRIPTION</th> <th>NUMBER OF SESSIONS</th> <th>RESPONSIBLE</th> </tr> </thead> <tbody> <tr> <td>May -August 2011</td> <td>Preparation research set-up</td> <td></td> <td>S. van der Heul</td> </tr> <tr> <td>September</td> <td>Pre test (To determine the sound levels)</td> <td></td> <td>S. van der Heul R.A. Kastelein</td> </tr> <tr> <td>September</td> <td>Sound measurements</td> <td>Before actual experiments</td> <td>Employee TNO S. van der Heul R.A. Kastelein</td> </tr> <tr> <td>September &amp; October 2011</td> <td>Data collection</td> <td>1 per day / 5 days a week.</td> <td>S. van der Heul</td> </tr> <tr> <td>January 2012</td> <td>Sound measurements</td> <td>Before actual experiments</td> <td>Employee TNO S. van der Heul R.A. Kastelein</td> </tr> <tr> <td>January &amp; February 2012</td> <td>Data collection</td> <td>1 per day / 5 days a week.</td> <td>S. van der Heul</td> </tr> <tr> <td>March - July 2012</td> <td>Analysis and writing</td> <td></td> <td>S. van der Heul R.A. Kastelein</td> </tr> </tbody> </table>	PERIOD	DESCRIPTION	NUMBER OF SESSIONS	RESPONSIBLE	May -August 2011	Preparation research set-up		S. van der Heul	September	Pre test (To determine the sound levels)		S. van der Heul R.A. Kastelein	September	Sound measurements	Before actual experiments	Employee TNO S. van der Heul R.A. Kastelein	September & October 2011	Data collection	1 per day / 5 days a week.	S. van der Heul	January 2012	Sound measurements	Before actual experiments	Employee TNO S. van der Heul R.A. Kastelein	January & February 2012	Data collection	1 per day / 5 days a week.	S. van der Heul	March - July 2012	Analysis and writing		S. van der Heul R.A. Kastelein
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	<b>Preparation location</b>											
	<b>Pre-tests</b>											
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	<b>Tests</b>											
	<b>Analysis/writing</b>											
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	<b>Project Personnel</b>	<ul style="list-style-type: none"> <li>• S. van der Heul (Principle investigator, data collection, analysis and writing manuscript)</li> <li>• R.A. Kastelein (Advice acoustics, co-writing manuscript)</li> <li>• N. Jennings (Statistical analysis)</li> <li>• Employee TNO (Sound measurements and analysis)</li> <li>• Students (data collection and analysis)</li> </ul>										
<b>Steering group</b>	<p>Scientific advice during research and writing:</p> <ul style="list-style-type: none"> <li>• Prof. dr. ir. P.J.H. Reijnders; IMARES, dept. Ecosystems, and Wageningen University, dept. Aquatic Ecosystems and Waterquality, P.O. box 167, 1790 AD Den Burg, The Netherlands. Office: 0031 317 487107; Mail: peter.reijnders@wur.nl</li> <li>• Others recommended by The ASCOBANS Advisory Committee????</li> <li>• Dr. P. de Laender; Veterinarian Dolfinarium department. Dierendokters, Prins Karellaan 39, 8000 Bruges, Belgium. Practice: 0032 50 373133; Cell: 0032 477 761712; Mail: piet.delander@skynet.be</li> <li>• J. Cottyn; curator Dolfinarium; Dolfinarium department Boudewijn Seapark; A. de Baeckestraat 12, 8000 Bruges, Belgium. Office: 0032 50 408415; Cell: 0032 476 456379; Mail: johan.cottyn@boudewijnseapark.be</li> </ul>											
<b>Budget Estimates</b>	<b>DESCRIPTION</b>	<b>BUDGET COSTS</b>	<b>EXPLANATION</b>									
	9 pre-test days	900,-	Main pool + Dolphins 1 hour x €100 x 9 days									
	2 sound measurements	2.000,-	Main pool for a day €1000 x 2days									
	Research; behavioural response to playback 40 days	4.000,-	Main pool + Dolphins 1 hour x €100 x 40days									
	5 working days S vd Heul	7.500,-	€150 per ay x 50days									

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x 10 weeks (during research)		
1 working day/week for 6 months S vd Heul (after research; analysis and writing publication)	3.600,-	€150 x 24days
Working time senior trainers 40 days 30 minutes/day (conduct sessions research)	825,-	30 minutes x 2 trainers x 40days = 2400 minutes = 40 hours TOTAL: 5.5 days x €150
Hire SEAMARCO personnel	6000,- (Incl. VAT)	500€ per day x 10 days = €5000
Sound measurements + analysis (2 times)	5000,- (Incl. VAT)	€2.500 per time x 2
Rent research equipment	3300,- (Incl. VAT)	€700 per month x 4 months = €2800
Statistic analysis Dotmoth.com	500,-	€500
ravel costs SEAMARCO	300,-	€50 per round trip x 6 trips
<b>TOTAL</b>	<b>33.975,-</b>	

• Funding by Boudewijn Seapark

DESCRIPTION	BUDGET COSTS	COVERED BY	EXPLANATION
9 pre-test days	900,-	Boudewijn Seapark	Main pool + Dolphins 1 hour x €100 x 9 days
2 sound measurements	2.000,-	Boudewijn Seapark	Main pool for a day €1000 x 2days
Research; behavioural response to playback 40 days	4.000,-	Boudewijn Seapark	Main pool + Dolphins 1 hour x €100 x 40days
5 working days S vd Heul x 10 weeks (during research)	7.500,-	Boudewijn Seapark	€150 per day x 50days
1 working day/week for 6 months S vd Heul (after research; analysis and writing publication)	3.600,-	Boudewijn Seapark	€150 x 24days
Working time senior trainers 40 days 30	825,-	Boudewijn Seapark	30 minutes x 2 trainers x 40days =

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	minutes/day (conduct sessions research)			2400 minutes = 40 hours TOTAL: 5.5 days x €150
	<b><u>TOTAL</u></b>	<b>18.825,-</b>	Boudewijn Seapark	
	<ul style="list-style-type: none"> <li>Funding by ASCOBANS</li> </ul>			
	<b>DESCRIPTION</b>	<b>BUDGET COST</b>	<b>COVERED BY</b>	<b>EXPLANATION</b>
	Hire SEAMARCO personnel	6000,- (Incl. VAT)	Funding	€500 per day x 10 days = €5000
	Sound measurements + analysis TNO (2 times)	5000,- (Incl. VAT)	Funding	€2.500 per time x 2
	Rent research equipment	3200,- (Incl. VAT)	Funding	€700 per month x 4 months = €2800
	Statistic analysis Dotmoth.com	500,-	Funding	€500
	Travel costs SEAMARCO	300,-	Funding	€50 per round trip x 6 trips
	<b><u>TOTAL</u></b>	<b>15.000,-</b>		
<b>References</b>	<ul style="list-style-type: none"> <li>Madsen, P.T., Wahlberg, M., Tougaard, J., Lucke, K., and Tyack, P. 2006. Wind turbine underwater noise and marine mammals: implications of current knowledge and data needs. <i>Mar. Ecol. Progr. Ser.</i> <b>309</b>: 279-295.</li> <li>Nedwell, J.R., Parvin, S.J., Edwards, B., Workman, R., Brooker, A.G. and Kynoch, J.E. 2008. Measurement and interpretation of underwater noise during construction and operation of offshore wind farms in UK waters. Subacoustech Report No. 544R0736 to COWRIE Ltd. ISBN: 978-0-9554279-5-4.</li> <li>Van der Meij SET, Camphuysen CJ (2006). The distribution and diversity of whales and dolphins (Cetacea) in the southern North Sea: 1970-2005. <i>Lutra</i> 49: 3-28.</li> <li>Simmonds, P.S., Dolman, S.J., 2008. All at sea: Renewable energy production in the context of marine nature conservation. Proceedings of the workshop on offshore wind farms and marine mammals: impacts &amp; methodologies for assessing impacts. 6-11.</li> </ul>			

**FORMAT FOR PROJECT PROPOSALS  
FOR THE CONSIDERATION OF THE ASCOBANS ADVISORY COMMITTEE**

<p><b>Title</b> Conservation genetics of functional loci for <i>Tursiops truncatus</i> populations in the ASCOBANS region</p>	<p><b>Justification:</b> Conservation and Management Plan Triennium Work Plan</p>	<p><b>Project ID:</b> 2012/03</p>
<p><b>Implementing Agency / Applicant</b></p>	<p>A. Rus Hoelzel School of Biological and Biomedical Sciences Durham University, South Road, Durham, DH1 3LE, UK</p>	
<p><b>Collaborating Agencies / Other Sponsors</b></p>	<p>Centre for Genomic Research, Liverpool, UK</p>	
<p><b>Background / Problem</b></p>	<p>This will be a new activity that builds on earlier work. We have established that <i>Tursiops truncatus</i> shows fine-scale population structure at neutral genetic markers across the ASCOBANS region (Natoli et al. 2005, Nichols et al. 2007). Given ongoing anthropogenic impacts (fisheries bycatch, habitat modification, chemical and sound pollution, and fisheries impact on prey resource) it is essential to understand the level of isolation of regional populations as a measure of their vulnerability. At the same time, it is important to know to what extent local populations are adapted to and therefore dependent on local habitat, and this is currently poorly understood. Here we will apply a methodology that will provide greatly improved resolution to the assessment of stock structure, and permit the identification of functional loci likely to be under selection, permitting for the first time the incorporation of local adaptation into the development of conservation strategies for this species. These new data will also greatly improve estimates of local diversity, effective population size, and as a consequence, the potential for adaptive response to environmental change.</p> <p>Nichols, C., Herman, J., Gaggiotti, O.E., Dobney, K.M., Parsons, K. &amp; Hoelzel, A.R. 2007. Genetic isolation of a now extinct population of bottlenose dolphins (<i>Tursiops truncatus</i>). <i>Proc. Royal Soc. B</i> <b>247</b>: 1611-1616.</p> <p>Natoli, A., Birkin, A., Aquilar, A., Lopez, A. &amp; Hoelzel, A.R. 2005. Habitat structure and the dispersal of male and female bottlenose dolphins (<i>Tursiops truncatus</i>). <i>Proc. Royal Soc. B.</i> <b>272</b>:1217-1226.</p>	
<p><b>Objectives</b></p>	<p>1) To apply second generation sequencing technologies to identify candidate loci that may be under selection (and therefore of functional relevance) for <i>Tursiops truncatus</i> across the environmental gradients relevant to the ASCOBANS region (especially with respect to latitude and the comparison between the Atlantic Ocean and North Sea).</p> <p>2) To provide initial screening at identified functional loci and establish the potential for much more extensive analyses.</p> <p>3) To identify neutral single nucleotide polymorphisms (SNPs)</p>	

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	<p>that can be used to provide a high resolution assessment of stock structure across the ASCOBANS region.</p> <p>4) To promote the effective conservation and management of diversity for this species in the context of anthropogenic impact within the ASCOBANS region.</p>
<p><b>Relevance to ASCOBANS</b></p>	<p>This study is most directly relevant to point 4 in the table defining the activities in the Agreement's Triennium Work Plan: to "Review new information, as far as possible in co-operation with EU, ICES and IWC, on cetacean population size, distribution, and structure." However, points 1-3 having to do with bycatch, pollution and sound (respectively) are all dependent on the accurate identification of the units of conservation, and this study will make substantial advances in support of that objective. It is widely recognized that effective conservation must incorporate information on local adaptation and habitat dependence, even though this has not been an achievable goal until recently. Current technological advances make this possible and affordable, and it is therefore appropriate that it becomes a priority aspect of the identification of stock structure and natural patterns of diversity. This study will also provide substantial support for the planned ASCOBANS activity, Tursiops Seas.</p>
<p><b>Activities</b></p>	<p>All DNA is available from earlier studies and held in frozen archive at the PI's lab in Durham. Approximately 30 samples from the northern extreme geographic range of <i>Tursiops truncatus</i> (in Scotland) will be compared with approximately 30 samples from the Bay of Biscay (France) and 6 samples from the Mediterranean Sea as an outgroup. To identify loci under selection, we will use a recently developed technique called Restriction-Associated DNA (RAD) Tags (Baird <i>et al.</i> 2008; Hohenlohe <i>et al.</i> 2010) to discover and genotype thousands of single nucleotide polymorphisms (SNPs) across the genome. The method uses second-generation sequencing to sequence millions of bases from each individual, permitting the identification of these variable markers. Loci under the influence of divergent selection between populations will be distinguished from neutral loci using tests that identify loci which are statistical outliers in terms of levels of diversity compared to levels of divergence ("<math>F_{ST}</math> outliers"), or through correlation with ecological variables (Oleksyk <i>et al.</i> 2011). Many more variable neutral markers will be developed permitting the assessment of population structure due to demography and genetic drift at a much higher level of resolution than has been possible in the past. Given the complicated pattern of differentiation seen in some regions for this species, including population structure among lagoons and between nearshore and offshore populations off Florida (Sellas <i>et al.</i> 2005), and fine-scale structure around the UK (Nichols <i>et al.</i> 2007), further resolution is likely to provide important information about stock structure that has not yet been identified.</p> <p>Baird NA, Etter PD, Atwood TS, <i>et al.</i> (2008) Rapid SNP Discovery and Genetic Mapping Using Sequenced RAD Markers. <i>Plos One</i> 3.</p> <p>Hohenlohe PA, Bassham S, Etter PD, <i>et al.</i> (2010) Population Genomics of Parallel Adaptation in Threespine Stickleback using</p>

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	<p>Sequenced RAD Tags. <i>Plos Genetics</i> <b>6</b>.</p> <p>Oleksyk TK, Smith MW, O'Brien SJ (2011) Genome-wide scans for footprints of natural selection. <i>Philosophical Transactions of the Royal Society B-Biological Sciences</i> <b>365</b>, 185-205.</p> <p>Sellas AB, Wells RS, Rosel PE (2005) Mitochondrial and nuclear DNA analyses reveal fine scale geographic structure in bottlenose dolphins (<i>Tursiops truncatus</i>) in the Gulf of Mexico <i>Conservation Genetics</i> <b>6</b>, 715-728</p>
<b>Outputs</b>	<p>Given known information on genome size (based on an available draft sequence of <i>Tursiops truncatus</i> through NCBI) it is expected that this method will produce about 4.6Mb of sequence for each individual (to be generated using the service available at the Centre for Genomic Research in Liverpool at a cost of approximately 150 Euros per sample). If there is one SNP per 1000bp, this would identify ~4600 SNPs, and from that it would be expected to identify 100-300 loci showing a signal for selection. The remainder would be applied to the assessment of neutral diversity. While the full exploitation of these data would require a long-term project, they will facilitate this future work and permit significant advances towards the more effective conservation of this species even from the initial analyses possible within the current proposed project.</p>
<b>Work Plan and Timetable</b>	<p>The project would run for one year, with sequence generation being undertaken during the first 6 months, and sequence analysis (computer based) and report/ manuscript writing during the second 6 months.</p>
<b>Project Personnel</b>	<p>The project will be supervised by Prof. A. Rus Hoelzel who will oversee the provision of suitable samples (already available in archive at the PI's lab in Durham) to the genomics lab in Liverpool for analysis. The assembly of sequences, identification of SNP loci and initial screening of diversity (based on the initial set of sequenced individuals) will be undertaken by Dr. Andre Moura, a recent graduate from the Molecular Ecology Group in Durham with excellent skills relevant to this study and relevant experience associated with his PhD project work.</p>
<b>Budget Estimates</b>	<p>There are two main budget items, the data generation at the Liverpool Centre for Genomic Research, and the contract analytical work, to be done by a named researcher (Dr. Andre Moura).</p> <p>Genomics analysis – Assuming 66 samples, the cost per sample for all work associated with the RAD Tag analyses (library construction, sequencing and initial bioinformatics) will be 150 Euros (10,000 for the full sample set).</p> <p>Computer-based SNP discovery, identification of candidate loci under selection and population genetic analyses using both functional and neutral loci – 5,000 Euros for the contract job.</p> <p>Supervision of the project by the PI (PI salary) and all space and computing facilities will be paid for by Durham University.</p>

For more information please contact the ASCOBANS Secretariat at  
[ascobans@ascobans.org](mailto:ascobans@ascobans.org).

**FORMAT FOR PROJECT PROPOSALS  
FOR THE CONSIDERATION OF THE ASCOBANS ADVISORY COMMITTEE**

Funding of projects through ASCOBANS is dependent upon availability of funds. Since ASCOBANS is not a funding agency, there is no guarantee that funds will be available each year. Please also note that the maximum sum the Agreement will spend on any one project is 15,000 Euro. Also, there is no possibility for supporting long-term projects. ASCOBANS will not fund monitoring obligations of EU member states or Parties to international conventions.

The ASCOBANS Advisory Committee, which meets annually in March/April, will consider the proposals made available to its review and select those that are a priority for funding. *Please note that only projects with a direct benefit for the conservation objectives of the Agreement can be supported.* Projects covering more than one ASCOBANS Party will be favoured.

Please provide only summary information in the form below. The Secretariat will request more detailed information for selected projects only. The purpose of this form is to assist in the review and approval of the project proposal by the Advisory Committee.

Proposals received **by 15 February** of each year will be made available to the Committee for their review. Funding applications received later will not be considered until the following year.

<p><b>Title</b></p> <p align="center"><b>Examine habitat exclusion and long term effect of pingers</b></p>	<p><b>Justification:</b> Conservation and Management Plan  Triennium Work Plan</p>	<p><b>Project ID:</b> 2012/04</p>
<p><b>Implementing Agency / Applicant</b></p>	<p>Dr. Line A. Kyhn Institute for BioScience, Aarhus University, Frederiksborgvej 399 DK-4000 Roskilde Denmark Mail: <a href="mailto:lky@dmu.dk">lky@dmu.dk</a> Phone: +45 30183148 <a href="http://www.au.dk">www.au.dk</a></p>	
<p><b>Collaborating Agencies / Other Sponsors</b></p>	<p>The Danish AgriFish Agency, under the Ministry of Food, Agriculture and Fisheries in Denmark, will fund the monitoring of harbour porpoises included in this proposal.</p>	
<p><b>Background / Problem</b></p>	<p>Background  The harbour porpoise is listed on Annex II and IV of the EU Habitats Directive (92/43/EEC) which obliges all EU Member States to protect the species in its entire range as well as</p>	

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	<p>identify protected areas (Special Areas of Conservation, SACs).</p> <p>Since incidental bycatch in gillnets pose a serious threat to porpoises and is the most reasonable explanation for a possible reduction in the population, pinger use is being enforced by the Danish Government as a trial for all gillnet fisheries in an area of high porpoise density, the Great Belt, for the duration of a year beginning in July 2012. This enforcement is regardless of vessel size and the type of gillnet used, which means that commercial as well as recreational fishermen must use pingers on all gillnets. Previous results from small scale controlled studies have indicated that porpoises may be scared out of areas where pingers are used (Jørgensen 2006, Carlström <i>et al.</i> 2009), however these studies were of too short duration to warrant conclusive results and the duration and area of the potential habitat exclusion in large scale pinger use requires further study. The upcoming pinger enforcement in the Great Belt provides the opportunity for such a study since it allows for both quantification of pinger noise and presence of porpoises and thereby quantification of potential habitat exclusion of harbour porpoises. The suggested study is connected to an already funded project where porpoise presence is being monitored before and after the pinger enforcement in the Great Belt. However, since the extent of the gillnet fishery is unknown, an assessment of pinger impact on porpoise presence in the area also requires monitoring of pinger activity. The aim of the present study is to quantify pinger activity in the Great Belt simultaneously with the monitoring of harbour porpoise echolocation activity.</p> <p>Briefly describe issues/problems to be addressed by the project. Please indicate whether the proposed project is a new activity and its possible linkages with already ongoing/planned initiatives.</p>
<b>Objectives</b>	<p>Purpose and benefit for conservation objectives</p> <p>The specific objective of this project is to determine the effect of pingers on harbour porpoise presence. We will do so by :</p> <ol style="list-style-type: none"><li>1) quantifying the pinger exposure in the area with mandatory pinger use in all gillnet fisheries (the Great Belt, Denmark), and</li><li>2) simultaneously monitor harbour porpoise presence in the Great Belt to examine whether pinger noise results in decreased porpoise presence and whether the porpoises habituate to the pinger sound over time.</li></ol> <p>In this proposal we apply for funding for Part 1). Part 2) is funded by the AgriFish Agency. With the results of the proposed studies, we will obtain essential knowledge on the long term effects of pingers and their usability as bycatch mitigation in protected areas as well as elsewhere.</p>

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	<p>Briefly specify the project objective as the overall intended achievement. This part should include one or two main objectives, possibly supplemented by more specific objectives, which could provide more structure to the design of the project. Objectives are intended goals and should be clearly distinguished from outputs and activities.</p>
<p><b>Relevance to ASCOBANS</b></p>	<p>This project is directly relevant to the conservation of harbour porpoises and thus to the objectives of ASCOBANS. Pingers have proven an effective tool to mitigate bycatch, but here we aim to assess potential side-effect of pingers (habituation and habitat exclusion), which will determine whether pingers can actually be implemented in areas of high porpoise density such as SACs. This project is urgent not only in relation to the management of nationally appointed SACs in the EC, but also to the general protection of harbour porpoises elsewhere.</p> <p>The project will significantly add to information requested under “Conservation issues “points 1 and 3 in the ASCOBANS Draft Triennial Work Plan (2010-2012), with point 1 addressing bycatch of porpoises and the need for Parties and Range States to provide information “on the implementation, efficacy and impacts of measures introduced to reduce bycatch and point 3 requesting review of the extent of negative effects of sound on small cetaceans. The proposed study is also included in one of the recommendations in the draft Conservation Plan for Western Baltic, Belt Sea and Kattegat.</p> <p>Furthermore, the issue of pinger side-effects have been discussed on numerous occasions in meetings organised under the auspices of ASCOBANS e.g. the Jastarnia Group, the North Sea group and the AC meetings.</p> <p>Only projects directly relevant to the conservation objectives of ASCOBANS will be supported. Briefly explain the pertinence of the project for the attainment of ASCOBANS goals and justify by explaining how the project helps to address the relevant Activities in the Agreement’s Triennium Work Plan. Include references to other decisions or documents/instruments produced within the Agreement, such as the Agreement’s Conservation and Management Plan, Resolutions or actions recommended by the Advisory Committee as appropriate.</p>
<p><b>Activities</b></p>	<p><b>Research Plan and Methods</b></p> <p><b>Monitoring of porpoise presence</b></p> <p>From July 2011 to June 2012 porpoise presence has been monitored in two Danish Special Areas of Conservation (SACs), Kalundborg Fjord and the Great Belt as part of the Danish national monitoring programme. The monitoring is conducted by means of five randomly positioned C-PODs in each of the two SACs. This monitoring will serve as a baseline in relation to the pinger enforcement, and the C-PODs will remain on their current positions in the Great Belt from July 2012 to June 2013 to monitor</p>

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	<p>porpoise presence after the introduction of pingers. Concurrently the five C-PODs in Kalundborg Fjord will also remain in the area as controls since the pinger enforcement does not cover Kalundborg Fjord. It is thereby possible to make a Before-After-Control-Impact (BACI) statistical test in relation to the pinger enforcement. This part of the study is funded by the AgriFish Agency.</p> <p><b>Pinger noise monitoring</b></p> <p>By deploying a Loggerhead DSG noise logger together with each of the five C-PODs, we propose to expand the harbour porpoise monitoring project by quantifying pinger noise exposure simultaneously. The noise loggers record pinger sounds and by analysing the noise logger files, the pinger exposure can be quantified for each of the five C-POD positions. We thereby obtain measures of both porpoise presence and pinger exposure, and by comparing the two measures, we will evaluate the hypothesis that porpoises are displaced by pinger sounds. Since both C-PODs and noise loggers will be deployed for a year we will also evaluate the hypothesis that porpoises habituate to pingers over time.</p> <p>The noise loggers will be deployed for a year along with the CPODs. For this study we apply for funding to obtain 3 noise loggers. All remaining equipment and salary has been funded by the AgriFish Agency, except for the two remaining noise loggers that will be funded by Aarhus University.</p> <p><b>Feasibility</b></p> <p>The project will be conducted by an experienced group of porpoise researchers from Institute of Bioscience, Aarhus University, Denmark. Both the principal Investigator, Dr. Line A. Kyhn, as well as the project participants, Dr. Signe Sveegaard, Dr. Jonas Teilmann, Dr. Jakob Tougaard and Dr. Anders Galatius have extensive and profound experience in porpoise monitoring, sound recordings and analysis including the experimental setup prosed here (Carstensen et al. 2006; Kyhn <i>et al.</i> 2008, 2009, 2010, 2011, 2012. Sveegaard <i>et al.</i> 2010, 2011a, 2011b; Teilmann <i>et al.</i> 2002, 2006; Tougaard <i>et al.</i> 2008, 2009a, 2009b).</p> <p><i>Briefly describe the work or the tasks to be performed. As the main element of the project's design, this section should outline the methodologies to be employed, personnel and equipment needs, location and expected duration of individual actions. Actions should be clearly related to the outputs described below.</i></p>
<p><b>Outputs</b></p>	<p>The results will be presented to ASCOBANS as well as to the AgriFish Agency.</p> <p>The results will be written up for an international scientific journal such as <i>Conservation Biology</i>.</p> <p><i>Indicate the specific products or services (e.g. reports, publications) produced by the activities to achieve the project objectives, including scientific, conservation and management and educational outputs.</i></p>

## ASCOBANS Project Proposal Format

<b>Work Plan and Timetable</b>	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><b>Porpoise monitoring</b></th> <th style="text-align: center; border-bottom: 1px solid black;">June 2011-2012</th> <th style="text-align: center; border-bottom: 1px solid black;">June 2012-2013</th> <th style="text-align: center; border-bottom: 1px solid black;">June 2013- June 2014</th> </tr> </thead> <tbody> <tr> <td><i>Baseline, both areas, CPODs</i></td> <td style="text-align: center;">x</td> <td></td> <td></td> </tr> <tr> <td><i>Control, Kalundborg, CPODs</i></td> <td></td> <td style="text-align: center;">x</td> <td></td> </tr> <tr> <td><i>Pinger exposure, Great Belt ,CPODs</i></td> <td></td> <td style="text-align: center;">x</td> <td></td> </tr> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><b>Pinger monitoring</b></th> <td></td> <td></td> <td></td> </tr> <tr> <td><i>Pinger monitoring, noise loggers</i></td> <td></td> <td style="text-align: center;">x</td> <td></td> </tr> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><b>Analysis</b></th> <td></td> <td></td> <td></td> </tr> <tr> <td><i>Porpoise presence</i></td> <td></td> <td style="text-align: center;">x</td> <td style="text-align: center;">x</td> </tr> <tr> <td><i>Pinger quantification</i></td> <td></td> <td style="text-align: center;">x</td> <td style="text-align: center;">x</td> </tr> <tr> <td><i>Preparation of manuscript</i></td> <td></td> <td></td> <td style="text-align: center;">x</td> </tr> </tbody> </table> <hr style="border-top: 3px double #000;"/> <p>The manuscript will be submitted during spring 2014.</p> <p style="color: blue; font-size: small;">As a general rule, small-scale projects funded by ASCOBANS should be completed within one year, and their expected duration should not exceed 2-3 years. Indicate proposed beginning and end dates.</p> <p style="color: blue; font-size: small;">The work plan sets out the timetable for carrying out project activities and the delivery of outputs. The timetable should include start and end dates for each activity and indicate who is responsible for its implementation. The information is best presented as a table.</p>	<b>Porpoise monitoring</b>	June 2011-2012	June 2012-2013	June 2013- June 2014	<i>Baseline, both areas, CPODs</i>	x			<i>Control, Kalundborg, CPODs</i>		x		<i>Pinger exposure, Great Belt ,CPODs</i>		x		<b>Pinger monitoring</b>				<i>Pinger monitoring, noise loggers</i>		x		<b>Analysis</b>				<i>Porpoise presence</i>		x	x	<i>Pinger quantification</i>		x	x	<i>Preparation of manuscript</i>			x
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<b>Project Personnel</b>	<p>Scientist Dr. Line A. Kyhn (PI in this project)            Mail: <a href="mailto:lky@dmu.dk">lky@dmu.dk</a>            Phone: +45 30183148</p> <p>Scientist Dr. Signe Sveegaard            (PI on porpoise monitoring in the Danish habitat areas)            Mail: <a href="mailto:sign@dmu.dk">sign@dmu.dk</a>            Phone: +45 28951664</p> <p>Senior scientist, Dr. Jonas Teilmann            (Project participant and senior scientist in porpoise monitoring)            Mail: <a href="mailto:jte@dmu.dk">jte@dmu.dk</a>            Phone: +45 21424291</p> <p>Senior scientist, Dr. Jakob Tougaard            (Project participant and senior scientist in noise recordings and analysis)            Mail: <a href="mailto:jat@dmu.dk">jat@dmu.dk</a>            Phone: +45 40984585</p> <p>Scientist Dr. Anders Galatius?            Mail: <a href="mailto:agj@dmu.dk">agj@dmu.dk</a>            Phone: +45 28710372</p>																																								

## ASCOBANS Project Proposal Format

	<p>All employed at:          Institute for Bioscience, Aarhus University          Frederiksborgvej 399,          DK-4000 Roskilde</p> <p>CVs attached for all participants</p>																																																																				
<b>Budget Estimates</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Expenses (including overhead)</th> <th style="text-align: right;">Per unit</th> <th style="text-align: right;">Units</th> <th style="text-align: right;">Total, Euro</th> </tr> </thead> <tbody> <tr> <td colspan="4"><b>Funded by the AgriFish Agency:</b></td> </tr> <tr> <td>10 CPODs, 10 moorings with acoustic releasers, anchors etc</td> <td style="text-align: right;">4,658</td> <td style="text-align: right;">10</td> <td style="text-align: right;">46,575</td> </tr> <tr> <td>Vessel charter (8 deployments/retrievals)</td> <td style="text-align: right;">1,370</td> <td style="text-align: right;">8</td> <td style="text-align: right;">10,959</td> </tr> <tr> <td>Travel</td> <td style="text-align: right;">274</td> <td style="text-align: right;">8</td> <td style="text-align: right;">2,192</td> </tr> <tr> <td>Deployment and servicing, 8 trips á 12 hours 2 persons</td> <td style="text-align: right;">92</td> <td style="text-align: right;">192</td> <td style="text-align: right;">17,753</td> </tr> <tr> <td>Preparations and calibrations</td> <td style="text-align: right;">92</td> <td style="text-align: right;">80</td> <td style="text-align: right;">7,397</td> </tr> <tr> <td>Reporting</td> <td style="text-align: right;">145</td> <td style="text-align: right;">200</td> <td style="text-align: right;">29,071</td> </tr> <tr> <td>Data analysis</td> <td style="text-align: right;">92</td> <td style="text-align: right;">20</td> <td style="text-align: right;">1,849</td> </tr> <tr> <td colspan="4"><b>Funded by Aarhus University:</b></td> </tr> <tr> <td>2 DSG noise loggers</td> <td style="text-align: right;">4,503</td> <td style="text-align: right;">2</td> <td style="text-align: right;">9,006</td> </tr> <tr> <td><b>Total funded budget</b></td> <td></td> <td></td> <td style="text-align: right;"><b>124,803</b></td> </tr> <tr> <td colspan="4"><b>Applied budget:</b></td> </tr> <tr> <td>3 DSG noise loggers</td> <td style="text-align: right;">4,503</td> <td style="text-align: right;">3</td> <td style="text-align: right;"><b>13,509</b></td> </tr> <tr> <td>Analysis</td> <td style="text-align: right;">92</td> <td style="text-align: right;">16</td> <td style="text-align: right;">1,472</td> </tr> <tr> <td><b>Total applied budget</b></td> <td></td> <td></td> <td style="text-align: right;"><b>14,981</b></td> </tr> <tr> <td><b>Total budget</b></td> <td></td> <td></td> <td style="text-align: right;"><b>139,784</b></td> </tr> </tbody> </table> <p>Every project proposal must include a detailed project budget. A breakdown of the expected costs of the project should be prepared. Purchase of non-expendable equipment through ASCOBANS funding is accepted only exceptionally, and the equipment will remain the property of UNEP/ASCOBANS, which will decide at the closure of the project on its disposal or retention.</p> <p>The budget should include not only the funds requested of ASCOBANS, but also possible other financial resources made available by other sponsors or collaborating agencies. The budget should be presented in a tabular format and, where applicable, should clearly indicate the expected source of the various amounts budgeted.</p>	Expenses (including overhead)	Per unit	Units	Total, Euro	<b>Funded by the AgriFish Agency:</b>				10 CPODs, 10 moorings with acoustic releasers, anchors etc	4,658	10	46,575	Vessel charter (8 deployments/retrievals)	1,370	8	10,959	Travel	274	8	2,192	Deployment and servicing, 8 trips á 12 hours 2 persons	92	192	17,753	Preparations and calibrations	92	80	7,397	Reporting	145	200	29,071	Data analysis	92	20	1,849	<b>Funded by Aarhus University:</b>				2 DSG noise loggers	4,503	2	9,006	<b>Total funded budget</b>			<b>124,803</b>	<b>Applied budget:</b>				3 DSG noise loggers	4,503	3	<b>13,509</b>	Analysis	92	16	1,472	<b>Total applied budget</b>			<b>14,981</b>	<b>Total budget</b>			<b>139,784</b>
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For more information please contact the ASCOBANS Secretariat at  
[ascobans@ascobans.org](mailto:ascobans@ascobans.org).

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# CURRICULUM VITAE : LINE A. KYHN

## 1. PERSONAL HISTORY

Date of birth : 01.03.1976  
Citizenship : Danish

## 2. EDUCATION

Academic degree : Cand. scient (biology), University of Copenhagen, 2006  
PhD in Passive acoustic monitoring and biosonar of toothed whales, Aarhus University, 2010

Languages : Danish, English, some German, a little French.

## 3. EMPLOYMENT RECORD

2010 - Scientist, Institute of Bioscience, Aarhus University.  
2007 - 2010 Ph.D. student, NERI, Aarhus University. PhD Project entitled "Passive acoustic monitoring of toothed with implications for mitigation, management and biology".  
2009 Research assistant, NERI, Aarhus University. 2½ months leave from PhD to conduct biological sampling for the climate change programme at Zackenberg Ecological Research Operations (ZERO), Northeast Greenland (August – October 2009).  
2006 - 2007 Research assistant, NERI, Aarhus University. Employed to conduct tests of acoustic dataloggers in a field study, acoustic surveys of porpoises, take part in the Danish National Galathea3 expedition to make sound recordings of marine mammals, work at Zackenberg in the ZERO programme.

## Other activities

- Field assistant at ZERO BioBasis Programme, Northeast Greenland. Responsible for: Data sampling including; fishing and plant phenology, collection and species identification of arthropods, censuses of mammals and birds, database management, data analysis and reports (3 months in summers 2002, 2003, 2005).
- Field assistant on acoustic yacht based expedition from Denmark to Greenland to record sounds of deep diving whales, Aarhus University (July-August 2006)
- Employed in a Master of Science position in the project "Atlas of Danish Mammals, at The National History Museum of Copenhagen. Species identification of mammals, educating volunteers and keeping contact with volunteers, educating the public, database management (Acces) and mapping in GIS (MapInfo) (Fulltime August 2001-May 2002).
- Field assistant in bat censuses, Zoological Museum (Spring 2003)
- Student job as teacher and information worker at the Zoological Museum, Copenhagen. Teaching of school classes, guidance and information for visitors, creative and practical help with exhibitions, development of teaching material (August 2001 – October 2006).
- Guide for Whale Safari Andenes, Norway. Guided tours for tourists at the Whale Museum and guide during whale watching tours (2 months in 2000 & 2 months in 2001).
- Volunteer for ARCHELON Sea Turtle Protection Society, Creete, Grece. Collection of data on turtle nest, hatching and mortality. Information to tourist on protection of sea turtles (July – August 1999).

#### 4. PUBLICATIONS

- Kyhn L.A., Tougaard J., Thomas L., Duve L.R., Stenback J., Amundin M. and Teilman J. 2012. From echolocation clicks to animal density—Acoustic sampling of harbor porpoises with static dataloggers. *Journal of the Acoustical Society of America* 131(1): 550-560.
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## PRESENTATIONS

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# CURRICULUM VITAE : Anders Galatius

## 1. PERSONAL HISTORY

Date of birth : 05.08.1973  
Citizenship : Danish

## 2. EDUCATION

Academic degree : Cand. scient. (biology), University of Copenhagen, 2002  
PhD in evolution and reproduction of porpoises, University of Copenhagen, 2009

Languages : Danish, English, German, some Spanish.

## 3. EMPLOYMENT RECORD

2011 - Scientist, Department of Bioscience, Aarhus University.  
2010 - 2011 Post Doc., NERI, Aarhus University, working with pollutants in Danish marine mammals.  
2009 - 2010 Teaching assistant, Institute of Biology, University of Copenhagen  
2005 - 2009 PhD-student, Institute of Biology, University of Copenhagen. Thesis entitled: 'Paedomorphosis in phocoenids (porpoises): perspectives for reproduction and evolution within and between species'.  
2005 Research assistant/Statistician, Breast Cancer Clinic, Hørsholm Hospital.  
2004 - 2005 Teaching assistant, Institute of Biology, University of Copenhagen.  
2001 - 2003 Assistant at the project 'Focus on Cetaceans'. Dissections and surveys of cetaceans in Danish waters.

## Other activities

- Chair of HELCOM Seal Expert Group (2011 - ).
- Chair of the Danish Marine Mammal Society (2007 - ).
- Board member of the Danish Marine Mammal Society (2004 - 2007).
- Board member of the Danish Natural History Society (2008 - ).
- Danish National Contact Person of the European Cetacean Society (2003 - ).
- Student representative at the board of the Institute of Molecular Biology, University of Copenhagen (1999 – 2000).
- Reviewer for scientific journals: The Biological Journal of the Linnean Society, Lutra, Journal of Morphology, Journal of the Marine Biological Association of the United Kingdom, Science of the Total Environment, Journal of Vertebrate Paleontology, South American Journal of Aquatic Mammals, Mammalian Biology.

## 4. PUBLICATIONS

- **Galatius, A.**, Kinze, C. C., Teilmann, J. (under revision) Population structure of harbour porpoises in the greater Baltic region: Evidence of separation based on geometric morphometric comparisons. Journal of the Marine Biological Association of the United Kingdom.
- **Galatius, A.**, Jansen, O.E., Kinze, C.C. (in press) Parameters of growth and reproduction of white-beaked dolphins (*Lagenorhynchus albirostris*) from the North Sea. Marine Mammal Science.
- Dietz, R., Rigét, F.F., **Galatius, A.**, Sonne, C., Teilmann, J. Bossi, R. (2012) Spatial trends of perfluorochemicals in harbour seals (*Phoca vitulina*) from Danish waters. Science of the Total Environment: **414**: 732-737.

- **Galatius, A.**, Dietz, R., Rigét, F.F., Sonne, C., Kinze, C.C., Lockyer, C., Bossi, R. (2011). Temporal and life history related trends of PFC contaminants in harbour porpoises from the Danish North Sea. *Marine Pollution Bulletin* 62: 1476-1483.
- **Galatius, A.**, Gol'din, P. E. (2011). Geographic variation of skeletal ontogeny and skull shape in the harbour porpoise (*Phocoena phocoena*). *Canadian Journal of Zoology*, **89**: 869-879.
- **Galatius, A.**, Berta, A., Frandsen, M. S., Goodall, R. N. P. (2011) Interspecific variation of ontogeny and skull shape among porpoises (Phocoenidae). *Journal of Morphology* 272: 136-148. doi: 10.1002/jmor.10900
- **Galatius, A.** (2011) Dreidimensionell auf den Schädel geschaut: Haben Ostsee-Schweinswale ihre ganz eigenen Köpfe? *Meer und Museum*, **23**: 148-149.
- **Galatius, A.** (2010) Paedomorphosis in two small toothed whales (Odontoceti): how and why? *Biological Journal of the Linnean Society*, **99**: 278-295.
- **Galatius, A.**, Kinze, C. C., Teilmann, J. (2010) Population structure of harbour porpoises in the greater Baltic region: Evidence of separation based on geometric morphometric comparisons. Report to ASCOBANS Jastarnia Group, 17 pp.
- **Galatius, A.**, Sonne, C., Kinze, C. C., Dietz, R. and Jensen, J.-E. B. (2009) Occurrence of vertebral osteophytosis in a museum sample of white-beaked dolphins (*Lagenorhynchus albirostris*) from Danish waters. *Journal of Wildlife Diseases*, **45**: 19-28.
- **Galatius, A.** (2008) Pædomorfose i marsvinefamilien. *Dansk Naturhistorisk Forenings Årsskrift* **18**: 24-27.
- Report of ASCOBANS/HELCOM small cetacean population structure workshop (P. G. H. Evans and J. Teilman, eds. 2008): Author of the chapter 'Skeletal variation', co-author of the chapters: 'Harbour porpoise', 'white-beaked dolphin', 'Atlantic white-sided dolphin'
- **Galatius, A.** (2006) Directional bilateral asymmetry of the appendicular skeleton of the white-beaked dolphin (*Lagenorhynchus albirostris*). *Aquatic Mammals*, **32**: 232-235.
- **Galatius, A.**, Andersen, M.E.R., Haugan, B., Langhoff, H.E. and Jespersen, Å. (2006). Timing of epiphyseal development in the flipper skeleton of the harbour porpoise (*Phocoena phocoena*) as an indicator of paedomorphosis. *Acta Zoologica*, **87**: 77-82.
- **Galatius, A.** (2005). Directional bilateral asymmetry of the appendicular skeleton of the harbor porpoise (*Phocoena phocoena*). *Marine Mammal Science*, **21**: 401-410.
- **Galatius, A.** (2005). Sexually dimorphic proportions of the harbour porpoise (*Phocoena phocoena*) skeleton. *Journal of Anatomy*, **206**: 141-154.
- **Galatius, A.** (2005) Marsvin er barnlige. *Dansk Naturhistorisk Forenings Årsskrift* **15**: 38-41.
- Galatius, A. (2004) Asymmetrisk adfærd hos hvaler. *Dansk Naturhistorisk Forenings Årsskrift* **14**: 37-44.
- **Galatius, A.** & Kinze, C. C. (2003). Ankylosis patterns in the post-cranial skeleton and hyoid bones of the harbour porpoise (*Phocoena phocoena*) in the Baltic and North Sea. *Canadian Journal of Zoology*, **81**: 1851-1861.
- Levermann, N., **Galatius, A.**, Ehme, G., Rysgaard, S. & Born, E. W. (2003). Feeding behaviour of free-ranging walrus with notes on apparent dexterity of flipper use. *BMC Ecology*, **3**:9.

#### PRESENTATIONS

- **Galatius, A.**, Jansen, O.E. and Kinze, C.C. Life history parameters of white-beaked dolphins from the North Sea. 19<sup>th</sup> Biennial Conference of the Society for Marine Mammalogy, Tampa, USA. Poster.

- Salling, A., Thompsen, P., Wahlberg, M., Borowska, E., **Galatius, A.**, Nowak, Z., Gilbert, M.T.P. and Foote, A.D. Detection of harbor porpoise using environmental DNA (eDNA) from seawater samples. 19<sup>th</sup> Biennial Conference of the Society for Marine Mammalogy, Tampa, USA. Poster.
- **Galatius, A.**, Kinze, C. C. and Teilmann, J. (2011). Population structure of harbour porpoises in the greater Baltic region: Evidence of separation based on geometric morphometric comparisons. Annual Conference of the European Cetacean Society, Cadiz, Spain. Talk/Powerpoint.
- **Galatius, A.** and Gol'din, P.E (2010). Geographic Variation of Skeletal Paedomorphosis in the Harbour Porpoise: Does Ecology Matter? Annual Conference of the European Cetacean Society, Stralsund, Germany. Talk/Powerpoint.
- **Galatius, A.** and Kinze, C.C. (2010). Age estimation and life history parameters of white-beaked dolphins from the North Sea. White-beaked / White-sided dolphin workshop, Annual Conference of the European Cetacean Society, Stralsund, Germany, Talk
- **Galatius, A.** (2008) Porpoise and dolphin ontogenies compared: Porpoise paedomorphosis formalized. 22<sup>nd</sup> Annual conference of the European Cetacean Society, Egmond an Zee, The Netherlands. Talk/Powerpoint.
- **Galatius, A.** (2007) Is phocoenid paedomorphosis the result of progenesis? 17<sup>th</sup> Biennial Conference of the Society for Marine Mammalogy, Cape Town, South Africa. Talk/Powerpoint.
- **Galatius, A.** (2007) Paedomorphosis in porpoises: Ecological adaptation? 4<sup>th</sup> Danish Marine Mammal Symposium, Copenhagen. Talk/Powerpoint.
- **Galatius, A.** and Kinze, C. C. (2007) Aspects of life history of white-beaked dolphins (*Lagenorhynchus albirostris*) from Danish waters. 21<sup>st</sup> Annual conference of the European Cetacean Society, San Sebastian, Spain. Poster.
- **Galatius, A.** and Kinze, C. C. (2006) Differences in timing of sexual maturity in Danish and Greenlandic harbour porpoises (*Phocoena phocoena*): varying levels of paedomorphosis? 20<sup>th</sup> Annual conference of the European Cetacean Society, Gdynia, Poland. Talk/Powerpoint.
- **Galatius, A.** and Kinze, C. C. (2004) Occurrence of the degenerative disease *spondylosis deformans* in the vertebral column of white-beaked dolphins (*Lagenorhynchus albirostris*) from Danish waters. 18<sup>th</sup> Annual conference of the European Cetacean Society, Kolmården, Sweden. Poster.
- **Galatius, A.** and Kinze, C. C. (2003) Ankylosis patterns in the skeletons of white-beaked dolphins (*Lagenorhynchus albirostris*) from Danish waters. 17<sup>th</sup> Annual conference of the European Cetacean Society, Las Palmas de Gran Canaria, Spain. Poster.
- **Galatius, A.** and Kinze, C. C. (2002) Epiphyseal ankylosis in the vertebral column and flippers of Danish harbour porpoises (*Phocoena phocoena*): onset and development. 16<sup>th</sup> Annual conference of the European Cetacean Society, Liege, Belgium. Poster.

# CURRICULUM VITAE : SIGNE SVEEGAARD

## 1. PERSONAL HISTORY

Date of birth : 25.02.1976  
Citizenship : Danish

## 2. EDUCATION

Academic degree : Cand. scient (biology), University of Copenhagen, November 2006  
PhD in ecology and distribution of harbour porpoises, Aarhus University,  
Expected March 2011

Languages : Danish, English, and some German.

## 3. EMPLOYMENT RECORD

2010 – 2007 - 2010 Researcher, Institute of Bioscience, Aarhus University (December 2010 – )  
Ph.D. student, NERI, Aarhus University. PhD project entitled “Temporal and spatial distribution of harbour porpoises in relation to their prey”.

2008 - 2009 Research assistant, National Environmental Research Institute, Aarhus University. two month leave from PhD to conduct Environmental Impact Assessment of marine wind farm on marine mammals (June 2008 – July 2009).

2007 Research assistant, National Environmental Research Institute, Aarhus University. Employed to conduct acoustic surveys of porpoises in order to identify high density areas, that the Government could designate as protected areas.

2006 - 2007 Biologist, Roskilde Municipality, Department of Nature and Environment. Coordination of recycling and waste management. Information for citizens (November 2006 – March 2007).

2007 - Nature guide, Albatros Travels. Information and guidance for travellers on nature, animals and plant son trips to Ecuador and the Galapagos Islands (March 2007 - )

## Other activities

- Delegate for the Danish Mammal Society in the marine subgroup of the Det Grønne Kontaktudvalg (The Green Committee). Coordinatory committee of NGO's working with protection of nature (2006 - 2008).
- Student job in the Environmental Ministry Information centre. Information for citizens and professionals on nature and environmental issues in relation to the work of the ministry (June 2001 - September 2004).
- Student job at Greenland Institute of Natural Resources. Analysis of walrus stomach content, establishment of walrus database, GIS maps on Greenlandic catches of polar bears (May 2005 - October 2006)
- Student job as information worker at the Zoological Museum, Copenhagen. Guidance and information for visitors, creative and practical help with exhibitions, development of teaching material (May 2002 – October 2006).
- Guide for Whale Safari Andenes, Norway. Guided tours for tourists at the Whale Museum and guide during whale watching tours (July 2000 – August 2000).
- Volunteer for ARCHELON Sea Turtle Protection Society, Crete, Greece. Collection of data on turtle nest, hatching and mortality. Information to tourist on protection of sea turtles (July – August 1999).

#### 4. PUBLICATIONS

- **Sveegaard S.** 2010. Spatial and temporal distribution of harbour porpoises in relations to their prey. PhD Thesis. National Environmental Research Institute, Aarhus University.
- **Sveegaard S,** Andreassen H, Mouritsen KN, Jeppesen JP, Teilmann J, Kinze CC (2012) Correlation between the seasonal distribution of harbour porpoises and their prey in the Sound, Baltic Sea. *Mar Biol* available online from February 2, 2012. DOI: 10.1007/s00227-012-1883-z
- **Sveegaard S,** Teilmann J, Berggren P, Mouritsen KN, Gillespie D, Tougaard J (2011a) Acoustic surveys confirm areas of high harbour porpoise density found by satellite tracking. *ICES Journal of Marine Science* 68: 929-936
- **Sveegaard S,** Teilmann J, Tougaard J, Dietz R, Mouritsen KN, Desportes G, Siebert U (2011b) High density areas for harbour porpoises (*Phocoena phocoena*) identified by satellite tracking. *Marine Mammal Science* 27: 230–246
- Nabe-Nielsen, J., **Sveegaard, S.**, Tougaard, J., Teilmann, J., Wisz, M.S., Dietz, R. 2009, Satellite tracking data and modelling of porpoise behaviour in the Great Belt. NERI Technical Report.
- Andersen, A., Rahe, K., **Sveegaard, S.** & Forchhammer, M.C. (2009). Colony attendance in a Black Guillemot colony in West Greenland. *DOFT, Dansk Orn. Foren. Tidsskr.* 103: 22-27
- **Sveegaard, S.**, Teilmann, J., Tougaard, J., Dietz, R., Mouritsen, K.N., Desportes, G. & Siebert, U. (2010). High density areas for harbor porpoises (*Phocoena phocoena*) identified by satellite tracking. *Marine Mammal Science*, early view.
- **Sveegaard, S.** & Teilmann, J. (2009). Satellite tracking of harbour porpoises in European Waters. Conference proceedings, Muc Mhara 2008 - 2nd IWDG International Whale Conference.
- Teilmann, J., **Sveegaard, S.**, Dietz, R., Petersen, I.K., Berggren, P. & Desportes, G. (2008). High density areas for harbour porpoises in Danish waters. National Environmental Research Institute, University of Aarhus. 84 pp. – NERI Technical Report No. 657. <http://www.dmu.dk/Pub/FR657.pdf>
- **Sveegaard, S.**, Tougaard, J. & Teilmann, J. (2008). Sprogø Wind Farm: Environmental Impact Assessment Background Report on Marine Mammals. Scientific Report, National Environmental Research Institute.
- **Sveegaard, S.** & Teilmann, J. (2008). Can satellite telemetry show us the key habitats for Harbour Porpoises? Peer reviewed conference proceedings, European Cetacean Society Conference, San Sebastian.
- **Sveegaard, S.** & Teilmann, J. (2007). Identifying areas of high porpoise density using satellite telemetry, In ICES report, ICES CM 2007/MHC, ICES, s. 33-34.
- **Sveegaard, S.** & Teilmann, J. (2007). Marsvin (*Phocoena phocoena*). In Søgaard, B., Asferg, T. (red.) Scientific Report, National Environmental Research Institute, s. 101-105.
- **Sveegaard, S.** (2005). Med 300 tejster i kikkerten. *Tidsskriftet Grønland* 2005, nr.2-3: 119-124.

#### 5. PRESENTATIONS

- **Sveegaard S.** (2010). Spatial and temporal distribution of harbour porpoises in relation to their prey. Oplæg om PhD studie fremlagt ved Grønlands Naturinstitut, Nuuk 02.sept.2010 - TALK/POWERPOINT (20 min)
- Tougaard J, Nabe-Nielsen J, Teilmann J, **Sveegaard S.** (2010). Storebæltsbroen og marsvinene. Oplæg fremlagt ved Havmiljøet og de faste forbindelser, København, Danmark 30. september, 2010

- **Sveegaard, S.**, Teilmann, J., Stæhr, K.J., Jensen, T.F., Mouritsen, K.N. (2010). Correlation of harbour porpoise distribution and its prey in Scandinavian waters. European Cetacean Society Conference, Stralsund, March 2010 - TALK/POWERPOINT (15 min)
- **Sveegaard, S.** Teilmann, J., Mouritsen, K.N., Berggren, P., Gillespie, D. (2009). Acoustic surveys confirm areas of high harbour porpoise density found by satellite tracking. 18th Biennial Conference on the Biology of Marine Mammals. Quebec City, Québec, Canada, 12 – 16 October 2009 - TALK/POWERPOINT (15 min)
- **Sveegaard, S.**, Teilmann, J. (2009). "Acoustic surveys of harbour porpoises (*Phocoena phocoena*) confirms high density areas identified in Danish waters by satellite tracking", Dansk Havforskermøde, Helsingør 27.1.2009 - 29.01.2009 - TALK/POWERPOINT (15 min)
- **Sveegaard, S.**, Teilmann, J. (2008). "Satellite tracking of harbour porpoise in European Waters", Muc Mhara Conference, Dublin 19.-21.09.2008 - TALK/POWERPOINT, INVITED SPEAKER (45 min)
- **Sveegaard, S.**, Teilmann, J., Dietz, R., Berggren, P., Desportes, G. (2008). "Identifying high density areas for harbour porpoises in Danish waters - Satellite telemetry / acoustic surveys", Workshop on Fisheries Management in Marine Protected Areas, ICES, Copenhagen, 02.06 - 04.06.2008 - TALK/POWERPOINT (20 min)
- **Sveegaard, S.**, Dietz, R., Teilmann, J. (2008). "Identification of high density areas for harbour porpoises. Will satellite telemetry and acoustic survey give similar results?" Dansk Havpattedyrsymposium 2008, Århus, 29.02.2008 - TALK/POWERPOINT (15 min)
- **Sveegaard, S.**, Teilmann, J., Dietz, R., Berggren, P., Desportes, G. (2008). "Identifying high density areas for harbour porpoises - satellite telemetry / acoustic survey", Fourth Meeting of the ASCOBANS Jastarnia Group, Kolmården, Sweden, 25.02. – 27.02.2008 - TALK/POWERPOINT (30 min)
- **Sveegaard, S.**, Teilmann, J. (2007). "Can Satellite Telemetry show us the Key habitats for Harbour Porpoises?", 21st udg., European Cetacean Society conference, San Sebastian, 22.04. - 25.04.2007 - TALK/POWERPOINT (15 min)
- **Sveegaard, S.**, Teilmann, J. (2007). "Identifying areas of high porpoise density using satellite telemetry", WKFMPA workshop, ICES, Copenhagen, 10.04.2007 - 12.04.2007 - TALK/POWERPOINT (20 min)
- **Sveegaard, S.**, Teilmann, J., Dietz, R., Hansen, J.R. (2007). "Marine Protected Areas for harbour porpoises (*Phocoena phocoena*). Selection and monitoring using satellite telemetry, acoustic surveys and passive acoustic detection", Year of the dolphin in Europe - Conservation of small cetaceans and marine protected areas, Federal Agency for Nature Conservation (BfN), Stralsund, 29.10.2007 - 01.11.2007 – TALK/POWERPOINT, INVITED SPEAKER (30 min)
- **Sveegaard, S.**, Hansen-Rye, J., Teilmann, J. & Johnsen, I. (2006) "Selecting Special Areas of Conservation for harbour porpoises (*Phocoena phocoena*) using satellite telemetry and T-PODs", 5. February 2006, Dansk Havpattedyrsymposium, Odense. - TALK/POWERPOINT (15 min).

# CURRICULUM VITAE : JONAS TEILMANN

## 1. PERSONAL HISTORY

Year of birth : 25.03.1966  
Citizenship : Danish  
Civil status : Married, three children

## 2. EDUCATION

Academic degree : M.Sc. Biology, University of Copenhagen, 1995  
Ph.D. degree, Institute of Biology, University of Southern Denmark, 2001

Languages : Danish, English

## 3. EMPLOYMENT RECORD

2001 - Senior Scientist, Institute of Bioscience, Aarhus University. Research and consulting projects on interactions between humans and marine mammals in Denmark and abroad.

### Main qualifications:

- Project leader on several surveys and expeditions in Denmark and Greenland.
- Surveys on density and abundance of seals and cetaceans.
- Satellite tracking and dive recording of seals and cetaceans in Denmark and Greenland.
- Acoustic recordings of harbour porpoise echolocation and use of remote acoustic clickdetectors (T-PODs).
- Assessment of human related disturbance on marine mammals, with special reference to offshore wind farms and oil exploitation.
- Behaviour and physiology of harbour porpoises in relation to bycatch in fishery.
- Age determination, reproduction, and feeding ecology of seals and cetaceans.

### Other engagements:

- Supervisor (master and Ph.d. students), guest lecturer, and examiner in marine mammal ecology at several universities.
- Member of governmental advisory groups on the management of seals and cetaceans in Denmark.
- Member of the Danish delegation of ASCOBANS. Member of the marine mammal working group under ICES.
- Member of a specialist group under the Ministry of Environment in relation to environmental impact of high speed ferries in Danish waters.
- Reviewer for Polar Biology, Journal of Cetacean Research and Management, Arctic, Journal of Ecology and Flora og Fauna.
- International participant in a Polish network of excellence under framework programme 6.

## 4. PUBLICATIONS (1991-2010)

### Scientific publications

- Dietz, R., Heide-Jørgensen, M.P., Härkönen, T., Teilmann, J. & Valentin, N. 1991: Age Determination of European Harbour Seal, *Phoca vitulina*. - Sarsia 76: 17-21.
- Teilmann, J. 1992: Saltholms sæler. - Flora og Fauna 98 (3+4): 93-99.
- Heide-Jørgensen, M.-P., Mosbech, A., Teilmann, J., Benke, H. & Schultz, W. 1992: Harbour porpoise (*Phocoena phocoena*) densities obtained from aerial surveys north of Fyn and in the Bay of Kiel. - Ophelia 35 (2): 133-146.

- Heide-Jørgensen, M.-P., Teilmann, J., Benke, H. & Wulf, J. 1993: Abundance and distribution of harbour porpoises, *Phocoena phocoena*, in selected areas of the western Baltic and the North Sea. - Helgoländer Meeresuntersuchungen, 47: 335-346.
- Heide-Jørgensen, M.-P., Lassen, H., Teilmann, J. & Davis, R.A. 1993: An index of the relative abundance of wintering belugas (*Delphinapterus leucas*) and Narwhals (*Monodon monoceros*), off West Greenland. - Canadian Journal of Fisheries and Aquatic Sciences 50 (11): 2323-2335.
- Heide-Jørgensen, M.-P. & Teilmann, J. 1994: Growth, reproduction, age structure and feeding habits of belugas (*Delphinapterus leucas*) in West Greenland waters. - Meddelelser om Grønland, Bioscience 39: 195-212.
- Heide-Jørgensen, M.-P., Jensen, J., Larsen, A.H., Teilmann, J. & Neurohr, B. 1994: Age estimation of white whales (*Delphinapterus leucas*) from Greenland. - Meddelelser om Grønland, Bioscience 39: 187-193.
- Lowry, N. & Teilmann, J. 1994: Bycatch and bycatch reduction of the harbour porpoise (*Phocoena phocoena*) in Danish waters. - Rep. int. Whal. Commn (special issue 15): 203-209.
- Teilmann, J. & Dietz, R. 1994: Status of the harbour seal (*Phoca vitulina*) in Greenland. - Canadian Field- Naturalist 108 (2): 139-155.
- Teilmann, J. & Lowry, N. 1996: Status of the Harbour Porpoise (*Phocoena phocoena*) in Danish waters. - Rep. int. Whal. Commn. 46: 619-625.
- Teilmann, J. & Dietz, R. 1998: Status of the Harbour Porpoise (*Phocoena phocoena*) in Greenland. - Polar Biology 19: 211-220.
- Teilmann, J. & Kapel, F.O. 1998: Exploitation of ringed seals (*Phoca hispida*) in Greenland. In: Heide-Jørgensen, M.P. & Lydersen C. (Eds.). Ringed seals in the North Atlantic. - NAMMCO Scientific Publications - Volume 1: 130-151.
- Kapel, F.O., Christiansen, J., Heide-Jørgensen, M.P., Härkönen, T., Born, E.W., Knutsen, L.Ø., Riget, F. & Teilmann, J. 1998: Netting and conventional tagging used to study movements of ringed seals (*Phoca hispida*) in Greenland. In: Heide-Jørgensen, M.P. & Lydersen C. (Eds.). Ringed seals in the North Atlantic. - NAMMCO Scientific Publications - Volume 1: 211-228.
- Born, E.W., Teilmann, J. & Riget, F. 1998: Abundance of ringed seals (*Phoca hispida*) in the Kong Oscars Fjord, Scoresby Sund and adjacent areas, eastern Greenland. In: Heide-Jørgensen, M.P. & Lydersen C. (Eds.). Ringed seals in the North Atlantic. - NAMMCO Scientific Publications - Volume 1: 152-166.
- Teilmann, J., Born, E. & Acquarone, M. 1999: Behaviour of ringed seals tagged with satellite transmitters in the North Water polyna during fast-ice formation. - Canadian Journal of Zoology 77: 1934-1946.
- Teilmann, J., Miller, L., Kirketerp, T., Kastelein, R., Madsen, P.T., Nielsen, B.K. & Au, W.W.L. (2002): Characteristics of echolocation signals used by a harbour porpoise (*Phocoena phocoena*) during a target detection experiment. - Aquatic Mammals 28 (3): 275-284.
- Born, E.W., Teilmann, J. & Riget, F. (2002): Haul-out activity of ringed seals (*Phoca hispida*) determined from satellite telemetry. Marine Mammal Science 18(1): 167-181.
- Teilmann, J. (2003): Influence of Seastate on Abundance Estimates of Harbour Porpoises (*Phocoena phocoena*). - Journal of Cetacean Research and Management 5(1): 85-92.
- Born, E.W., Teilmann, J., & Riget, F. (2004): Habitat Use of Ringed Seals (*Phoca hispida*) in the North Water Area (North Baffin Bay). Arctic 57(2): 129-142.
- Geertsen, B.M., J. Teilmann, R.A. Kastelein, H.N.J. Vlemmix & L.A. Miller (2004). Behaviour and physiological effects of transmitter attachments on a captive harbour porpoise (*Phocoena phocoena*). Journal of Cetacean Research and Management 6(2): 139-146.
- Teilmann, J., Tougaard, J., Kirketerp, T., Anderson, K., Labberté, S. & Miller, L. (2006). Reactions of captive harbour porpoises (*Phocoena phocoena*) to pinger-like sounds. Marine Mammal Science 22(2): 240-260.
- Härkönen, T., Dietz, R., Reijnders, P., Teilmann, J., Harding, K., Hall, A., Brasseur, S., Siebert, U., Goodman, S.J., Jepson, P.D., Rasmussen, T.D. and Thompson, P. (2006). A review of the 1988 and 2002 phocine distemper virus epidemics in European harbour seals. Diseases of Aquatic Organisms 68:115-130.
- Carstensen, J., Henriksen, O.D. and Teilmann, J. (2006). Impacts on harbour porpoises from offshore wind farm construction: acoustic monitoring of echolocation activity using porpoise detectors (T-PODs). Marine Ecology Progress Series, vol 321: 295-308.
- Akamatsu, T., Teilmann, J., Miller, L.A., Tougaard, J., Dietz, R., Wang, D., Wang, K., Siebert, U. & Naito, Y. (2007). Comparison of echolocation behaviour between coastal and riverine porpoises. - Deep-Sea Research Part II 54(3-4): 290-297.
- Wilson, R.P., Liebsch, N., Davies, I.M., Quintana, F., Weimerskirch, H., Storch, S., Lucke, K., Siebert, U., Zankl, S., Müller, G., Zimmer, I., Scolaro, A., Campagna, C., Plötz, J., Bornemann, H.,

- Teilmann, J. & McMahon, C.R. (2007). All at sea with animal tracks; methodological and analytical solutions for the resolution of movement. - Deep-Sea Research Part II 54(3-4): 193-210.
- Andersen, S.M., Teilmann, J., Harders, P.B., Hansen, E.H. & Hjøllund, D. (2007). Diet of harbour seals and great cormorants in Limfjord, Denmark: interspecific competition and interaction with fishery, ICES Journal of Marine Science 64(6): 1235-1245.
  - Härkönen, T., Brasseur, S., Teilmann, J., Vincent, C., Dietz, R., Abt, K., Reijnders, P., Thompson, P., Harding, K. & Hall, A. (2007). Status of grey seals along mainland Europe from the Southwestern Baltic to France. NAMMCO Scientific Publications 6: 57-68.
  - Härkönen, T., Harding, K., Rasmussen, T.D., Teilmann, J. & Dietz, R. (2007). Age- and Sex-specific Mortality Patterns in an Emerging Wildlife Epidemic: the Phocine Distemper in European Harbour Seals. PLoS ONE 9: 1-4.
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- Teilmann, J., Heide-Jørgensen, M.P. 2001, 'Sæler i Østersøen, Kattegat og Limfjorden 2000', in Laursen, K. (ed.), Faglig rapport fra DMU, Danmarks Miljøundersøgelser, Aarhus Universitet, pp. 84-91.
- Bach, S., Teilmann, J., Henriksen, O.D. 2000, SEAS, Rambøll.

# **CURRICULUM VITAE : JAKOB TOUGAARD**

## **1. PERSONAL HISTORY**

Date of birth : 1967-08-18  
Citizenship : Danish  
Civil status : Married, two children

## **2. EDUCATION**

Academic degree : Cand. scient (Biology), Aarhus University, 1994  
Ph.D. (Bioacoustics), Aarhus University, 1998

Languages : Danish, English, and some German.

## **3. EMPLOYMENT RECORD**

2004 - Senior Scientist, NERI. Present employment. Research and consulting projects on interactions between humans and marine mammals in Denmark and abroad.

2003 - 2003 Biological consultant, Roskilde Hedeselskabet, Miljø og energi A/S (now Orbicon A/S). Employment as consultant on projects on marine mammals in relation to offshore installations.

1998 - 2002 Assistant professor (Adjunkt), University of Southern Denmark: Employment within Centre for sound communication financed by Danish National Research Foundation. Work on bioacoustics of harbour porpoises

Membership of professional bodies: Acoustical Society of America, Society for Marine Mammalogy, European Cetacean Society, European Association for Aquatic Mammals, Danish Mammalian Society, Danish Society for Marine Mammalogy

Other skills : Computer programming (Delphi), GIS-capable, Marine mammal observer, basic electronics construction and repair, maintenance and calibration of acoustic equipment

Key qualifications: Bioacoustics, Underwater acoustics, effects of noise on marine mammals, passive acoustic monitoring of marine mammals, Satellite tracking of marine mammals, general biology of marine mammals

## **4. INVOLVEMENT IN RESEARCH PROJECTS**

Currently project leader on following projects:

Habitat modelling in connection to offshore wind farms

Impact of a Dutch offshore wind farm on harbour porpoises

Environmental Impact Assessment (marine mammals) of an offshore wind farm in Northern Great Belt

Referee for the following journals.

Journal of the Acoustical Society of America, Marine Ecology Progress Series, Journal of the Marine Biological Association of the U.K., Journal of Cetacean Research and Management, Journal of Applied Ecology, Marine Biology

## 5. PUBLICATIONS

### International Scientific Publications (from 2002 and onward)

#### 2010

Kyhn, L.A., Jensen, F.H., Beedholm, K., Tougaard, J., Hansen, M., Madsen, P.T. (2010) Echolocation in sympatric Peale's dolphins (*Lagenorhynchus australis*) and Commerson's dolphins (*Cephalorhynchus commersonii*) producing narrow-band high-frequency clicks. *Journal of Experimental Biology* 213:1940-1949.

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Dudzinski, K., Brown, S., Lammers, M., Lucke, K., Mann, D.A., Simard, P., Wall, C.C., Rasmussen, M.H., Magnúsdóttir, E.E., Tougaard, J., Eriksen, N. (2010) Trouble-shooting deployment and recovery options for various stationary passive acoustic monitoring devices in both shallow and deep water applications. *Journal of the Acoustical Society of America*. In press.

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#### 2009

Kyhn, L.A., Tougaard, J., Jensen, F.H., Wahlberg, M., Stone, G., Yoshinaga, A., Beedholm, K., Madsen, P.T. (2009) Feeding at a high pitch: Source parameters of narrow band, high-frequency clicks from echolocating off-shore hourglass dolphins and coastal Hector's dolphins. *Journal of the Acoustical Society of America*. 125:1783-1791.

Simon, M.J., Hanson, M.B., Murrey, L., Tougaard, J., Ugarte, F. (2009) From captivity to the wild and back: An attempt to release Keiko the killer whale. *Marine Mammal Science*. 25:693-705.

Shapiro, A.D., Tougaard, J., Jørgensen, P.B., Kyhn, L.A., Balle, J.D., Bernardez, C., Fjälling, A., Karlsen, J.D., Wahlberg, M. (2009) Transmission loss patterns from acoustic harassment and deterrent devices do not always follow geometrical spreading predictions. *Marine Mammal Science*. 25:53-67.

Tougaard, J., Henriksen, O.D., Miller, L.A. (2000) Underwater noise from three types of offshore wind turbines: estimation of impact zones for harbor porpoises and harbor seal. *Journal of the Acoustical Society of America*. 125:3766-3773.

Tougaard, J., Carstensen, J., Teilmann, J., Skov, H., Rasmussen, P. (2009) Pile driving zone of responsiveness extends beyond 20 km for harbor porpoises (*Phocoena phocoena* (L.)). *Journal of the Acoustical Society of America*. 126:11-14.

#### 2008

L. A. Kyhn, J. Tougaard, J. Teilmann, M. Wahlberg, P. B. Jørgensen, and N. I. Bech. (2008) Harbour porpoise (*Phocoena phocoena*) passive acoustic monitoring: laboratory detection thresholds of T-PODs are reflected in field sensitivity. *J.Mar.Biol.Ass.UK* 88 (1), 2008. (in press)

J. Tougaard, P. T. Madsen, and M. Wahlberg (2008). Underwater noise from construction and operation of offshore wind farms. *Bioacoustics* 17 (1-3) (In press).

J. Tougaard, J. Teilmann, and S. Tougaard (2008). Harbour seal spatial distribution estimated from Argos satellite telemetry - overcoming positioning errors. *Endangered Species Research* 4:113-122.

#### 2007

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## 2006

Madsen, P.T., Wahlberg, M., Tougaard, J., Lucke, K. & Tyack, P. 2006: Wind turbine underwater noise and marine mammals: implications of current knowledge and data needs. - Marine Ecology Progress Series 309: 279-295. Available at: <http://int-res.com/abstracts/meps/v309/p279-295/>

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## 2005

Eriksen, N., Miller, L.A., Tougaard, J. & Helweg, D.A. 2005: Cultural change in the songs of humpback whales (*Megaptera novaeangliae*) from Tonga. - Behaviour 142(3): 305-328.

## 2003

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## PAL: By-catch mitigation using harbour porpoise warning calls Field Tests in the North Sea





<b>Title</b> <b>PAL: By-catch mitigation using harbour porpoise warning calls:</b> <b>Field Tests in the North Sea</b>	<b>Justification:</b> Conservation and Management Plan	<b>Project ID:</b> 2012/05
<b>Implementing Agency / Applicant</b>	Prof. Dr. Boris Culik F <sup>3</sup> : Forschung . Fakten . Fantasie Am Reff 1 D- 24226 Heikendorf  Fon: +49(0) 431 2378 588 Mobil +49 (0) 172 750 41 92 Fax: +49(0) 431 2378 589 Email: <a href="mailto:bculik@fh3.de">bculik@fh3.de</a> Web: <a href="http://www.fh3.de">www.fh3.de</a>	
<b>Collaborating Agencies</b>	L3 ELAC Nautik, Kiel BIOLA, Hamburg Fachhochschule Kiel WTD71, German Navy, Kiel	
<b>English Summary</b>	<p><b>I apply here for support by ASCOBANS to enable construction and field tests of 5 prototypes of the new acoustic alarm PAL in the North Sea, aimed at reducing by-catch of harbour porpoises.</b></p> <p>Currently, harbour porpoise by-catch in fisheries is mitigated using acoustic devices, so-called pingers, producing sounds resulting in disturbance or harassment of the animals (see Culik 2011 for review). 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 threatening nets: As shown by past investigations, the maximum distance from which harbour porpoises may detect a net as a barrier or threat by using their biosonar is only 2-4 m (Koschinski et al. 2006).</p> <p>Furthermore, pingers have the potential to scare harbour porpoises into neighbouring nets which are not pinger-equipped, because e.g. these were laid out by vessels smaller than 12 metres in length and therefore - according to current EU regulations - not obliged to use pingers (European Union Council Regulation No 812/2004).</p>	



This entails that pingers cannot be considered as an end-point in the development of acoustic by-catch mitigating devices.

The newly developed, acoustic alerting device “PAL” (porpoise alarm) synthetically generates clicktrains matching harbour porpoise alarm calls to warn the animals and focus their attention on the deadly nets. The generated 1.4 s upsweep-chirp consists of 750 clicks (132 kHz), starting with 400 K/s and ending with 1100 K/s (Clausen et al. 2010), followed by a variable pause of several seconds.

Initial trials on animals in an aquarium and in the wild (kindly supported by “Friends of CMS”) showed in late 2010 that harbour porpoises correctly interpret the signal and react by intensifying their investigative behaviour. Video and acoustic observation on 4 harbour porpoises maintained at the Fjord and Baelte Centre, Kerteminde, DK showed a significant positive response as well as increased biosonar activity during one minute of PAL operation (mean = 5726 clicks) as opposed to one minute immediately before (3944 clicks) and after (1323 clicks.; n= 11 tests in total,  $p < 0,05$ , Wilcoxon Test).

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 clicks/s (median) 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; Culik and Winkler, 2011).

These promising results led to the development of two versions of a new prototype PAL, incorporating major improvements such as omnidirectional signal propagation and strongly reduced power consumption:

a) a remote-controlled PAL (supported by friends of CMS), enabling on/off via radio remote control for further field tests. This version is to be employed in a theodolite-tracking study in summer of 2012 in a marine area with high harbour porpoise densities.

b) a new, further improved miniaturized prototype PAL with constant source level (SEL) irrespective of remaining battery power, easily programmable for different signal/pause ratios.

A series of well-designed and statistically powerful field tests on free-living animals are required to prove that PAL does have the reproducible and intended effect on harbour porpoises.

However, field trials in the Baltic Sea in late 2011 were unsuccessful due to low animal densities. The return of the animals to the study site in the Danish Belt Sea in late spring, early summer to enable observations via theodolite or boat is still months away and



	<p>furthermore will only yield limited data strongly dependent on weather and animal density, not to mention the required manpower.</p> <p>While such theodolite-tests are pending, I have developed a more efficient experimental setup on North Sea animals to be conducted as soon as possible:</p> <p>We plan to conduct sea- trials on the newly developed self-contained prototype PAL (as in b) above), equipped with sufficient battery power to ensure 1-2 months autonomy. A total of 5 PAL are to be used at various monitoring sites in the German North Sea, to be identified in conjunction with the relevant authority (Bundesamt für Seeschifffahrt und Hydrographie, BSH). Acoustic recording of animal reaction at PAL deployment sites as well as at control sites will be conducted employing acoustic harbour porpoise detection devices (C-POD). Acoustic porpoise monitoring in these areas is routinely conducted by e.g. the biological consulting firm biola for various offshore wind park developers. This will enable us to use ship time at low cost to reach these known locations with high harbour porpoise densities.</p> <p>This approach has two advantages:</p> <ul style="list-style-type: none"> <li>- porpoise by-catch by numbers are significantly larger in the North Sea than in the Baltic (Culik, 2011) and</li> <li>- the use of 5 PAL simultaneously would yield a significant amount of data to:             <ul style="list-style-type: none"> <li>- complement Baltic Sea data</li> <li>- ensure rapid PAL adaptations for improvements and a field trial in a real fishery .</li> </ul> </li> </ul>
<p><b>Relevance to ASCOBANS</b></p>	<p>As stated in the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (New York, 1992), Chapter 2:</p> <p>2.1 The Parties undertake to cooperate closely in order to achieve and maintain a favourable conservation status for small cetaceans.</p> <p>2.2. In particular, each Party shall apply within the limits of its jurisdiction and in accordance with its international obligations, the conservation, <b>research</b> and management measures prescribed in the Annex.</p> <p>The Annex states explicitly in Chapter 2, Surveys and Research:</p>



	<p>“Investigations, to be coordinated and shared in an efficient manner between the Parties and competent international organizations, shall be conducted in order to ... (c) identify present and potential <b>threats</b> to the different species. “ and specifies that: “Studies under (c) should include research on ... <b>disturbance and interactions with fisheries, including work on methods to reduce such interactions.</b></p>
<p><b>Activities</b></p>	<p><u>Construction of 5 self-contained PAL prototypes.</u> The proposed field tests require a self-contained PAL prototype with programmable click-train intervals and signal/pause ratio: fine-tuning of experimental design between test and control sites, is a pre-requisite to exclude an influence of PAL during pause on the control site, depending on signal radius. The PAL need to be housed in a professionally designed robust and waterproof housing able to withstand the rough environmental conditions of the North Sea. We will use an omnidirectional signal transducer and include a reed- switch, so that the devices can easily be switched on exteriorly. LED on board the electronics ensures visual function control .</p> <p><u>Field tests in the North Sea</u> Field tests are to be conducted in areas of high Harbour Porpoise density identified by biola, Hamburg in the course of their monitoring activities for BSH and a series of offshore wind park developers. This offers the advantage of using already established monitoring sites, thereby greatly reducing costs of field experiments. Study sites will be chosen carefully to ensure simultaneous controls. Acoustic detection of harbour porpoise signals at study and control sites is conducted using C-PODs. We plan to repeatedly test PAL at these sites throughout 2012.</p>
<p><b>Outputs</b></p>	<p>This project is designed to gather a large amount of data on free-living animals within a relatively short time, an important step to develop a true porpoise <u>alerting</u> device. PAL will only become an alternative to pingers, if harbour porpoise reaction, i.e. increased echolocation in the vicinity of PAL, is documented on free-living animals on a large statistical basis. This research focus is strongly supported by a recent comment by Stefanie Werner, Umweltbundesamt (UBA). Alerting at the site of the risk, at frequencies which do not call other species such as seals (because they can't hear above 100</p>



	<p>kHz) and which are inaudible to fish, with low energy requirements and at low costs to the customer (i.e. the fishermen) is, in my view, a promising technical solution.</p> <p>Outputs of the activities will be in form of:</p> <ul style="list-style-type: none"> <li>- A novel self-contained acoustic alerting prototype</li> <li>- A progress report</li> <li>- A scientific publication</li> <li>- public outreach and popular science reports in the local media</li> </ul> <p>The applicant of this proposal is familiar with the various bycatch reducing devices currently available (updated in a dedicated workshop during the European Cetacean Society Conference on March 20, 2010 in Stralsund, Germany). To the best of my knowledge there is no other company or organisation developing a similar alerting device, the novelty of which was confirmed by Dr. Bernd Würsig, Texas A&amp;M University.</p> <p>Note: The investigations proposed here are the basis for further research: In order to test whether wild porpoises learn to associate the sound emitted by the new alerting device with threatening gill-nets employed in commercial fisheries, a subsequent field study will be required (sensu e.g. Kindt-Larsen, 2008). A positive outcome of such a study would suggest that the alerting device is sufficient to focus the porpoises attention towards avoiding lethal nets in time. A negative outcome would require a subsequent test in conjunction with reflective nets, which have been shown to increase harbour porpoise detection range and reaction time (Koschinski et al. 2006).</p>
<p><b>Work Plan and Timetable</b></p>	<p>Part A: Construction, assembly and physical tests of 5 PAL prototypes: The devices will have an autonomy of 1-2 months, be fully waterproof to 200 m, rugged and robust to withstand a fall from 2 m height and will be equipped with a reed-switch. The sound transducer is omni-directional. All 5 prototypes will be ready for deployment within 6 weeks after positive evaluation and support of the project.</p> <p>Part B: Deployment of the PAL Devices at experimental sites in conjunction with C-PODs as well as C-POD deployment only at control sites. The study sites are within areas of high</p>



	<p>harbour porpoise density in the North Sea and will be identified using the biola data bank as well as in agreement with offshore wind park developers and the BSH. The field study will begin 6 weeks after project initiation and will last throughout 2012.</p>
<b>Project Personnel</b>	<p>The project is to be carried out by the applicant and a field assistant and will be supported by partners in the institutions mentioned above.</p>
<b>Budget Estimates</b>	<p>Part A: Building of 5 self-contained, prototype PAL transducers, including parts, electronics, motherboard, housing design and production, assembly and physical tests in the laboratory and a test tank:          € 950 per PAL + VAT (19%)          Sum: € 4.750,- + € 902,50 (VAT 19%) = € 5.652,-</p> <p>Part B: Tests in the field          5 x 1 days scientist à € 380.- = € 1.900,-          5 x 1 days field assistant à € 180.- = € 900,-          5 trips à € 400.- = € 2.000,-          Data analysis scientist 8 days à € 380.- = € 3.040,-          Sum : € 7.840 + € 1.489,60 (19% VAT) = € 9.329,60</p> <p><b>Total incl. VAT: € 14,9981,60</b></p>

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Enhanced detection of harbour porpoises prior to ramming,  
seismic blasts and ammunition clearance:  
design and construction of a PAL-porpoise detector (PPD)





<b>Title</b> <b>Enhanced detection of harbour porpoises prior to ramming, seismic blasts and ammunition clearance: design and construction of a PAL-Porpoise Detector (PPD)</b>	<b>Justification:</b> Conservation and Management Plan	<b>Project ID:</b> 2012/06
<b>Implementing Agency / Applicant</b>	Prof. Dr. Boris Culik F³: Forschung . Fakten . Fantasie Am Reff 1 D- 24226 Heikendorf  Fon: +49(0) 431 2378 588 Mobil +49 (0) 172 750 41 92 Fax: +49(0) 431 2378 589 Email: <a href="mailto:bculik@fh3.de">bculik@fh3.de</a> Web: <a href="http://www.fh3.de">www.fh3.de</a>	
<b>Collaborating Agencies</b>	Technologiebüro M. Conrad & Partner, Schwedeneck L3 ELAC Nautik, Kiel Fachhochschule Kiel WTD71, German Navy, Kiel	
<b>English Summary</b>	<p><b>I apply here for support by ASCOBANS for design, construction and field tests of a novel prototype harbour PAL porpoise detector (PPD). The detector will generate harbour porpoise alarm signals to receive focused echolocation clicks and thereby greatly improve animal detection. Detection of harbour porpoises within a large radius is of great importance prior to the onset of activities with intensive acoustic hazard such as ammunition clearance, seismic exploration or pile-ramming, currently threatening small cetaceans world wide (Culik, 2011).</b></p> <p>In a recent paper Southall et al (2007) determine sound exposure levels (SEL) causing harbour porpoise injury and strong avoidance reactions as 186 dB and 171 dB (rel. 1 µPa) respectively. However, a temporary threshold shift in the animals hearing already occurs at 164 dB and they actively avoid areas ensonified with more than 145 dB (Lucke et al. 2009).</p> <p>As a consequence, the German Hydrographic Service (Bundesamt für Seeschifffahrt und Hydrographie, BSH) has limited man-made emissions within 750 m of a marine sound source at 160 dB SEL or 190 dB (peak to peak (according to § 58 Abs. 1 Satz 2 Bn-</p>	



atSchG).

However, peak pressures during submarine explosions of charges with a mass of only 10 kg e.g. reach levels above 190 dB within a 15 km radius. Full-scale seismic arrays generate peak-peak source levels of 259 dB and received levels of more than 190 dB within a 1 km range (Richardson et al. 1995). Finally, pile-ramming during construction of offshore-windparks generates sound exposure levels above 160 dB within the 750 m radius for all pile diameters above 1,5 m.

While several mitigation measures, such as e.g. bubble curtains, attenuate sound exposure of marine wildlife, these have a limited effect: Koschinski (2011) reports that a bubble curtain reduces the peak pressure of a blast shock wave by 16-19 dB. With respect to pile-ramming, the effect of bubble curtains on SEL is in the range of only minus 8-12 dB (Betke, 2010).

In order to avoid negative impacts or injury to marine mammals, real-time detection within the exposure radius prior to the beginning of sound emissions is crucial. This would enable operators to postpone planned measures or to exclude the animals from hazardous areas prior to the onset of operations by using e.g. acoustic deterrents.

Harbour porpoise detection is currently conducted by observers on airplanes or ships, or via autonomous acoustic detectors such as C-PODs (Chelonia, UK). However, detection ranges and probabilities are low: As quantified via  $g(0)$ , the detection probability from aircraft is only 0.079 – 0.292, depending on the experience of the observers (Laake et al. 1997). Ship-based detection  $g(0)$  is between 0.7- 0,8 during extraordinarily good weather (sea state < 1.5; Reay, 2005), with detection probabilities decreasing from 0,8 to below 0,2 within 0 - 300 m from the ship. However, optimal conditions are seldom met in the German North Sea (Diederichs et al. 2010). Finally, in acoustic detection  $g(0)$  is quite low, reaching only 0.1 – 0.3 for T-PODs (the precursor of the C-POD), with an effective detection range of only 22-104 m (Kyhn 2010).

The reason for low  $g(0)$  in acoustic detectors is believed to be discontinuous echolocation by harbour porpoises as well as by their echolocation signals not being focussed on the receiver: their signals are narrow-beam with an aperture of only 16° in the horizontal and vertical planes (Au et al., 1999).

However, click detectors could have the potential of achieving a detection radius of 530 m to over 1.200 m, if they receive directed porpoise clicks and if their detection sensitivity is appropriate: Clausen et al. 2010 calculated that harbour porpoises potentially communicate over such distances, depending on the source levels of their click signals.



	<p>The newly developed, acoustic alerting device “PAL” (porpoise alarm) synthetically generates clicktrains matching harbour porpoise alarm calls to focus their attention on the sound source. The generated 1.4 s upsweep-chirp consists of 750 clicks (132 kHz), starting with 400 K/s and ending with 1100 K/s (Clausen et al. 2010), followed by a variable pause of several seconds. PAL was patented by F<sup>3</sup> and L3-ELAC-Nautik.</p> <p>Initial trials on animals in an aquarium and in the wild (kindly supported by “Friends of CMS”) showed in late 2010 that harbour porpoises correctly interpret the signal and react by intensifying their investigative behaviour. 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 (mean = 5726 clicks) as opposed to one minute immediately before (3944 clicks) and after (1323 clicks.; n= 11 tests in total, p&lt;0,05, Wilcoxon Test).</p> <p>This was confirmed by acoustic observation via C-POD on free-living harbour porpoises off Fredericia, DK. Bioacoustic activity during one minute of PAL operation was significantly increased, reaching 147 clicks/s (median) as opposed to one minute immediately before (105 c/s) and after (70 c/s; n=33 trials, group size 1-6, p&lt;0,05, Wilcoxon Test; Culik and Winkler, 2011).</p> <p>These promising results are the basis for the proposed development of a new type of harbour porpoise detector (PPD). Using their own alerting signals as a stimulus, we plan to focus their echolocation on the PAL-detector. The latter will be an integrated system consisting of digital signal transducer, signal generator and signal detector. Detection of signals will be achieved by an on-board software. In the initial stage, the detector is archival, the data will be stored on board in compressed form as well as in detailed format for subsequent data analysis. However, right from the beginning of the design phase, we will specify a clear data transmission protocol for subsequent real-time data transmission of a condensed summary using appropriate radio-equipment.</p> <p>The idea is that deployment of one or several PPDs within an appropriate radius from the disturbance site will enable operators to detect presence or absence of harbour porpoises in real-time.</p>
<b>Relevance to ASCOBANS</b>	As stated in the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (New York, 1992), Chapter 2: 2.1 The Parties undertake to cooperate closely in order to achieve



	<p>and maintain a favourable conservation status for small cetaceans.</p> <p>2.2. In particular, each Party shall apply within the limits of its jurisdiction and in accordance with its international obligations, the conservation, <b>research</b> and management measures prescribed in the Annex.</p> <p>The Annex states explicitly in Chapter 2, Surveys and Research: “Investigations, to be coordinated and shared in an efficient manner between the Parties and competent international organizations, shall be conducted in order to (a) <b>assess the status and seasonal movements</b> of the populations and stocks concerned, (b) <b>locate areas of special importance to their survival</b>, and (c) <b>identify present and potential threats to the different species</b>. “ and specifies that:  “Studies under (a) should particularly include improvement of existing and development of <b>new methods</b> ... Studies under (b) should focus on locating <b>areas of special importance</b> to breeding and feeding. Studies under (c) should include <b>research on habitat requirements...</b>”</p>
<p><b>Activities</b></p>	<p><u>Design and construction of a PAL-based porpoise detector (PPD).</u></p> <p>We aim at designing and building a programmable, easy to use harbour porpoise click- and clicktrain generator combined with a detector for these signals.</p> <p>The frequency range of signal generation and detection falls within the range of harbour porpoise signals, i.e. between 110 – 180 kHz.</p> <p>The device will be designed for water depths of up to 50 m, which are characteristic of the North and Baltic Seas.</p> <p>The programmable device will enable the experimental user to modify frequency, ramp-up, click-train duration and pause intervals of the stimulating signal, to achieve rapid optimization.</p> <p>The porpoise click and clicktrain detector will automatically filter animal signals from the surrounding acoustic environment. This is particularly important in areas with intensive marine traffic, such as e.g. during offshore wind park construction.</p> <p>Archival functions include click numbers, time and date. We will also design a data-interface protocol for future wireless short-wave signal transmission.</p> <p>The PPD will have a battery and data storage autonomy of at least 14 days.</p> <p>Data retrieval as well as re-programming of the PPD will be achieved standard PC interface standards (USB) using standard</p>



	<p>PC programmes (e.g. Matlab).</p> <p>Finally, we will develop a software - based analysis tool to graphically display click activity over time.</p> <p>Design and prototype will be thoroughly tested in the laboratory of L3-Elac Nautik, including the acoustic testing tank.</p> <p><u>Field tests</u> are to be conducted in the of the Fjord&amp; Baelte Centre in Kerteminde, DK. We will determine click- and clicktrain detection in the harbour area, taking into account the effects of anthropogenic noise from boats, ships and sonar, by comparison to a standard C-POD. We will also determine signal detection radius by varying the distance to the open sea-cages. The latter will be confirmed under controlled conditions using a calibrated PAL as a source generator at the facilities of the German Navy in Lake Plön.</p>
<p><b>Outputs</b></p>	<p>Outputs of the activities will be in form of:</p> <ul style="list-style-type: none"> <li>- A novel self-contained active porpoise detector</li> <li>- A progress report</li> <li>- A scientific publication</li> <li>- public outreach and popular science reports in the local media</li> </ul> <p>The applicant of this proposal is familiar with the various porpoise detection methods currently available (updated during the European Cetacean Society Conferences in 2010 and 2011). To the best of my knowledge there is no other company or organisation developing a similar active porpoise detection device.</p> <p>Note: The investigations proposed here are the basis for further research aimed at :</p> <ul style="list-style-type: none"> <li>- real time detection of porpoise signals and transmission to the system operator</li> <li>- deploying the new PPD deployed at an offshore wind park construction site</li> </ul>
<p><b>Work Plan and Timetable</b></p>	<p>Part A: Design, construction, assembly and physical tests on PPD prototype, software development: immediately after positive evaluation and support of the project, duration 9 months.</p>



	<p>Part B:</p> <p>Test of the PPD system at facilities of the German Navy in Lake Plön, as well as in Fjord and Baelt centre, Kerteminde: following part A, depending on favourable weather conditions and time window at F&amp;B centre, duration 3 months</p>										
<b>Project Personnel</b>	<p>The project is to be carried out by Technologiebüro M. Conrad &amp; Partner (design and construction of PPD, software development) as well as by the applicant and a field assistant (field tests) and will be supported by partners in the institutions mentioned above.</p>										
<b>Budget Estimates</b>	<p>Part A: PPD-development</p> <p>Design and construction of modular hardware consisting of system controller, signal amplifier, transmission and reception decoupler, hydroacoustic transducer, low noise signal detector, power stabilizer, data storage and communications interface.</p> <p>Communication-, programming- and data analysis software.</p> <p>Physical tests in the laboratory and L3 test tank:</p> <p>Lump sum: € 7.500 + € 1.425 (VAT 19%) = € 8.925,-</p> <p>Part B: Tests in the field</p> <table> <tr> <td>2 x 2 days scientist à € 380.-</td> <td>= € 1.520,-</td> </tr> <tr> <td>2 x 2 days field assistant à € 180.-</td> <td>= € 720,-</td> </tr> <tr> <td>2 trips à € 300.-</td> <td>= € 600,-</td> </tr> <tr> <td>Data analysis scientist 5 days à € 380.-</td> <td>= € 1.900,-</td> </tr> <tr> <td>Sum : € 4.740 + € 900,60 (19% VAT)</td> <td>= € 5.640,60</td> </tr> </table> <p><b>Total incl. VAT (19%): € 14,565,60</b></p>	2 x 2 days scientist à € 380.-	= € 1.520,-	2 x 2 days field assistant à € 180.-	= € 720,-	2 trips à € 300.-	= € 600,-	Data analysis scientist 5 days à € 380.-	= € 1.900,-	Sum : € 4.740 + € 900,60 (19% VAT)	= € 5.640,60
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**PROJECT PROPOSAL FOR THE CONSIDERATION OF  
THE ASCOBANS ADVISORY COMMITTEE**

<p><b>Title</b> Atlas of Cetacean distribution in north-west European waters</p>	<p><b>Justification:</b> Triennium Work Plan</p>	<p><b>Project ID:</b> 2012/07</p>
<p><b>Implementing Agency / Applicant</b></p>	<p>Mr Tim Dunn, Joint Nature Conservation Committee, Inverdee House, Baxter Street, Aberdeen AB11 9QA, Scotland</p> <p>Dr Peter Evans, Sea Watch Foundation, Ewyn y Don, Bull Bay, Amlwch, Anglesey LL68 9SD, Wales</p> <p>Dr Charles Paxton, Centre for Research into Ecological &amp; Environmental Modelling, University of St Andrews, The Observatory, Buchanan Gardens, St Andrews, Fife, KY16 9LZ, Scotland</p>	
<p><b>Collaborating Agencies / Other Sponsors</b></p>	<p>Forty-five research groups, organisations and marine development industries from around the ASCOBANS Agreement Area have participated in providing effort-related cetacean sightings data (standardised according to the Joint Cetacean Protocol data standard) to form the largest collaborative data resource available for the region (see map appended for survey coverage).</p>	
<p><b>Background / Problem</b></p>	<p>Central to our understanding of how to manage cetacean populations is knowledge of their status and distribution. This project is an international collaborative effort to deliver information on the distribution, abundance and population trends of cetacean species occurring in north-west Europe. It combines data both from large scale synoptic surveys conducted over short periods (e.g. SCANS, SCANS II &amp; CODA) with more regional longer-term survey effort. As such, it builds upon the work undertaken for the <i>Atlas of cetacean distribution in north-west European waters</i> published by JNCC (Reid, Evans &amp; Northridge, 2003). That Atlas has been widely utilised by government and other stakeholders for environmental impact assessment and other conservation management activities. However, since then there has been much more survey effort and the Joint Cetacean Protocol (JCP) project aims to synthesise these data to provide up to date distribution and abundance maps with assessments of status.</p>	
<p><b>Objectives</b></p>	<p>The JCP project has four general objectives:</p>	

	<ol style="list-style-type: none"> <li>1) to provide cetacean summary information, via a web-based portal, including species specific estimates of cetacean density, distribution and population trends;</li> <li>2) to create a standard structure for sharing cetacean sightings data;</li> <li>3) to allow portal users to request access to source data, while leaving their provision at the discretion of each contributing organisation;</li> <li>4) to assist with reporting on cetacean conservation status to various Directives including the EC Habitats and Species Directive and the Marine Strategy Framework Directive.</li> </ol> <p>This funding request is to facilitate the production of a printed atlas with supplementary information for use by government departments, marine industries, non-governmental organisations and the interested public. Without extra funding, the project will have to be confined to a web portal.</p>
<p><b>Relevance to ASCOBANS</b></p>	<p>This project directly addresses Conservation Action No. 5 of the ASCOBANS Triennium Work Plan 2013-2015:</p> <p>Review new information on cetacean population size, distribution, structure and causes of any changes in the ASCOBANS area and make appropriate recommendations to Parties and other relevant authorities</p> <p>The information derived from this Atlas project supports many of the other recommended Conservation &amp; Management Actions of the Triennium Work Plan as well as its major Conservation Resolutions.</p>
<p><b>Activities</b></p>	<p>The JCP Project has been conducted in four phases:</p> <p><b>April 2008 – Jan 2009:</b> A preliminary phase examined whether the final JCP data resource would have sufficient power to detect trends in distribution and abundance. It concluded that the Habitats Directive monitoring objective of detecting a 1% annual decline in abundance or range over a 6-year reporting period was not feasible but that trend detection over longer periods could be.</p> <p><b>April 2009 – Mar 2010:</b> Using a relatively data rich area (Irish Sea), an integrated analysis was undertaken that used a modeling approach to predict density and detect spatial and temporal trends in derived abundance estimates.</p> <p>Detection functions were fitted to all available survey</p>

	<p>sightings data that recorded distance from observer to sighting, and detection probability was calculated. These detection probabilities were then assigned to all sightings data including those without distance estimation.</p> <p>Density estimates were then calculated for each segment of survey effort and the resultant density surfaces were modeled in a two-stage GAM process by modeling presence-absence data followed by non-zero density.</p> <p>A power analysis of the modeled density data showed that declines of 0.3 to 2.2% per year, over a 6-year reporting period, could be detected within the Irish Sea for the commoner cetacean species. A data standard was then developed for the integration of JCP data on a wider scale.</p> <p><b>Mar - Aug 2011:</b> The next phase took data sets from an extended geographic area (west coast of the UK), and refined the modeling approach to include areas that had a convoluted coastline and were less data rich.</p> <p><b>Sep 2011 – Mar 2012:</b> The final phase has included integration of data sets from the ASCOBANS extended agreement area, with analyses using the methods developed during the previous two phases, in order to produce robust absolute density estimates for North-west European waters. These estimates have been modelled to identify spatial and temporal trends in density.</p> <p><b>Apr 2012 – Mar 2013:</b> The basic products of the analysis will be made available on line. A user friendly printed output illustrated with maps and photographs and accompanied by systematic species accounts would be produced as a NW European Cetacean Atlas. Publication would be organised by the Joint Nature Conservation Committee of the UK.</p>
<b>Outputs</b>	<p>A printed atlas containing:</p> <ul style="list-style-type: none"> <li>• a description of the data sources;</li> <li>• methods of data collection, synthesis and analysis;</li> <li>• interpretation of the maps; and</li> <li>• species accounts.</li> </ul> <p>The atlas will be illustrated throughout with maps and photographs of the species.</p>
<b>Work Plan and</b>	<b>May – July 2012:</b> Finalisation of map outputs for the Atlas

<b>Timetable</b>	<p><b>July – Dec 2012:</b> Production of text (Introduction, Methods, Species Accounts) and final choice of illustrations</p> <p><b>Jan – Mar 2013:</b> Graphics design &amp; printing of Atlas, with the aim of circulation in time for ASCOBANS AC20.</p>						
<b>Project Personnel</b>	<p>Tim Dunn, Seabird and Cetacean Surveillance Manager, JNCC (<a href="mailto:Tim.Dunn@jncc.gov.uk">Tim.Dunn@jncc.gov.uk</a>) – management of Atlas production</p> <p>Dr Peter Evans, Director, Sea Watch Foundation (<a href="mailto:peter.evans@bangor.ac.uk">peter.evans@bangor.ac.uk</a>) – management of accounts summarising population sizes, biology and ecology, and international protection for each species</p> <p>Dr Charles Paxton, Statistician, CREEM, University of St Andrews (<a href="mailto:cgp2@st-andrews.ac.uk">cgp2@st-andrews.ac.uk</a>) – data synthesis &amp; analysis, modelling, production of maps</p> <p>Please note final authorship of the Atlas has yet to be decided.</p> <p>[Summary CVs attached]</p>						
<b>Budget Estimates</b>	<table border="0"> <tr> <td>1) Integration, Analysis &amp; Map Production</td> <td>300,000 Euros</td> </tr> <tr> <td>2) Production &amp; Printing of Atlas</td> <td>35,000 Euros</td> </tr> <tr> <td><b>TOTAL COST</b></td> <td><b>335,000 Euros</b></td> </tr> </table> <p>[assuming exchange rate of 1 GBP = 1.2 Euros]</p> <p>Stage 1 has been paid for by Defra, The Crown Estate, Countryside Council for Wales (UK) and National Parks and Wildlife Service (Ireland).</p> <p>For Stage 2, request from ASCOBANS is for 15,000 Euros, with the remainder being paid for through funds raised by JNCC.</p>	1) Integration, Analysis & Map Production	300,000 Euros	2) Production & Printing of Atlas	35,000 Euros	<b>TOTAL COST</b>	<b>335,000 Euros</b>
1) Integration, Analysis & Map Production	300,000 Euros						
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<b>TOTAL COST</b>	<b>335,000 Euros</b>						
<b>Brief CVs</b>	<p><b>Tim Dunn</b> has worked for JNCC for over 12 years on a wide variety of projects. These have included the <i>Seabird 2000</i> colony census; Seabird Monitoring Programme; and Marine Special Protection area project. He leads the Joint Cetacean Protocol project (JCP) and currently manages the Seabird and Cetacean Surveillance Project. This aims to deliver a coherently designed and well-organised seabird and cetacean surveillance project that will contribute to JNCC's overall Marine Monitoring Programme. The Marine Monitoring Programme will provide the data necessary to underpin future assessments of the status and trends of marine biodiversity in the UK.</p> <p><b>Dr Peter Evans</b> is the Scientific Director of the UK marine</p>						

environmental research charity, Sea Watch Foundation, and Honorary Senior Lecturer at the School of Ocean Sciences, University of Wales Bangor. He has worked on cetaceans for 35 years, and oversees a national cetacean monitoring scheme in UK. He has served on the Council of the European Cetacean Society from its inception in 1987 to 2008, as Editor, and previously was founding Secretary and later Chairman. He currently sits on the Society's Science Advisory Committee. He is a Director of Fair Isle Bird Observatory Trust, a Trustee of the Hebridean Whale and Dolphin Trust, member of the International Committee of the Society for Marine Mammalogy, and member of the Scientific Advisory Panel of the World Society for the Protection of Animals. He sits on the editorial board of the *Journal of the Marine Biological Association UK* and serves on the External Advisory Panel of the OGP Joint Industry Programme on Sound and Marine Life.

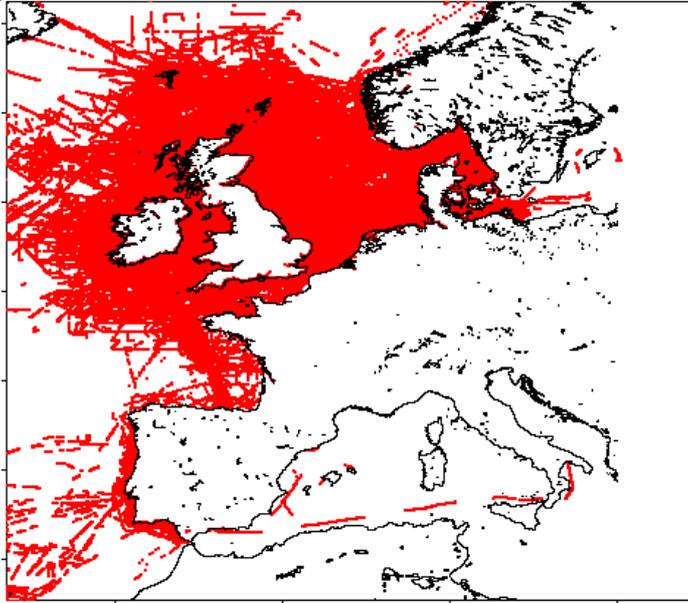
Peter's field research concentrates upon ecological, behavioural and conservation biology studies of cetaceans in UK, as well as the effects of human disturbance (particularly sound) upon cetaceans. He has written or edited 12 books (including "Natural History of Whales & Dolphins", "Whales", "Dolphins" and "Marine Mammals: Biology & Conservation") and is sole or co-author of c. 200 scientific publications (mainly on marine mammals and birds).

**Dr Charles Paxton** is a statistical ecologist and modeller at the Centre for Research into Ecological & Environmental Modelling in the University of St Andrews. He is a post-doctoral research fellow and lecturer at the University of St. Andrews assessing marine animal abundance and a general statistical consultant.

Charles's research interests are in the ecology, conservation biology, evolution and behaviour of aquatic animals. He has written over 50 peer reviewed papers, reports and popular articles.

Over the last three years, Charles has undertaken statistical analysis and modelling of cetacean sightings survey data contributing to the Joint Cetacean Protocol, with the aim of derive density surfaces and model-based abundance estimates for the commoner cetacean species occurring in UK and adjacent waters.

**Appendix**



**Map of Survey Effort from 45 Research Groups**

**FORMAT FOR PROJECT PROPOSALS  
FOR THE CONSIDERATION OF THE ASCOBANS ADVISORY COMMITTEE**

Funding of projects through ASCOBANS is dependent upon availability of funds. Since ASCOBANS is not a funding agency, there is no guarantee that funds will be available each year. Please also note that the maximum sum the Agreement will spend on any one project is 15,000 Euro. Also, there is no possibility for supporting long-term projects. ASCOBANS will not fund monitoring obligations of EU member states or Parties to international conventions.

The ASCOBANS Advisory Committee, which meets annually in March/April, will consider the proposals made available to its review and select those that are a priority for funding. *Please note that only projects with a direct benefit for the conservation objectives of the Agreement can be supported.* Projects covering more than one ASCOBANS Party will be favoured.

Please provide only summary information in the form below. The Secretariat will request more detailed information for selected projects only. The purpose of this form is to assist in the review and approval of the project proposal by the Advisory Committee.

Proposals received **by 15 February** of each year will be made available to the Committee for their review. Funding applications received later will not be considered until the following year.

<p><b>Title</b> Life history parameters of bottlenose dolphins (<i>Tursiops truncatus</i>) in European Waters</p>	<p><b>Justification:</b> Conservation and Management Plan</p>	<p><b>Project ID:</b> 2012/08</p>
<p><b>Implementing Agency / Applicant</b></p>	<p><b>Prof. Graham J. Pierce and Fiona L. Read</b></p> <p><b>Prof. Graham J. Pierce</b> School of Biological Sciences (Zoology) University of Aberdeen Tillydrone Avenue Aberdeen, AB24 2TZ Aberdeen UK Email: g.j.pierce@abdn.ac.uk</p> <p><b>Fiona L. Read</b> School of Biological Sciences (Zoology) University of Aberdeen Tillydrone Avenue Aberdeen, AB24 2TZ Aberdeen UK</p>	

ASCOBANS Project Proposal Format

	<p><u>and</u></p> <p>Instituto de Investigaciones Marinas (C.S.I.C) Eduardo Cabello 6 36208 Vigo Pontevedra Spain Email: fionaread@iim.csic.es</p>
<p><b>Collaborating Agencies / Other Sponsors</b></p>	<p>The following persons/institutions will contribute access to data and samples and/or specific expertise and will participate in writing up the results:</p> <p>a) <b>Dr Andrew Brownlow / Bob Reid</b> Wildlife Unit SAC Veterinary Science Division (Inverness) Drummondhill Stratherrick Road Inverness IV2 4JZ UK Email: Andrew.Brownlow@sac.ac.uk / Bob.Reid@sac.co.uk</p> <p>b) <b>Dr Paul Jepson / Rob Deaville</b> Institute of Zoology Regent's Park London NW1 4RY UK Email: paul.jepson@ioz.ac.uk / rob.deaville@ioz.ac.uk</p> <p>c) <b>Dr Christina Lockyer</b> Age Dynamics c/o Innelvveien 201 Kaldfjord N-9100 Kvaløysletta Norway Email: christina_lockyer@hotmail.com</p> <p>d) <b>Dr Alfredo Lopez</b> Coordinadora para o Estudo dos Mamíferos Mariños (CEMMA) Apdo. de Correos Nº 15 36380 Gondomar</p>

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	<p>Pontevedra Spain Email: cemma@arrakis.es</p> <p>e) <b>Dr Ángel F. González</b> Instituto de Investigaciones Marinas (C.S.I.C) Eduardo Cabello 6 36208 Vigo Pontevedra Spain Email: afg@iim.csic.es</p> <p>f) <b>Dr Aleta A. Hohn</b> NOAA Beaufort Laboratory 101 Pivers Island Road Beaufort North Carolina 28516 USA Email: aleta.hohn@noaa.gov</p> <p>g) <b>Dr Randall S. Wells</b> Sarasota Dolphin Research Program Chicago Zoological Society c/o Mote Marine Laboratory 1600 Ken Thompson Parkway Sarasota Florida 34236 USA Email: rwells@mote.org</p>
<b>Background / Problem</b>	<p>The bottlenose dolphin (<i>Tursiops truncatus</i>) is present worldwide in coastal and offshore waters of temperate and tropical seas (Wells and Scott, 2002) and their range in Europe covers the entire ASCOBANS region. Bottlenose dolphin populations often include residents, transients, and temporary migrants (Silva et al., 2008; Evans et al., 2009) although the taxonomic relationships of these are often unclear.</p> <p>In Europe, five genetically different bottlenose dolphin populations have been demonstrated: Black Sea, eastern Mediterranean Sea, western Mediterranean Sea, eastern North Atlantic (including individuals from Spain to southern England) and Scotland (Natoli et al., 2005). Resident populations have been reported in the Moray Firth in NE Scotland, Cardigan Bay in west Wales and the English Channel (Reid et al., 2003) in the UK and in the Ria de Vigo in South Galicia, NW Spain (Fernández-Cordeiro et al., 1996).</p> <p>However, the overall distribution range of bottlenose dolphins in</p>

European waters has changed over the last century and both sightings and strandings data indicate an extensive decline in UK coastal populations (Sheldrick, 1989; Sheldrick et al., 1994; Parsons et al., 2002; Jepson, 2005; Nichols et al., 2007). Despite significantly increased observer effort since the UK Government began funding systematic investigations of cetacean carcasses in 1990, bottlenose dolphin strandings are still effectively absent from most UK regions (Jepson, 2005). High levels of PCBs in bottlenose dolphin tissues represent an important threat and may account for the documented population decline (Jepson et al., 2009; Deaville and Jepson, 2010; ICES, 2010).

The bottlenose dolphin is recorded in the EU Habitats Directive (Directive 92/43/EEC) as a Species of Special Interest, the protection of which requires the designation of Special Areas of Conservation (SACs) by the EU State Members under Annex II and IV. The bottlenose dolphin in the North Sea was recently listed under Appendix II of CMS as having '*an unfavourable conservation status that would significantly benefit from the international co-operation that could be achieved through an international agreement for their conservation and management*'.

In the UK, monitoring of cetacean strandings as required under the Habitats Directive and ASCOBANS is funded by the UK government's DEFRA and Marine Scotland ([www.ukstrandings.org](http://www.ukstrandings.org)). In Galicia, such work is funded by the local government and carried out by an NGO (Coordinadora para o Estudio dos Mamíferos Mariños (CEMMA)). However, in both cases, core funding does not cover analysis of life history parameters, which represents an important gap in monitoring coverage, as recognised by ICES Working Group Marine Mammal Ecology (WGMME) (ICES, 2009). Knowledge of life history parameters is fundamental for understanding and interpreting population status, and trends are increasingly recognised as important for effective management and conservation. Data on age at death from stranded bottlenose dolphins can also be used to estimate overall mortality and fishery mortality rates.

Bottlenose dolphins are the most studied cetacean in European waters, but despite current research activity on genetics, photo-id and acoustics, almost no work on age structure and growth patterns has been conducted in Europe. When such information is needed, basic life history parameters e.g. age at sexual maturity are usually assumed to follow those recorded from based on studied populations in Sarasota Bay (Read et al., 1993) and the Indian River Lagoon (Stolen et al., 2002) in the USA. However, European bottlenose dolphins appear to be significantly larger and to mature at a larger size than animals from other studied populations (BIOCET, 2003; Lopez et al., 2003; Read et al., unpublished). Based on basic stranding data, UK bottlenose dolphins appear to be larger than individuals from Galicia.

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	<p>Due to their coastal distribution, bottlenose dolphins are particularly vulnerable to anthropogenic disturbances, e.g. habitat degradation, boat traffic and pollution. Preliminary analysis indicates that PCB levels in bottlenose dolphins from the UK are at a level where adverse physiological consequences would be expected, e.g. suppression of immune and reproductive function (Jepson et al., 2009; Deaville and Jepson, 2010; ICES, 2010) as also seen in Sarasota Bay, USA (Wells et al., 2005). Furthermore, bottlenose dolphins in Galicia appear, on average, to die younger than those in the UK due to fisheries mortality (Read et al., unpublished data).</p> <p>Age in cetaceans is estimated by counting growth layer groups (GLGs) in the dentine and cementum of teeth. Bottlenose dolphins are one of the few odontocete species where annual deposition of dentinal GLGs in the teeth has been confirmed and validated (Sergeant et al., 1973; Hohn et al., 1989). Sarasota Bay hosts a population of individually known bottlenose dolphins and tooth specimens taken during annual health assessments are available for the proposed project, providing us with a unique opportunity to calibrate European age readings with known-aged animals.</p> <p>Samples from stranded and by-caught bottlenose dolphins from the UK and Galicia, NW Spain have been collected since 1990 and are available for the proposed project. Additionally, data from Ireland, Scotland, France and Netherlands compiled during 2000-2004 as part of the EU-funded "BIOCET" project, co-ordinated by the applicant, are also available for the current project.</p>
<b>Objectives</b>	<p>The proposed project aims to:</p> <ol style="list-style-type: none"> <li>1) Quantify life history parameters (age structure, age and length at sexual and asymptotic maturity, pregnancy rate, etc) for bottlenose dolphins in the UK and Galicia, north-west Spain.</li> <li>2) Use age-at-death data to estimate mortality rates bottlenose dolphins in the UK and Galicia.</li> <li>3) Compare life history parameters of UK and Galician bottlenose dolphins with those from other studied populations e.g. Sarasota Bay, USA and</li> <li>4) Calibrate age estimates of European bottlenose dolphins with known-age animals from Sarasota Bay, USA.</li> <li>5) Provide baseline life-history parameter data, as required under current environmental legislation, to underpin assessments of conservation status.</li> </ol>
<b>Relevance to ASCOBANS</b>	<p>The bottlenose dolphin is strictly protected under European legislation and data on strandings and post-mortems must be reported to ASCOBANS. During the 9th Meeting of the Conference of Parties in December 2008, the North Sea bottlenose dolphin population was added to Appendix II of CMS</p>

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	<p>as a '<i>species with an unfavourable conservation status</i>'. ASCOBANS recently reported that '<i>information on material available for other studies (genetics, diet, reproductive physiology, estimation of life history parameters) should be compiled in a common meta-database for all cetacean species</i>'. The proposed project would provide baseline data on life history parameters for bottlenose dolphins, data which are currently generally lacking in European waters.</p> <p>Life history parameters are potentially for useful for discriminating between populations. The present proposal aims to provide life history data for 5 of the 11 'Recommended Management Units' of bottlenose dolphins as suggested during the ASCOBANS '<i>Small Cetacean Population Structure Workshop</i>' (Evans and Teilmann, 2009).</p> <p>Present research interests on the effect of pollutants on reproductive success and survival of European bottlenose dolphins require life history data. ASCOBANS recently funded a project entitled 'Pollutant exposure in coastal top predators: assessing current levels of exposure and toxic effects' which provided funding to age 20 European bottlenose dolphins. The proposed project would significantly increase this sample size and add maturity and pregnancy data whilst also providing data for future studies.</p>
<p><b>Activities</b></p>	<p>All samples are available, the methodology is established and facilities are available.</p> <p>Teeth will be extracted and prepared using a standard protocol whereby they are decalcified, sectioned at 25 µm on a cryostat and stained with Mayer's haematoxylin. Age will be determined by counting growth layer groups in the dentine. Readings will be conducted twice by two readers independently. Age data will be used to construct life tables and thus estimate mortality rates e.g. mortality due to fisheries interactions.</p> <p>Dr Christina Lockyer and Fiona Read will cross-examine their readings with known-aged animals from the Sarasota Dolphin Research Program (<a href="http://www.sarasotadolphin.org">www.sarasotadolphin.org</a>). Digital images and/or slides will be provided by Dr Randall Wells and Dr Aleta Hohn.</p> <p>At the time of necropsy, females were examined for pregnancy and lactation. Formalin-fixed ovaries will be weighed, measured, sectioned and the presence of mature follicles, <i>corpora lutea</i> and <i>corpora albicantia</i> recorded to determine individual reproductive status and history. Histological examination will be conducted to confirm macroscopic findings.</p> <p>For males, testes with attached epididymis will be measured, weighed and a central cross-section formalin-fixed. Histology will</p>

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	<p>be performed to measure the diameter of seminiferous tubules (an indication of maturity) and to note cell activity (e.g. sertoli and germinal cells).</p> <p>Together with age data, these data will be used to construct maturity ogives (to establish age and size at sexual maturity), and determine the pregnancy rate and annual reproductive cycle. However, sensitivity is likely to be limited by sample size.</p> <p>Data generated from the UK and Galicia will compared to investigation differences in life history parameters of different management units recommended by ASCOBANS. Furthermore, because the proposed project uses standardized methods, the results will be compared to other studied populations.</p>
<b>Outputs</b>	<p>The proposed analytical work (practical work and data analysis) is expected take approximately 9 months, after which a report will be presented to the ASCOBANS Advisory Committee.</p> <p>The data will also be presented in a scientific publication in an international peer-reviewed journal and included in the PhD thesis of Fiona Read.</p> <p>All data generated from the project will be included in the DEFRA funded UK national strandings database (<a href="http://www.ukstrandings.org">www.ukstrandings.org</a>) and strandings database of CEMMA. The data will available for future studies requiring age and maturity data, either from the individuals processed in the proposed project or from the growth curves the project will generate.</p>
<b>Work Plan and Timetable</b>	<p>The proposed work is expected take approximately 9 months. Please see the attached work plan (table 1).</p>
<b>Project Personnel</b>	<p><b>Prof. Graham J. Pierce</b>  School of Biological Sciences (Zoology)  University of Aberdeen  Tillydrone Avenue  Aberdeen  AB24 2TZUK  Email: g.j.pierce@abdn.ac.uk  <i>Project co-ordination, overall responsibility for data analysis and reporting.</i></p> <p><b>Fiona L. Read</b>  Instituto de Investigaciones Marinas (C.S.I.C)  Eduardo Cabello 6  36208, Vigo</p>

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	<p>Pontevedra Spain Email: fionaread@iim.csic.es <i>Research technician. Conduct life history analysis. Assistance with data analysis and report writing.</i></p> <p><b>Dr Christina Lockyer</b> Age Dynamics c/o Innelvveien 201 Kaldfjord N-9100 Kvaløysletta Norway Email: christina_lockyer@hotmail.com <i>Supervisor for age determination. 2<sup>nd</sup> reader for age slides.</i></p>
<p><b>Budget Estimates</b></p>	<p>Expected budget** of the proposed project: Please see the attached budget (table 2).</p> <p>Ageing: 60 Euros per tooth (x 100 animals) = 6000 Euros Histology: 10 Euros per animal (x 100 animals) = 1000 Euros Age Dynamics 2<sup>nd</sup> age reading: 6 Euros per tooth (x100) = 600 Euros Glass plate for cryostat: 250 Euros Collection and shipping of samples for analysis: 200 Euros Shipping of tooth slides to Norway for second age readings: 150 Euros Insurance for laboratory work for Fiona Read at the IIM: 100 Euros Travel between UK, Spain and Norway: 1000 Euros</p> <p><b>Total = 9,300 Euros</b></p> <p>Rates are based on those used in comparable projects. As an alternative basis for costing this is equivalent to paying for 2 months of Fiona Read's time (@3.35 k Euros per month) plus a materials budget of 1000 k Euros, Ageing specialist budget of 600 Euros and a travel budget of 1000 k Euros.</p> <p><i>**The University of Aberdeen will manage this budget without charging any overhead.</i></p>

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For more information please contact the ASCOBANS Secretariat at [ascobans@ascobans.org](mailto:ascobans@ascobans.org).

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**Table 1. Work plan and timetable.**

	<b>Activity</b>	<b>Responsible person(s)</b>
<b>Month 1</b>	Sort available samples, make database and determine of cause of death from necropsy forms.	Fiona Read
<b>Month 2</b>	Age reading calibration with known-age Bottlenose dolphins from Sarasota Bay, USA.	Fiona Read and Christina Lockyer
<b>Month 3</b>	Age determination, including 2 independent readings by two different readers.	Fiona Read and Christina Lockyer
<b>Month 4</b>		
<b>Month 5</b>	Reproductive tract analysis, including histology	Fiona Read
<b>Month 6</b>		
<b>Month 7</b>	Data analysis. Final report for ASCOBANS Scientific Committee. Publication in Scientific journal.	Graham Pierce and Fiona Read
<b>Month 8</b>		
<b>Month 9</b>		

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Table 2. Budget

	Activity	Price per unit	Unit number	Total cost
<b>Direct costs</b>	Age determination	60 Euros	100	6000
	Second age reader	6 Euros	100	600
	Histological preparation	10 Euros	100	1000
	Glass plate for cryostat	250 Euros	1	250
	Collection and shipping of samples for analysis	200 Euros	1	200
	Shipping of samples to Norway for 2nd age readings	150 Euros	1	150
	Insurance for Fiona Read to conduct laboratory work at the IIM, Vigo	100 Euros	1	100
	Travel between Spain, Scotland and Norway	1000 Euros	1	1000
<b>Indirect costs</b>	Institute overheads	The University of Aberdeen, UK and the IIM, Spain will not charge any overhead on this project	0	0
<b>TOTAL COSTS</b>				<b>9300 Euros</b>

## Curriculum Vitae

NAME **Graham John Pierce (BSc, MSc, PhD)**

CURRENT POST **Professor of Zoology**, Oceanlab, School of Biological Sciences, University of Aberdeen, Main Street, Newburgh, Aberdeenshire AB41 6AA, UK. Tel: 44 (0)1224 272459. E-mail: [g.j.pierce@abdn.ac.uk](mailto:g.j.pierce@abdn.ac.uk)

**Research profile:** My current research covers various aspects of the biology, ecology, monitoring and conservation of marine mammals, including life history, trophic ecology, habitat use, interactions with fisheries, monitoring of strandings, and sightings surveys. I also have interests in cephalopods, biodiversity, aquaculture and coastal zone management. I have co-ordinated five European research projects, including projects on bioaccumulation of contaminants and fishery by-catches in marine mammals. I have published over 190 papers in peer-reviewed journals and presented or contributed to around 300 conference talks and posters. These include invited talks on marine mammal monitoring at the SAFESEA workshop (Viano do Castelo, 2010) and Symposium on Monitoring Strategies for Marine Mammal Populations (La Rochelle, 2008).

### External duties

- Chair, ICES SCICOM Steering Group on Ecosystem Function (2012-15).
- Publications Editor, European Cetacean Society (to 2011).
- President, Cephalopod International Advisory Council (to 2012).
- Member of the *ICES Working Group on Marine Mammal Ecology* (since 2005).
- Member (Chair 2007-10 and 1998- 2001) of the *International Council for the Exploration of the Seas Working Group on Cephalopod Fisheries and Life History* (since 1991).
- Editorial Board of *Journal of the Marine Biological Association of the United Kingdom (JMBA)*, recent guest editorials for *ICES Journal of Marine Science*, *Hydrobiologia* and *JMBA*
- A range of review work including peer review of fishery assessments as part of the Marine Stewardship Council certification process.

**Teaching and training:** I recently completed a 3-year posting as Marie Curie Chair at Instituto Español de Oceanografía (Centro Oceanográfico de Vigo) in Spain under which 50% of my time was devoted to postgraduate supervision and teaching, including PhD courses and contribution to a Masters programme in fisheries at the University of Vigo. I supervise or co-supervise over 20 postgraduate research students, mainly at the Universities of Aberdeen, Vigo (Spain) and Minho (Portugal). Twenty-nine of my previous research students have now graduated. I have co-ordinated two Marie Curie postgraduate training networks and co-organised the University of Aberdeen's MSc in *Marine & Fisheries Science* for 12 years. In Aberdeen, I teach ecology, marine biology, fisheries and applied statistics.

### Selected grants

- *Anthropogenic Impacts on the Atlantic marine Ecosystems of the Iberian Peninsula* (Animate). CEC FP6 Marie Curie Chair, MEXC-CT-2006-042337, €287k, chair-holder, 2007-2010.
- *Understanding harbour porpoise (Phocoena Phocoena)-fishery interactions in the north-west Iberian Peninsula*. ASCOBANS, 2010-2011, 10,000 Euros. Joint Grant-holder with Fiona Read
- *ECOsystem approach to SUSTainable Management of the Marine Environment and its living Resources*. CEC Marie Curie Training Site, 2006-09. Co-ordinator.
- *Bioaccumulation of persistent organic pollutants in small cetaceans in European waters: transport pathways and impact on reproduction (BIOCET)*. CEC FP5 project, 2001-03, €350k. Co-ordinator.
- *Environmental Approach to Essential Fish Habitat Designation*. CEC FP6 research project, 2006-08, €116K. Partner.
- *Investigation of the feeding habits of Monachus monachus*. Hellenic Society for the study and Protection of the Monk Seal, 2006-2008, €13.5k

## Selected recent publications

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## FIONA LOUISE READ

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**Date of Birth:** 06<sup>th</sup> February 1979 Full UK driving license  
**Nationality:** British PADI advanced diving license

### EDUCATION:

2001 – 2002 M.Res. Marine and Fisheries Science: Sustainable Management of Living Marine Resources  
Aberdeen University, Aberdeen, United Kingdom  
Thesis: Seasonal and Annual Variation in the Diet of Seals in Orkney, N.E. Scotland.

1997 – 2000 B.Sc. Honours Marine Biology (grade 2.1)  
Portsmouth University, Portsmouth, United Kingdom  
Thesis: Behaviour of Guppies, *Poecilia reticulata*, when Exposed to Sex Pheromones

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### RELEVANT EMPLOYMENT HISTORY:

#### The North Atlantic Marine Mammal Commission (NAMMCO), Tromsø, Norway

Researcher

August 2011-October 2011

#### Main objectives

- Write a review publication on age determination in marine mammals with a focus on monodontids for the NAMMCO Scientific Publication series.
- Present the review paper at the NAMMCO Age Determination workshop Age Determination Workshop in Tampa, USA in November 2011.

#### Instituto de Investigaciones Marinas, C.S.I.C and Instituto Español de Oceanografía, Vigo, Spain University of Aberdeen, Aberdeen, U.K.

PhD (Doctoral) candidate

April 2007 - Present

#### Marine Mammal and Fisheries Interactions in the north-west Iberian Peninsular (NWIP).

#### Main objectives

- To estimate mortality rate for common, striped and bottlenose dolphins and harbour porpoises in Galician and Portuguese fisheries using life-history (teeth and gonads, including histology and microscopy) data and interviews with fishermen
- Provide valuable new life history data by producing a life-history table for all the above species
- Investigate seasonal, geographic, annual and ontogenetic variation in the diet of the cetaceans in relation to prey abundance
- Recommend mitigation measures to prevent by-catch. Including support from the fishing industry to minimise adverse effects on the fisheries and maximise participation from fishermen
- Provide recommendations on issues related to the conservation of cetaceans and the management of fisheries in the NWIP.

#### Erasmus Medical Centre, Rotterdam, the Netherlands

January 2003 – April 2007

Research Technician and Pathology Assistant

#### Duties include:

- Research project titled '*Life History of Harbour Seals in Dutch Waters*'. Including the analysis of over 1400 reproductive organs and canine teeth (for age determination), including histology and microscopy.
- Life history parameters of stranded marine mammals, mainly harbour porpoises
- Use of magnetic resonance imaging (MRI) to conduct a research project on its uses for reproductive studies in marine mammals

#### Fisheries Research Services Marine Laboratory and University of Aberdeen, Aberdeen, U.K.

Research Assistant

November 2002 – January 2003

Lipid extraction for fatty acid profiles. The work was for the *BIOCET* (Bioaccumulation of Persistent Organic Pollutants in Small Cetaceans in European Waters: Transport Pathways and Impact on Reproduction) project.

## EXTERNAL RESPONSIBILITIES

Chair for the 'Conservation' session at the European Cetacean Society annual conference 2011.

Organiser of 'Age Determination Workshop' at the European Cetacean Society conference, April 2006, Gdynia, Poland (co-organisers: Dr Patricia Lastra and Dr Christina Lockyer).

Invited participant for the closed working group 'Age Validation of Seals' in November 2006, Bergen, Norway.

Co-supervisor (with Professor Graham Pierce) of M.Sc Thesis Project undertaken by Nathaniel Dove, University of Aberdeen, 2009. *Analysis of Small Cetacean Strandings and their Relationship with Fishery Activity in Galicia between 1990 and 2008.*

Supervisor of various internships and two external researchers at the Instituto de Investigaciones Marinas (CSIC), Vigo, Spain and Department of Virology, Erasmus Medical Centre, Rotterdam, the Netherlands.

Member of the ICES working group 'Marine Mammal Ecology' (since 2009), Society for Marine Mammalogy (since 2005) and European Cetacean Society (since 2004).

## SUCCESSFUL FUNDING APPLICATIONS

Understanding Harbour Porpoise (*Phocoena Phocoena*) and Fishery Interactions in the North-West Iberian Peninsula, 2010. Funding from the *Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Sea* (ASCOBANS) (10,000 Euros) (with Professor Graham Pierce).

Awarded 33 months within the Marie Curie EU-funded ECOSUMMER project (ECOSystem approach to SUSTainable Management of the Marine Environment and its living Resources). MEST-CT-2005-020501. April 2007 – December 2010.

Diet Analysis of Harbour Seals that Died During the PDV Epidemic, 2002. Funding from the *Scottish Association for Marine Science* (SAMS) Research Bursary. (£1000 GBP) (with Professor Graham Pierce and Professor Thijs Kuiken).

## PARTICIPATION IN PROJECTS

Pollutant exposure in coastal top predators: assessing current levels of exposure and toxic effects, 2010. Funding from the *Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Sea* (ASCOBANS) (9,750 Euros).

Marie Curie EU-funded project ECOSUMMER (ECOSystem approach to SUSTainable Management of the Marine Environment and its living Resources, MEST-CT-2005-020501). April 2007 – December 2009.

EU-funded project BIOCET (BIOaccumulation of persistent organic pollutants in small CETaceans in European Waters: Transport Pathways and Impact on Reproduction, EVK3-2000-00027). October 2002 – January 2003.

Dutch Ministry of Agriculture 'Directorate Science and Knowledge Transfer' funded project *Emergency Protocol for Investigation of the 2002 PDV Epidemic in Harbour Seals in the Netherlands*. June 2002-December 2002.

## PUBLICATIONS IN PEER REVIEWED JOURNALS

**Read, F.L.**, Santos, M.B., López, A., González, A.F., Ferreira, M., Martínez-Cedeira, J., Lens, S., Vingada, J. and Pierce, G.J. *A Review of Marine Mammal-Fisheries Interactions in the Northwest Iberian Peninsula*. Submitted to Journal Marine Biological Association, U.K.

**Read, F.L.** *Age Estimation Methods in Marine Mammals: with special reference to Monodontids*. Submitted to NAMMCO Scientific Publications 9: Age Determination in Marine Mammals.

Murphy, S., Perrott, M., McVee, J., **Read, F.L.**, Roe, W., Stockin, K.A. *Deposition of growth layer groups in dentine tissue of captive common dolphins Delphinus sp.* Submitted to NAMMCO Scientific Publications 9: Age Determination in Marine Mammals.

Lockyer, C., Mackay, B., **Read, F.L.**, Härkönen, T. & Hasselmeier, I. *Age Determination Methods in Harbour Seals with a Review of Methods Applicable to Carnivores*. NAMMCO Scientific Publications 8: Harbour Seals. In press.

Murphy, S., Winship, A., Dabin, W., Jepson, P.D., Deaville, R., Reid, R.J., Spurrier, C., Rogan, E., López, A., González, A.F., **Read, F.L.**, Addink, M., Silva, M., Ridoux, V., Learmonth, J.A., Pierce, G.J. & Northridge, S.P. *The Importance of Biological Parameters in Assessing the Status of Delphinus delphis*. Marine Ecology Progress Series, 388: 273–291, 2009.

**Read, F.L.**, Santos, M.B., González, A.F., Martínez-Cedeira, J., López, A. & Pierce, G.J. *Common Dolphin (Delphinus delphis) in Galicia, NW Spain: Distribution, Abundance, Life History and Conservation*. Working Paper, Scientific Committee, International Whaling Commission SC/61/SM5, 2009.

Rijks, J.M., **Read, F.L.**, van de Bildt, M.W.G., van Bolhuis, H.G., Martina, B.E.E., Wagenaar, J.A.A., van der Meulen, K., Osterhaus, A.D.M.E & Kuiken, T. *Quantitative Analysis of the 2002 Phocine Distemper Epidemic in the Netherlands*. Veterinary Pathology, 45: 515-530, 2008.

## **OTHER PUBLICATIONS**

Whale and Dolphin Conservation Society (WDCCS) blog on harbour porpoise conservation. 2010.

<http://www2.wdcs.org/fieldblog/index.php?/archives/215-Harbour-Porpoise-and-fisheries-interactions-in-the-north-west-Iberian-Peninsula.html>

**Read, F.L.**, Santos, M.B., González, A.F., Martínez-Cedeira, J., López, A. & Pierce, G.J. *Common Dolphin (Delphinus delphis) in Galicia, NW Spain: Distribution, Abundance, Life History and Conservation*. Working Paper, Scientific Committee, International Whaling Commission SC/61/SM5, 2009.

## **28 PRESENTATIONS IN INTERNATIONAL CONFERENCES INCLUDING:**

**Read, F.L.**, González, A.F., Ferreira, M., López, A., Vingada, J., Santos, M.B. & Pierce, G.J. *By-catch mortality and conservation of the Iberian harbour porpoise population*. 19th Biennial Conference on the Biology of Marine Mammals, Tampa, USA. December 2011.

**Read, F.L.** *Age Determination Methods in Marine Mammals: with special reference to Monodontids*. NAMMCO Workshop on Age Estimation of Marine Mammals. Tampa, USA. November 2011.

**Read, F.L.**, González, A.F., Ferreira, M., López, A., Vingada, J., Santos, M.B. & Pierce, G.J., 2011. *Life History Data From Harbour Porpoises Stranded in the NWIP*. ‘Sustainability of Local Fishing Arts and the Promotion of a Safer Sea for Cetaceans’ SAFESEA conference, Figueira do Foz, Portugal. Invited.

**Read, F.L.**, González, A.F., Ferreira, M., López, A., Vingada, J., Santos, M.B. & Pierce, G.J., 2011. *The importance of long-term datasets for conserving the Iberian harbour porpoise population*. 25th ECS Conference, Cadiz, Spain.

**Read, F.L.**, Santos, M.B., González, A.F., Goetz, S., Ferreira, M., López, A. & Pierce, G.J., 2010. *Present Knowledge of Marine Mammal and Fisheries Interactions in the North-West Iberian Peninsula*. By-catch of cetaceans. ‘Present scenarios and mitigation measures’ SAFESEA conference, Viana do Castelo, Portugal. Invited.

**Read, F.L.**, González, A.F., Santos, M.B., Ferreira, M., López, A. & Pierce, G.J., 2010. *The Importance of Life History Parameters for Assessing Marine Mammal and Fisheries Interactions*. 24th ECS Conference, Stralsund, Germany.

**Read, F.L.**, Ferreira, M., Goetz, S., González, A.F., López, A., Martínez-Cedeira, J., Santos, M.B. & Pierce, G.J., 2009. *Marine Mammal and Fisheries Interactions in the North-West Iberian Peninsula*. 18th Biennial Conference on the Biology of Marine Mammals, Quebec, Canada.

**Read, F.L.**, Rijks, J.M., van de Bildt, M.W.G., van Bolhuis, H.G., Philippa, J.D.W., Martina, B.E.E., Osterhaus, A.D.M.E & Kuiken, T., 2008. *Overview of the 2002 Phocine Distemper Outbreak in the Netherlands: Epidemiology, Pathology and Life History*. Sea Mammal Research Unit, UK. Invited.

**Read, F.L.**, Pierce, G.J. & Kuiken, T., 2007. *Age and Body Length at Sexual Maturity of Harbour Seals in the Netherlands*. 17th Biennial Conference on the Biology of Marine Mammals, Cape Town, South Africa. 2007.

## CONFIDENTIAL - CURRICULUM VITAE

### Personal:

First names: Christina Helen  
Family name at birth: Grzegorzewska on marriage: Lockyer  
Date of birth: 10 April 1947

Nationality: British citizen;  
Passport number: 705287888  
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DK CPR no: 100447-3902  
Norwegian person no: 100447-21223

### Addresses:

Current home - Innelvveien 201, Kaldfjord, N-9100 Kvaløysletta, Norway  
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Reg. business - Age Dynamics, Huldbergs Allé 42, DK2800 Kongens Lyngby, Denmark.  
tel. - +47 77641100 / +45 444490  
e-mail - [agedynamics@mail.dk](mailto:agedynamics@mail.dk)

### Education:

#### Secondary schooling and qualifications:

1958-1965 - Ursuline Convent Grammar School, London SW18, England  
GCE'O'-levels - English language, English literature, French, Latin, Biology, Chemistry, Physics, Mathematics, History;  
GCE 'A'-levels - Zoology, Botany, Chemistry

#### Universities and qualifications:

1965-1968 - University of East Anglia, Norwich, England - **B.Sc. (Hons) in Biology (first degree)**  
1969-1972 - Royal Holloway College, University of London, England - **M.Phil. in Zoology (master's degree)**  
1989 - University of East Anglia, Norwich, England - **Sc.D. in Zoology (higher doctorate in science)**  
see also supplementary information on p.11.

### Membership of professional organizations:

1. Scientific fellow of the Zoological Society of London;
2. Scientific member of the European Association of Aquatic Mammals;
3. Charter member of the Society for Marine Mammalogy; elected President of society 1990-1992;
4. Scientific member of the European Cetacean Society, and elected chairman 1997-2003.

### Other qualifications:

1. BSAC 2nd class diver, 1981;
2. CMAS 3-star diver, 1982;
3. CMAS International Scientific Diving Brevet, 1982;
4. Royal Yachting Association National Sportsboat certificate of competence, 1984;
5. British radio-operator's licence, 1977;
6. First Aid course – Denmark, November 2001; update with S.A.F.E. Scandinavia, November 2003;
7. Aerobics Training Instructor licence – S.A.F.E. Scandinavia, March 2003;
8. Aerobics Group Training Instructor licence – S.A.F.E. Scandinavia, October 2003.
9. International Personal Trainer certification – Fitness Consulting, Denmark, 2005.

### Other skills:

Languages spoken, written and read: English (first language), Danish (as second language only); limited French.

Career:

- 1967 (2 months) - Assistant Scientific Officer in Whale Research Unit, c/o British Museum (Natural History), London, England;  
nature of work: age determination of sperm whales from teeth;
- 1968 (4 months) - Assistant Experimental Officer in Royal Naval Physiological Laboratory, Alverstoke, England;  
nature of work: human physiology in diving and hyperbaric conditions;
- 1968-1976 - Scientific Officer/Higher Scientific Officer in Whale Research Unit (NERC), c/o British Museum (Natural History), London;  
nature of work: biological/ecological study of large whales and dolphins;
- 1977-1988 - Senior Scientific Officer in Sea Mammal Research Unit (formerly Whale Research Unit), (NERC), Cambridge, England;  
nature of work: biological study (namely parameters and bioenergetics) of large whales and dolphins in relation to fisheries management and ecosystem energetics and conservation;
- 1988- - Principal Scientific Officer (grade 7) in Sea Mammal Research Unit, (NERC), Cambridge, England
- 1988-1990 - On sabbatical leave from the Sea Mammal Research Unit, and based at the NOAA, NMFS, Southwest Fisheries Science Center, La Jolla, California, and Hubbs Marine Research Center (Sea World), San Diego, California, USA, from April 1988 to September 1990;  
nature of work: age and energetics of free-living and captive pilot whales; analysis of age and biological parameters of fin whales; investigation of criteria for defining stocks; specialist contract advisory work for NMFS on management issues relating to dolphin conservation.
- 1990- 1996 - Principal Scientific Officer (grade 7) in Sea Mammal Research Unit, (NERC), Cambridge, England; concurrently, secretary of ASCOBANS, the international small cetacean conservation agreement  
nature of work: harbour porpoise studies and resumption of previous work; position of setting up and running Secretariat for the Agreement on Conservation of Small Cetaceans in the North and Baltic Seas, ASCOBANS (under CMS Bonn Convention).
- 1996- 31 Dec. 2002 -Senior Scientist in the Danish Institute for Fisheries Research, Charlottenlund, Denmark.  
nature of work: biological research on harbour porpoise and reduction of fisheries interactions involving incidental take of small cetaceans. National and international advisory work on cetacean management and conservation.
- 1 Jan. 2003 continuing - own international scientific consultancy “Age Dynamics”, focusing on mammal age and population parameters: research (international client-based), advice (European Commission contracts and international governmental organisations on marine ecology, fisheries and oceanographic projects) and teaching (special university courses). Please see pp.12-13 for own scientific consultancy.
- July 2003 - March 2005 - employed as lecturing professor at the Denmark’s International Study Program, Copenhagen. This program is in affiliation with the University of Copenhagen and also in collaboration with Roskilde University Center. My responsibilities encompass a semester-long course (two lectures per week) on “The Biology of Marine Mammals” which is repeated in the spring and autumn to American university undergraduates in their 2<sup>nd</sup> and 3<sup>rd</sup> years’ of study. The course is in English. I also arrange the coursework, seminars, exams and research papers for the students, as well as grading.
- July 2003 - March 2005 - employed as part-time aerobics instructor by SATS, Denmark in different centres in the Copenhagen area.
- March 2005 cont. – employed as General Secretary of the North Atlantic Marine Mammal Commission (NAMMCO) based in Tromsø, Norway. Diplomatic status representing an inter-governmental marine mammal conservation and management organisation, heading a staff of three persons.

## Outline of work undertaken:

- Oceanography: Research studies commenced with investigation of southern hemisphere deep ocean temperature profiles, and the life cycle of *Euphausia superba* in the Antarctic seas, with particular reference to the krill as a food resource for local predators (especially large exploited whale species) and humans, between years 1968 and 1972, in collaboration with Dr Neil A. Mackintosh of the original "Discovery" investigations. Two papers were published (publication list pp.6-10, refs 4 and 6) as a result of this research, including a thesis for the degree of M.Phil. on krill and whale energy relations.
- Ecological energetics: The direction of research over the years has been towards integration of natural history data on age, growth, food and feeding, reproduction, distribution and behavioural energetics for the purpose of specific ecological energetic studies of large whale species. Past work has concentrated on the southern hemisphere, particularly with reference to the Antarctic whale fisheries and the management of whale stocks (refs 7, 10, 15, 17, 20, 21, 22, 23, 24, 27 and 28). Major studies have covered the Icelandic large whale biology with particular emphasis on the ecological energetics of the N.E. Atlantic whale species taken in commercial fisheries (refs 38, 43, 44, 46, 52, 59 and 65). Research (funded by the Marine Research Institute, Reykjavik) on the N.E. Atlantic fin whales examined the correlation of fluctuating biological parameters and environment. The overall research aim has been one of studying the cetaceans in the context of their environment: the dynamic inter-relationship between environmental factors (natural and man-made perturbations) and whale production, for the purpose of refining management models (refs 60, 61, 64 and 122).
- Biological parameters of marine mammals: Extensive studies on age determination techniques have developed over the years for several species of cetaceans, including sperm whales (*Physeter macrocephalus*), fin (*Balaenoptera physalus*), blue (*B. musculus*), sei (*B. borealis*), Bryde (*B. edeni*) and minke (*B. acutorostrata*) whales, and small cetaceans including *Tursiops sp.*, *Cephalorhynchus commersonii*, *Globicephala melas*, *G. macrorhynchus*, *Lagenorhynchus sp.*, *Delphinus delphis*, *Stenella sp.*, *Steno bredanensis*, *Phocoena phocoena*, beluga (*Delphinapterus leucas*) and rare species of beaked whales (*Mesoplodon sp.*), as well as grey seals (*Halichoerus grypus*), common seals (*Phoca vitulina*), ringed seals (*Phoca hispida*), southern elephant seals (*Mirounga leonina*) and the highly endangered Mediterranean monk seal (*Monachus monachus*). Work now includes polar bears (*Ursus maritimus*) and walrus (*Odobenus rosmarus*). These studies mostly included wider investigations of growth, reproduction, and biological parameters related to age and fecundity. Papers relating to these studies are in the reference list (refs 1, 2, 5, 8, 9, 11, 12, 16, 19, 24, 25, 26, 29, 30, 33, 36, 37, 39, 47, 48, 50, 51, 53, 54, 61, 66, 67, 71, 72, 77, 78, 81, 82, 83, 85, 87, 90, 92, 93, 94, 96, 97, 98, 99, 100, 102, 103, 115 and 120, 121).
- Specialist case investigations: The pilot whales taken in the drive fishery off the Faeroe Islands have been the focus of a large comprehensive biological and ecological study (refs 58, 59, 71 and 73). Work here has been jointly funded by Sea Mammal Research Unit and the Faroese Government (Dept of Fisheries). The primary personal research aim being to provide accurate means of age determination, and an ecological assessment of the role of seasonal energy storage. Respiratory, behavioural and age studies were undertaken on captive short-finned pilot whales from the N.E. Pacific at Sea World, San Diego, to supply live-animal energetics data, and to verify age determination techniques from known-history animals. This research was funded through an award from the US Dept of Commerce (award no NA88-ABH- 00040), during the period April 1 1988-September 30 1989. Main results presented to the International Whaling Commission Scientific Committee on small cetaceans in May/June 1989, resulted in the publication of four papers (refs 71, 72, 73 and 74) in a special publication issue of the Reports of the International Whaling Commission, which I co-edited with Dr Tony Martin and Greg Donovan (ref. 70).
- Small scale research investigations on behaviour and distribution: Studies have been ongoing for several years on free-living dolphins around the British coast, with emphasis on their behaviour and biology (refs 13, 14, 40, 41, 42, 45, 48, 49, 57, 62, 63 and 123). Most of this research has been funded by awards from The Royal Society (Browne Fund) and the Nuffield Foundation. Dolphin behaviour has been the subject of Masters students' theses that I have supervised in recent years in Denmark. Additionally, there have been other researches as documented in refs 3, 18, 55 and 56.
- International research collaboration: Current research focuses on small cetaceans in European waters, especially harbour porpoise (North and Baltic seas), in relation to strandings, by-catch and general population biology and ecology and encompass pathology and pollutant studies (refs 75, 76, 77, 79, 80, 82, 83, 84, 85, 86, 89, 91, 111, 112, 114 and 124). Work on population structure of harbour porpoise continues and has extended areas of work into west Greenland (since 1995) and also elsewhere within Europe. These studies necessitate wide national and international collaboration with other research institutions. Involvement with Spanish researchers at the University of Barcelona, under the auspices of the British Council, has resulted in collaboration on investigation of the biology of striped dolphin in the Mediterranean Sea in connection with the epizootic (refs 66, 67, 77 and 87).
- Physiology: A project investigating respiratory rate and metabolism in relation to behaviour and activity patterns of harbour porpoise was undertaken in April 1996 in collaboration with researchers from Cambridge University and Harderwijk Dolphinarium, the Netherlands (ref. 106). Recent research on growth and food intake of juvenile captive porpoises took place in the Fjord and Bælt Centre, Kerteminde in Denmark (refs 93, 94 and 115, 116 and 117) and dietary and nutritional analysis in porpoises (refs 105, 109 and 113). Age and biological investigations of belugas in Greenland,

Alaska and Siberia, (refs 101 and 102) have been undertaken in collaboration with overseas researchers in connection with stock differentiation and validation of age techniques. (A successful feasibility study in Dikson, Taimyr, in August 1995, and supported by the Royal Society, UK, investigated occurrence of belugas in the Siberian Arctic.) Research on verification of age determination utilising tetracycline time-marking of teeth in free-living seals and captive cetaceans is also ongoing. Current research has also investigated various physiological, anatomical and genetic methods for distinguishing stocks (refs 85, 89, 95, 105, 107, 108, 110 and 119).

- **International work:** Research has been based, of necessity, on international exchange. Geographical areas where studies have centred include the Antarctic, South Africa, Japan, Iceland, Norway, Spain, British Isles, the Faroe Islands, West Greenland and Denmark. All these places, with the exception of the Antarctic, have been visited, mostly both at research establishments and for field collection of materials. Funds were received from the Japanese Government (Dept of Culture) in 1977 for a study visit to the Far Seas Fisheries Laboratory, Shimizu between April and July, specifically to investigate determination of reproductive parameters from ear plugs of sei whales, and train student personnel. The Marine Research Institute in Reykjavik has also been a frequent host and sponsor. Between April 1988 and September 1990, the workplace was at the NOAA NMFS Southwest Fisheries Science Center, La Jolla, California, where sabbatical leave was taken for two and half years. Currently my workplace is based in Denmark, but Age Dynamics clients and contracts since January 2003 are worldwide: Belgium, Canada, Faeroe Islands, Germany, Israel, Netherlands, Norway, New Zealand, Poland, Spain, Sweden, United Kingdom, USA, and include universities, research institutions and government research departments.
- **Project handling, funding and coordination:** Responsibilities over the last 20+ years have been mainly in initiating, organizing and effecting research programmes, as well as seeking external funding. This includes programme planning, budgeting, delegating teamwork and overseeing both laboratory and field work. The Faroese pilot whale project where I was scientific coordinator involved co-ordinating 11 researchers from six different European countries. Other more recent international EC-funded projects have commanded an annual inclusive budget of up to approx. Euro 2.5 million with up to 4 international partners (BY-CARE - Contract EC FAIR-CT05-0523; EPIC - Project no DG XIV 97/0006 – see ref. 118). Currently I am able to raise income successfully for my research consultancy (gross income in 2003 – the initial year - was in excess of 300,000 DKK).
- **Academic:** General activities have included presentations of lectures and papers to public meetings, including Greenpeace, Friends of the Earth, Zoological Society of London, and academic lectures to Universities, including University of California (San Diego), Lancaster (England), Bangor (Wales), Swansea (Wales), Leicester (England), Odense (Denmark) and a long-term (10-years) teaching commitment at the University of East Anglia (England) to final-year undergraduates. Also, innumerable seminars and presentations have been given at research establishments in recent years. Contribution as reviewer of scientific papers submitted to *Can.J.Zool.*, *Can.J.Aquat.Fish.Sci.*, *Mar.Mammal Sci.*, *J.Mammal.*, *Biol.Conserv.*, *Sarsia*, *Proc. Roy. Soc.*, *Polar Science*, etc. is also a regular activity, with about 20 papers received annually for comment. I am currently on the editorial board of *Aquatic Mammals*.
- **Student supervision and teaching:** Responsibility for acting as supervisor to students for M.Sc. and Ph.D., as well as acting as opponent in the defence of D.Sc., Ph.D. and masters' degrees internationally (Denmark, Norway, Sweden, UK) has been ongoing for several years. (I am a registered censor for the universities in Denmark.) Provision of lecture courses at Universities nationally and internationally is ongoing – especially currently through Age Dynamics. In addition, many students come for training in age determination techniques in marine mammals, and also for practical classes on the dissection of cetaceans, and collection of samples. Recent courses run include University of Bangor, north Wales (April 2003 and 2004), Denmark's International Studies Program, Copenhagen (November 2003 and March 2004), Greenland Institute of Natural Resources, Nuuk (November 2002) and University of Gdansk, Poland (April 2003). I currently teach a semester-long course "Biology of marine mammals" to American and Danish university students at Denmark's International Studies Program, Copenhagen in spring and autumn annually.
- **Management and advice:** Active membership of the Scientific Committee of the International Whaling Commission (IWC), providing advice on conservation and management of whale stocks, has been a long-term commitment since 1972 until 2000. Active participation on other standing committees since 1986 include chairing the strandings working group of the European Cetacean Society (before moving to the USA), and the British Government's Dept of the Environment steering committee on the live cetacean review dealing with national commercial guidelines for maintenance of cetaceans in captivity. Other commissioned reports include one on humane killing in connection with whaling, presented to the IWC. Recently I was a coordinator of part of a DK government-commissioned report on environmental effects on fisheries around Denmark, specifically relating to the effects of top predators on fisheries (ref. 122). The elected position of President of the currently American-based Society for Marine Mammalogy was held from April 1990 until April 1992. This Society appointed me onto their Committee of Scientific advisors in March 1995 until 2002. I was elected chairman of the European Cetacean Society in 1997, but relinquished this role in October 2003 because of work pressures. I established and ran the international Secretariat for the Agreement on Conservation of Small Cetaceans in the North and Baltic Seas (ASCOBANS), under the auspices of the Bonn Convention (CMS), based at the UK-based Sea Mammal Research Unit, from 1992-1996. This was an international position with a budget funded by Parties to the Agreement, and approved for a 3-year term. This budget encompassed salary for the Secretary and one assistant and all other costs for the maintenance of

the Secretariat, amounting to a maximum of about Euro 300,000 in 1997. I was a member of ICES specialist working groups 1996-2002, and a scientific adviser to the Danish delegate to the ASCOBANS Advisory Committee, as well as ACCOBAMS in connection with ECS being an appointed ACCOBAMS-partner. Recently, I was appointed as an expert to the Indirect Effects Panel of the NOAA-NMFS tuna-dolphin fishery review, La Jolla, 4-6 September 2002. I am presently contracted to undertake work for the EC, reviewing research funding proposals on marine ecology, oceanography and fisheries. This continues in 2004. I am also appointed as a consultant member of the Scientific and Advisory Committees of both Fjord & Belt, Kerteminde, Denmark and Dolfinarium Harderwijk, Netherlands. Currently I am representing the inter-governmental organisation, the North Atlantic Marine Mammal Commission (NAMMCO) as General Secretary, heading a staff of three. Member nations include Iceland, Norway, Faroe Islands and Greenland.

- Organisation of international conferences: Co-convening, sponsorship and organisation of the 18<sup>th</sup> annual conference of the European Cetacean Society in Kolmården, Sweden, 28-31<sup>st</sup> March 2003, which was attended by nearly 350 researchers from worldwide. The conference theme was “Experimental approaches to research on marine mammals”.
- General: Research has involved work onboard ship for surveys and tagging of large whales – in the 1970’s off South Africa and 1980’s off Iceland onboard whaling vessels. In 1995, I participated in a month-long cruise on the “Adolf Jensen” off West Greenland – a survey dedicated to tagging and recording of belugas but also handling of harbour porpoises. During 2002 and 2003 I was also engaged as an in-water dolphin handler by NOAA, USA in their dolphin capture and satellite tagging fieldwork programme off New Jersey.
- Most current research: More recently, between 1996 and 2001, I have had the responsibility for initiating, running and coordinating two large EC-funded programmes in Denmark focusing on porpoise/gillnet fisheries interactions and the reduction of by-catches of porpoises in the North Sea and adjacent waters, and providing advice on management both at national (Denmark) and international government levels. This also focused on the establishment of several databases including a comprehensive collection of biological material retained as archival material. I now run my own research consultancy focusing on mammal age and population parameters: research, advice and teaching.
- Publications: Other published and in press studies bring the total currently recorded in excess of 100. Many other documents for meetings of ICES, IWC, ASCOBANS, NAMMCO and papers for restricted circulation, are also on record. See following pages.

Publications and circulated papers in approximate chronological order:

1. Gambell,R. and **Grzegorzewska,C.** 1967. The rate of lamina formation in sperm whale teeth. *Norsk Hvalfangst-Tidende* 56(6):117-121.
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5. Lockyer,C. 1974. Investigation of the ear plug of the southern sei whale, *Balaenoptera borealis*, as a valid means of determining age. *J.Cons.int.Explor.Mer* 36(1):71-81.
6. Lockyer,C. 1976. Body weights of some species of large whales. *J.Cons.int.Explor.Mer* 36(3):259-273.
7. Lockyer,C. 1977. Observations on diving behaviour of the sperm whale. In, *A voyage of Discovery*, ed. M.Angel, pp.591-609, Pergamon Press.
8. Lockyer,C. 1977. Mortality rates for mature southern sei whales. *Rep. int.Whal.Commn* (Special Issue 1):53-57.
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10. Lockyer,C. 1977. Some possible factors affecting age distribution of the catch of sei whales in the Antarctic. *Rep.int.Whal.Commn* (Special Issue 1):63-70.
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16. Lockyer,C. 1978. A preliminary investigation on age, growth and reproduction of the sei whale off Iceland. *Rep.int.Whal.Commn* 28:237-41.
17. Lockyer,C. 1978. A theoretical approach to the balance between growth and food consumption in fin and sei whales, with special reference to the female reproductive cycle. *Rep.int.Whal.Commn* 28:243-249.
18. Lockyer,C.1979. Responses of Orcas to tagging. *Carnivore* 2(3):19-21.
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20. Lockyer,C. 1979. Changes in a growth parameter associated with exploitation of southern fin and sei whales. *Rep.int.Whal.Commn* 29:191-196.
21. Lockyer,C. 1979. Review (in minke whales) of the weight/length relationship and the Antarctic catch biomass, and a discussion of the implications of imposing a body length limitation on the catch. *Rep.int.Whal.Commn* 29:369-374.
22. Lockyer,C. 1981. Estimates of growth and energy budget for the sperm whale, *Physeter catodon*. *FAO Fisheries Series* (5) - Mammals in the Seas 3:489-504.
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### Supplementary information

DETAILS OF COURSES STUDIED DURING 3-YEAR UNIVERSITY PROGRAMME, 1965-68, LEADING TO DEGREE OF BACHELOR OF SCIENCE, (B.Sc.Hons class 2 in Biology, 1968), AT UNIVERSITY OF EAST ANGLIA, NORWICH, ENGLAND.

Year 1 Biophysics; Biochemistry; Organic Chemistry; Mathematics; Biology (practical Anatomy and Histology);  
Year 2 Organic Chemistry; Statistics; Computer Science; Zoology; Botany;  
Year 3 Physiology (Organs and Tissues; Central Nervous System; Respiration and Circulation; Parasitology); Ecology (Ecosystems; Limnology; Oceanography and Fisheries); Population Dynamics and Biology (Organisms and Populations; Population Genetics; Cytogenetics)

DETAILS OF \*5-YEAR PART-TIME UNIVERSITY PROGRAMME LEADING TO THE DEGREE OF MASTER OF PHILOSOPHY, (M.Phil. in Zoology, 1972), AT ROYAL HOLLOWAY COLLEGE, UNIVERSITY OF LONDON, ENGLAND.

\*1969-1972 3-year only exemption; because of full-time research in 1968-69 at the Whale Research Unit, Institute of Oceanographic Sciences, c/o British Museum of Natural History, London, England, prior to registration.

Courses taken during study/research period: Statistics; special courses on age and growth/natural history, population and ecological studies on small mammals.

Title of thesis:

A review of the weights of cetaceans with estimates of the growth and energy budgets of the large whales, 196pp.

N.B. The thesis was published in four separate papers, one at the time of submission (no 2 on publications list), the remainder later (nos 6, 22 and 23 on publications list).

DETAILS OF UNIVERSITY PROGRAMME LEADING TO THE HIGHER DOCTORATE DEGREE OF DOCTOR OF SCIENCE, (Sc.D. in Zoology, 1989), AT THE UNIVERSITY OF EAST ANGLIA, NORWICH, ENGLAND.

Minimum of 10-years' postgraduate or 7-years' postdoctorate (Ph.D.) research and/or University affiliation through teaching, and awarded on research achievement and publication record; submission of c.v., research and publication record, presentation of case documenting research achievements and goals; reprints of published papers supporting submission.

Submission included:

Selection of 45 published papers, c.v. and case qualifying research impact, significance and experience in the field of marine mammal ecological energetics.

Huldbergs Allé 42  
DK2800 Kongens Lyngby  
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# AGE DYNAMICS



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Website:  
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## Who is Age Dynamics?

Age Dynamics is a small new company established in January 2003 by Dr Christina Lockyer (see short biography overleaf). The aim of the company is to provide expert advice and practical research services in estimating biological parameters of mammals, especially marine mammals. A full service focusing on age determination is available, comprising tissue preparation, age determination and reporting, depending on requirements.

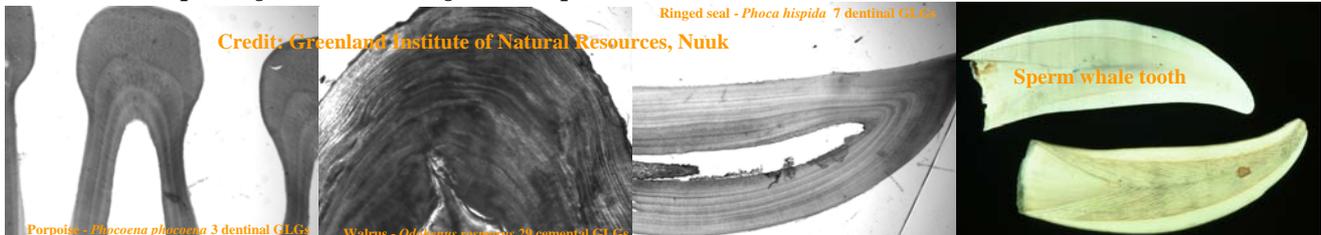
## Services

Examples of services include Growth Layer Group (GLG) analysis of whale ear plugs, tooth dentine and cementum, and other hard tissues e.g. bone. Digital photographic records of preparations can also be made and delivered on CD if requested. This is especially useful for clients who wish to freely circulate GLG images of samples worldwide to colleagues without the need for CITES permit application each time. Examination of reproductive material such as ovaries for the determination of pregnancy/ ovulation history is also possible.

The company can provide a variety of services from straightforward age determination of single samples e.g. individual animals held in captivity, to very large numbers of samples collected in field studies or culls e.g. by-catches, strandings, experimental studies.

## Reference material

Age Dynamics currently holds tooth GLG examples from a wide variety of species including large whales, dolphins and porpoises to seal species – including some rare species, walrus, polar bear and some terrestrial mammals e.g. reindeer. An important goal of the company is to archive ontogenetic series of species examples as a reference set for teaching. The ultimate goal is to prepare a reference manual with photographic examples of GLG samples from different species. I would be pleased to hear from you should you be interested in co-operating in or contributing to this important task.



## Teaching

With respect to teaching, Age Dynamics is also able to offer workshops and teaching courses – either at the home laboratory or at other laboratories in universities or institutions. These can be customised for single one-to-one teaching of staff or for small groups of up to a maximum of 10 individuals such as students. The company is currently well-equipped with a cutting saw, microtomes, microscope and digital cameras with computerised projection.



## Contact

Please feel free to contact me with your query. I can provide you with a list of services, prices and individual quotation. I am also available to consider other collaborations that involve biological parameters, and can also offer independent English language editing of scientific papers and reports.

## Short biography

Dr Christina Lockyer (née Grzegorzewska), born 10<sup>th</sup> April 1947, is British, and was educated in England: B.Sc. (Hons), Biology -1968 at the University of East Anglia, M.Phil., Zoology - 1972 at the University of London, and Sc.D., Zoology - 1989 at the University of East Anglia. She had been employed as a senior scientist at the Department of Marine Ecology and Aquaculture at the Danish Institute for Fisheries Research between April 1996 and January 2003 when she launched her own firm Age Dynamics investigating age determination and life history research in mammals in Denmark.

Prior to relocation in Denmark, she was employed by the Natural Environment Research Council in the United Kingdom between 1968 and 1996 and since 1977 at their Sea Mammal Research Unit in Cambridge, England. Her research encompasses population biology, behaviour and ecosystem energetics of large and small whales, and she has a total refereed scientific publications record exceeding 100 papers.

Externally funded work includes visits to Far Seas Fisheries Research Laboratory, Shimizu, Japan for 3 months 1977, and NOAA Southwest Fisheries Science Center and Sea World Research Institute in San Diego, USA for 3 years 1988-1990. She has been regularly involved in advisory committees to the International Whaling Commission (IWC), ICES and the Agreement on Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS) of which she was secretary between 1992 and 1996, and the North Atlantic Marine Mammal Commission (NAMMCO). She was, until recently, chairman of the European Cetacean Society with a membership of about 500 scientists, for 5 years. She has more recently been involved as international co-ordinator of the EU-funded EPIC (Project DGXIV 97/0006) and earlier in BYCARE (EU FAIR contract CT05-0523).

Currently, in conjunction with Age Dynamics, she runs international practical courses on marine mammal life history in universities and research institutions, and acts as consultant to the European Commission and various international organisations. In March 2005, Age Dynamics established a second operating base, in collaboration with the Norwegian Polar Institute based at the Polar Environmental Centre in Tromsø, Norway.

All communications presently should be addressed to Norway - address given below.

**CUT OUT AND KEEP THE CARD  
BELOW FOR FUTURE  
REFERENCE -**

# AGE DYNAMICS



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*Christina H. Lockyer Sc.D.  
Consultant research scientist specializing in  
marine mammal  
life history and age parameters*

**FORMAT FOR PROJECT PROPOSALS  
FOR THE CONSIDERATION OF THE ASCOBANS ADVISORY COMMITTEE**

<p><b>Title</b> Changes in the distribution of cetaceans in the North Sea.</p>	<p><b>Justification:</b> Conservation and Management Plan Triennium Work Plan</p>	<p><b>Project ID:</b> 2012/09</p>
<p><b>Implementing Agency / Applicant</b></p>	<p>The Rugvin Foundation Coordinator/chairman Frank Zanderink Jeruzalem 31 a 6881 JL Velp the Netherlands 00-31-26-3635444 <a href="mailto:rugvin@planet.nl">rugvin@planet.nl</a> <a href="http://www.rugvin.nl">www.rugvin.nl</a></p>	
	<p>All ARC partners connected with this research area: MarineLife, Norcet, GIS In Ecology, ORCA and Rugvin. Contact will also be made with other organisations to establish how best to create a more extensive network to collect regular monitoring data in the North Sea.</p>	
<p><b>Background / Problem</b></p>	<p>In recent years there have been potentially important, but primarily unexplored and unexplained changes in cetacean occurrence in the North Sea. These can be characterised by three main changes:</p> <ol style="list-style-type: none"> <li>1. The decrease of white beaked dolphins in the southern North Sea that coincides with a contraction in range on the west coast of Scotland, making the northern North Sea the last stronghold for the genetically-distinct and geographically isolated population of white-beaked dolphins that occur in the shelf waters of northwest Europe.</li> <li>2. The re-appearance of common dolphin on a regular basis in the northern North Sea, a species that appears to have last been common in this region in the 1930s – 1950s, but that almost completely disappeared from this region until recently.</li> <li>3. A change in the distribution of the harbour porpoise population from one where the highest densities were concentrated in the northern North Sea to one where the highest densities now occur in the southern North Sea.</li> </ol> <p>These changes have important implications for the management and conservation of these species in European shelf waters. However, the mechanisms behind these changes, and whether they are connected to each other remains unknown. It has been suggested that changes in the distribution of white-beaked dolphin and common dolphin are the result of climate change, but this would appear to be inconsistent with the southward shift in harbour porpoise distribution. Changes in fish stocks, driven by environmental changes or pressure from fisheries on prey species could also be implicated.</p> <p>These changes appear to be ongoing and to happen over very short time periods. As a result, continuous monitoring is required to track the changes as they occur in order to provide the most up to date information for making conservation and management decisions,</p>	

## ASCOBANS Project Proposal Format

	<p>particularly for white-beaked dolphin and harbour porpoise since the North Sea represents an important habitat area for these species in northwest Europe. In addition, such monitoring would provide the type of data required to investigate why these changes are occurrence and whether they are connected.</p>
<b>Objectives</b>	<p>The objectives of the project are to be divided in three parts</p> <ul style="list-style-type: none"> <li>• Analysing existing data on spatio-temporal changes in the distribution of harbour porpoises, white-beaked dolphin and common dolphin in the North Sea collected by a network of ferry surveys that have been undertaken since 2001. Since these ferry surveys are conducted on a regular basis, they can potentially provide important information to compliment the existing 'snapshot' information provided by the more wide-ranging SCANS and SCANS II surveys in 1994 and 2005 respectively.</li> </ul> <p>While collected important data for monitoring the status of cetacean species, such as harbour porpoise, white-beaked dolphin and common dolphin in Specific areas of the North Sea, the current ferry network does not have as complete coverage of this region as might be possible. Therefore, this project would aim to expand the existing ferry monitoring network to increase its spatial coverage to allow it to provide continuous monitoring of as much of the North Sea as possible. This will involve providing advice and training to research groups and organisations to encourage them to establish new ferry surveys and collect data using a methodology that would allow it to be integrated with data collected by the existing ferry network.</p> <ul style="list-style-type: none"> <li>• Investigate possible mechanisms behind the marked changes in distribution of these three species.</li> </ul>
<b>Relevance to ASCOBANS</b>	<p>As both species harbour porpoise and white beaked dolphin are small cetaceans and both species are apparently undergoing large scale changes of in distribution, it is therefore of high importance to investigate the reasons for this changes in order to understand this and make better protection possible.</p>
<b>Activities</b>	<ul style="list-style-type: none"> <li>• Organising a workshop for establishing more groups and implementing the data analyses work within the whole ARC.</li> <li>• Analysing the gathered data on white beaked dolphin and harbour porpoise to ascertain with more certainty exactly when the changes that are known to have occurred actually occurred. Employee should be hired for a 4 month period.</li> <li>• Investigating possible mechanisms behind these changes based on the improved knowledge of exactly when and how fast they occurred.</li> </ul>
<b>Outputs</b>	<p>Each activities will have its own output:</p> <ul style="list-style-type: none"> <li>• Workshop being attended by all existing ARC partners in the North Sea. And forming new routes.</li> <li>• A report on the analyses of the data. And a presentation at the European Cetacean Society conference (ECS).</li> <li>• An overall report of the combination of analyses and climatic</li> </ul>

**ASCOBANS Project Proposal Format**

	changes. A presentation at the ECS conference.																				
<b>Work Plan and Timetable</b>	<p>Start of project will be two weeks after approval of our proposal. Workshop will be organized for autumn 2012 and data analyses will start in September and be finalized in February 2013. End report will be ready in March 2013.</p> <table border="1"> <thead> <tr> <th><b>Within two after date of official approval</b></th> <th><b>September – October 2012</b></th> <th><b>February 2013</b></th> <th><b>March 2013</b></th> </tr> </thead> <tbody> <tr> <td>Start on organising workshop</td> <td>Workshop taking place in Bristol (UK)</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Start of data analyses after the workshop.</td> <td>Finalizing data analyses into report</td> <td></td> </tr> <tr> <td></td> <td>Start of report of the combination of analyses and climatic changes.</td> <td></td> <td>Finalizing data analyses and climatic changes into report. Presentation at ECS conference.</td> </tr> </tbody> </table>	<b>Within two after date of official approval</b>	<b>September – October 2012</b>	<b>February 2013</b>	<b>March 2013</b>	Start on organising workshop	Workshop taking place in Bristol (UK)				Start of data analyses after the workshop.	Finalizing data analyses into report			Start of report of the combination of analyses and climatic changes.		Finalizing data analyses and climatic changes into report. Presentation at ECS conference.				
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<b>Project Personnel</b>	<p><b>Dr. Colin D. MacLeod</b>, GIS In Ecology. He will provide advice on the processing of data using GIS to investigate changes in occurrence. He will also provide advice on data collection and analysis as part of the trainign workshops to ensure that all data collected are comparable, allowing them to be combined to provide a coherent picture of changes in cetacean occurrence in the North Sea. CM is also involved in the NORCET surveys in the northern North Sea and will provide access to their data for this project</p> <p><b>Ir. Frank Zanderink</b>, coordinator, chairman of Rugvin, seven year research on harbour porpoise in North Sea and Oosterschelde estuary. Frank is an ecologist and a project manager. He will coordinate the work shops and communication activities. And together with other members of Rugvin provide the monitoring data of this organisation.</p> <p><b>Dr. Tom Brereton</b>, is Research Director of the charity Marinelife and co-ordinator of the Atlantic Research Coalition. Tom is a population ecologist and project manager. He will provide advice on analysis of trends in cetacean status and in the development of ferry surveys and partnerships. Tom will also provide data from Marinelife ferry surveys operating through the North Sea.</p>																				
<b>Budget Estimates</b>	<p>Budget needed:</p> <table border="1"> <thead> <tr> <th></th> <th align="right">accommodation</th> <th align="right">travel costs</th> <th align="right">fee</th> <th align="right">subtotal</th> </tr> </thead> <tbody> <tr> <td><b>workshop</b></td> <td align="right">2400</td> <td align="right">2000</td> <td></td> <td align="right">€ 4.400</td> </tr> <tr> <td><b>data monitoring</b></td> <td align="right">4800</td> <td align="right">500</td> <td></td> <td align="right">€ 5.300</td> </tr> <tr> <td><b>data climate</b></td> <td align="right">4800</td> <td align="right">500</td> <td></td> <td align="right">€ 5.300</td> </tr> </tbody> </table>		accommodation	travel costs	fee	subtotal	<b>workshop</b>	2400	2000		€ 4.400	<b>data monitoring</b>	4800	500		€ 5.300	<b>data climate</b>	4800	500		€ 5.300
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## ASCOBANS Project Proposal Format

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	<p><b>overall total</b> € 15.000</p> <p>Next to this there will be voluntary input by Rugvin, Norcet and Marine life.</p> <p>GIS In Ecology is a commercial business that provides GIS training, advice and consultancy. Through the input of Colin D. MacLeod will provide up to 25 days of training and advice during this project free of charge. This amounts to 'in-kind' support of approximately €12,000 given the commercial costs of this time.</p> <p>NORCET will process their data and provide it free of charge to this project. The typical costs of such processing would be €400.</p>
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For more information please contact the ASCOBANS Secretariat at [ascobans@ascobans.org](mailto:ascobans@ascobans.org).

*Curriculum Vitae - Summary*  
**Dr. Colin D. MacLeod**

**ACADEMIC QUALIFICATIONS**

M.Sc. University of Aberdeen, UK, 1998  
Ph.D., University of Aberdeen, UK, 2005

**CURRENT POSITION**

Founder, GIS In Ecology, Glasgow, UK (see [www.GISinEcology.com](http://www.GISinEcology.com) for more information).

**PROFESSIONAL ASSOCIATIONS**

- Society of Marine Mammalogy
- European Cetacean Society

**RESEARCH INTERESTS**

- **Conducting surveys for cetaceans using passenger ferries. Established NORCET surveys in northern North Sea in 2002, and have been involved in processing and analysing the data since this time.**
- Use of geographical information systems (GIS) for investigating ecology and habitat preferences of marine organisms.
- The application of non-linear statistics to ecological research
- Climate change and cetaceans.
- Species Distribution Modelling (SDM) in the marine environment.

**SELECTED PUBLICATIONS IN THE PAST FIVE YEARS (REVERSE CHRONOLOGICAL ORDER)**

1. **MacLeod, C.D.** 2011. *An Introduction To Using GIS In Marine Biology*. Pictish Beast Publications, Glasgow, UK. 466 Pages.
2. Lambert, E., **MacLeod, C.D.**, Hall, K., Brereton, T., Dunn, T.E., Wall, D., Jepson, P.D., Deaville, R. and Pierce, G.J. In Press. Quantifying likely cetacean range shifts in response to global climatic change: Implications for conservation strategies in a changing world. *Endangered Species Research*.
3. **MacLeod, C.D.** 2010. Assessing the shape and topology of allometric relationships with body mass: A case study using testes mass allometry. *Methods in Ecology and Evolution*.
4. Hall, K., **MacLeod, C.D.**, Mandleberg, L., Schweder-Goad, C.M., Bannon, S.M. and Pierce, G.J. 2010. Do abundance-occupancy relationships exist in cetaceans? *Journal of the Marine Biological Association of the United Kingdom*.
5. **MacLeod, C.D.** 2010. Habitat representativeness score (HRS): A novel concept for objectively assessing the suitability of survey coverage for modelling the distribution of marine species. *Journal of the Marine Biological Association of the United Kingdom*.
6. **MacLeod, C.D.** and MacLeod, R.C. 2009. The relationship between body mass and relative investment in testes mass in amniotes and other vertebrates. *Oikos*.
7. **MacLeod, C.D.** 2009. Global climate change, range changes and potential implications for the conservation of marine cetaceans: A review and synthesis. *Endangered Species Research*, 7: 125–136. doi: 10.3354/esr00197.
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9. MacLeod, R.C., **MacLeod, C.D.**, Learmonth, J.A., Jepson, P.D., Reid, R.J., Deaville, R. and Pierce, G.J. 2007. Mass-dependent predation risk and lethal dolphin-porpoise interactions. *Proceedings of the Royal Society of London, Series B*, **274**: 2587-2593.
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# Curriculum Vitae

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## Education (1983 – 1989)

- Agricultural University Wageningen (WUR)
  - Monitoring brown bear and wolf population in Plitvice National Park
  - Wildlife management and forestry

## **Key contributions on conservation**

### **1. Foundation of Stichting Rugvin (2005 – 2012)**

- Setting up monitoring programme for cetaceans in North Sea from Stena Line ferries between Hook of Holland and Harwich (UK).
- First scans ever on harbour porpoises conducted in the Netherlands in the Oosterschelde estuary (2009 – 2011).
- First acoustic monitoring/research on passage of harbour porpoises through the Oosterschelde storm surge barrier.

### **2. ARK Nature (2003 -2012)**

- Reintroduction and monitoring of red deer in Weerterbos in the Netherlands
- Reintroduction and monitoring of wild horses and bovine species in Latvia
- Reintroduction and monitoring of Slavonian grey in Kopacki rit Nature Park, Croatia.
- Reintroduction and monitoring of fallow deer, red deer, European Bison and wild horses in Eastern Rhodopes, Bulgaria.

### **3. WWF/Zambia wetlands project (1994 – 1995)**

- Setting up Admade programme in Chikuni Game Management Area, Zambia as an anti poaching instrument to save black lechwe and sassaby antelopes.

# CURRICULUM VITAE

## Tom Brereton

### PERSONAL DETAILS

**Title** Dr  
**Full name** Thomas Mark Brereton  
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**Date of birth** 08/08/65  
**Nationality** British  
**Current job** Part-time Head of Monitoring, Butterfly Conservation  
Part-time Research Director, Marinelife

### EDUCATION

<b>1987</b> <b>Hatfield Polytechnic</b>	<i>BSc (Hons) Upper Second Class in Environmental Studies</i>
<b>1990</b> <b>University College London</b>	<i>Msc Conservation</i>
<b>1996</b> <b>University East London</b>	<i>“Ecology and conservation of the Grizzled Skipper butterfly in south-east England.” Doctor of Philosophy (PhD)</i>
<b>2000</b> <b>Kingston Maurward College</b>	<i>OCR Stage II MS Access databases</i>

### PREVIOUS EMPLOYMENT

#### 1985-6

**Northumberland Wildlife Trust, Hancock Museum, Newcastle:**

*Assistant conservation officer*

#### 1988 & 1989

**RSPB, Sandy, Bedfordshire:**

*Summer wardening contracts in Kent and Orkney.*

#### 1987-present:

*Occasional self-employed ecological consultancy work and wildlife tour leader (eg birds, cetaceans, plants, for P&O Ferries, Naturetrek, Ultimate Pelagics,*

#### 1991-93

**Reserves Ecology, RSPB, Sandy, Bedfordshire.**

*Research ecologist- 4 fixed term contracts (mammals, birds, insects, butterflies .*

#### 1992-95

**University of East London, Stratford, London.**

*Research Assistant – Butterfly Ecologist*

#### 1995-6

**University of East London, Stratford, London.**

*Part-time lecturer - Ecology*

#### 1997-1998

**Butterfly Conservation, Wareham, Dorset.**

*Threatened Fritillaries Project Officer*

#### 1998-2002

**Butterfly Conservation, Wareham, Dorset.**

*Monitoring & Species Ecologist*

**2002- 2004**

**Butterfly Conservation, Wareham, Dorset.**

*Senior Monitoring & Species Ecologist*

### **ADDITIONAL POSITIONS OF RESPONSIBILITY**

Founding <i>Co-Director</i> of the charity <i>Marinelife</i> , established in 2005 to further the conservation of marine animals through research and education.
<i>Co-ordinator</i> of the <i>Atlantic Research Coalition</i> - a network of ten cetacean research groups from seven European Countries. The partners are Marinelife, Aberdeen University, Irish Whale and Dolphin Group (IWDG), Isles of Scilly Wildlife Trust, Oceanopolis, Organisation Cetacea (Orca), Sociedad Ambar, Plymouth to Santander Marine Survey (PSMS), Rugvin Foundation and the Sea Trust.
<i>Editorial board member</i> of <i>Sea Watch Foundations</i> Soundings Newsletter (1994-90), Conservation Evidence (2006-present) and Seabird magazine (2007-present).
Steering Group member of UK <i>Cereal Field Margin</i> (2005-2007) and <i>Hedgerow</i> Habitat Action Plan Groups (2005-2008) and <i>England Biodiversity Strategy Indicators Group</i> (2005-present).
<i>Chairman</i> of the West Dorset heritage interpretation group <i>Discover West Bay</i> (2007-present)
<i>Refereeing scientific papers</i> – several journals including <i>Biological Conservation</i> , <i>Journal of the Marine Biological Association</i> , <i>Journal of Applied Ecology</i> , <i>Journal of Insect Conservation</i> .

### **PUBLICATIONS:**

Three books and over 100 scientific papers and reports. Selected recent publications include:

#### **Terrestrial**

Van Swaay, C.A.M., Van Strien, A.J., Harpke, A., Fontaine, B., Stefanescu, C., Roy, D., Maes, D., Kühn, E., Öunap, E., Regan, E., Švitra, G., Heliölä, J., Settele, J., Warren, M.S., Plattner, M., Kuussaari, M., Cornish, N., Garcia Pereira, P., Leopold, P., Feldmann, R., Jullard, R., Verovnik, R., Popov, S., Brereton, T., Gmelig Meyling, A., Collins, S. (2010). The European Butterfly Indicator for Grassland species 1990-2009. Report VS2010.010, De Vlinderstichting, Wageningen

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M., Wynhoff, I., Jiguet, F. (in press) Climate change induces desynchronization between European birds and butterflies. *Nature*

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Oliver, T., Hill, J.K., Thomas, C.D., **Brereton, T.** & Roy, D.B. (2009) Changes in habitat specificity of species at their climatic range boundaries. *Ecology Letters*, **12**, 1091-1101.

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**Brereton T.**, Warren M. & Stewart K. (2002) *BD1427: Developing a system for assessing the effect of agri-environment schemes on butterfly populations*. Butterfly Conservation Final Project Report, supplied to DEFRA

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Hobson, R., Bourn, N.A.D., Warren, M.S. & **Brereton, TM** (2001) *The Marsh Fritillary in England: a review of status and habitat condition*. Butterfly Conservation report S01-31, Butterfly Conservation, Wareham.

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**Brereton, TM** & Warren, M.S. (1999) Ecology of the pearl-bordered fritillary butterfly in Scotland and possible threats from bracken eradication measures in woodland grant schemes. *International Bracken Group Special Publication*, **3**, 62-73. April 1999

## Marine

**Brereton, T.M.**, MacLeod, C., Wall, D., Macleod, K., Cermeño, C., Curtis, D., Zanderink, F., Benson C., Bannon S., Osinga N., Martin C. & Pinn E. (2010) *Monitoring cetaceans in UK and adjacent waters: current and potential uses of Atlantic Research Coalition (ARC) data*. JNCC, Aberdeen.

Macleod, C. D., **Brereton, T.** & Martin, C. (2009) Changes in the occurrence of common dolphins, striped dolphins and harbour porpoises in the English Channel and Bay of Biscay. *Journal of the Marine Biological Association of the United Kingdom*, **89**, 1059–1065.

**Brereton T.**, Wynn R., MacLeod C., Bannon S., Scott B., Waram, J., Lewis, K., Phillips, J., Martin, C. & Covey, R. (2009) *Status of Balearic Shearwater, White-beaked Dolphin and other marine animals in Lyme Bay and surrounding waters*. Marinelife Report to Natural England, Verwood, Dorset.

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<b>Title</b>	Cooperative and solitary foraging behaviour in the harbour porpoise ( <i>Phocoena phocoena</i> )	<b>Justification:</b> Conservation and Management Plan Triennium Work Plan	<b>Project ID:</b> 2012/10
<b>Implementing Agency / Applicant</b>	Magnus Wahlberg, Ph. D. and Chief Scientist Fjord&Bælt and University of Southern Denmark Margrethes Plads 1 5300 Kerteminde, Denmark		
<b>Collaborating Agencies / Other Sponsors</b>	John Ratcliffe, Assistant Professor Institute of Biology, University of Southern Denmark Campusvej 55 5230 Odense M		
<b>Background / Problem</b>	The foraging behaviour of harbour porpoises in the field has still not been described in a satisfactory manner. This project will obtain detailed sonar, video and acoustic data on porpoises foraging solitary and in smaller as well as when in larger groups. The project is a new activity and will provide crucial information for harbour porpoise conservation.		
<b>Objectives</b>	<p>The main objective is to describe the foraging behaviour of harbour porpoises in nature, both when feeding solitary and while hunting in groups.</p> <p>A second objective is to determine whether harbour porpoises collaborate when foraging in groups. Many dolphinids are known to coordinate their movements when pushing fish schools towards the water surface. Preliminary surface observations of harbour porpoises sometimes reveal behaviours indicating cooperative foraging, but this needs to be confirmed by underwater observations.</p>		
<b>Relevance to ASCOBANS</b>	<p>There is considerable interest in the protection of harbour porpoises and their habitat in several European countries. The newly designed Danish marine Natura2000 areas are in several cases defined with the harbour porpoise as one of the focal species. Therefore there is an increased interest in understanding the biology of this animal: Which protection in the natural reserves will obtain the most efficient (both in terms of economic and logistic) protection?</p> <p>One of the goals of ASCOBANS' <i>Triennium Work Plan</i> for 2010-2012 is to investigate how vulnerable porpoises are to human-induced sounds. Also the <i>Jastarnia plan</i> and <i>the Conservation plan for harbour porpoises in the North Sea</i>, both launched by ASCOBANS in 2009, addresses the concerns of the effects of anthropogenic noise on porpoises.</p> <p>Porpoises may be especially vulnerable to noise in feeding situations. To assess such effects, we first need more thorough data on how sound is used while hunting for fish in this species, especially in situations where the animals may coordinate their movements during cooperative foraging. Currently the available data is very limited and unacceptable for designing adequate mitigation measures.</p>		

**Activities**

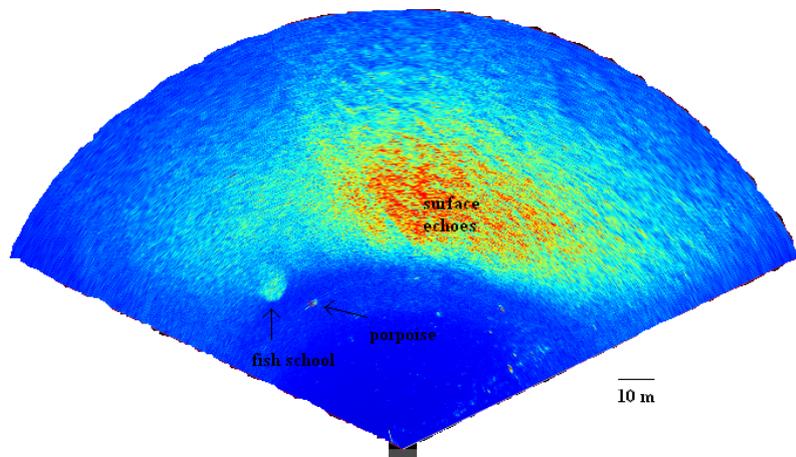
The foraging behaviour of harbour porpoises will be observed during feeding frenzy events and singular foraging using a great variety of techniques.

Field-work will be undertaken in inner Danish waters, mainly in Little Belt where animals are observed to forage solitarily and in small groups. Also, in this area so-called 'feeding frenzies' occur regularly from August through to September. Observing harbour porpoises demands calm waters, and Little Belt has ideal sea conditions almost independent of wind direction. Observations will be made from a 28-foot sailing ship owned by one of the applicants (MW), as well as from a larger tour boat (*Aventura*, Middelfart).

Some of the techniques proposed below are well known, others have been tried out a few times, others are completely novel.

*Hydrophone array recordings* are used to monitor the acoustic activity of the animals during foraging. Data on the directionality and intensity of the animals' signals as well as the rate of vocalizations enables us to understand how animals handle their biosonar when there are many porpoises vocalizing simultaneously. Preliminary recordings on captive animals have shown us that porpoises may adjust their vocalizations depending on the number of animals present.

*Multi-beam sonar* is a modern hydroacoustic technique that can help us to obtain detailed 2-D visualizations of the behaviour of porpoises in relation to the fish school. It has been used in studies of many different toothed whales but never on porpoises. We have made some preliminary feasibility studies using different types of sonar. Especially a multibeam sonar from the Danish company Reson has given useful images of both porpoises and fish schools.



Recording of a harbour porpoise and fish school with a Reson 7128 sonar in Little Belt in September, 2011.

*Underwater video* recordings are made to further visualize details in the behaviour of the porpoises and the fish. Such techniques have been developed for studies in captivity but yet need to be refined for field studies.

*In-air video recordings* are made from a remote-controlled helicopter that can hover above the fish school. Porpoises often turn and spin in the water and when doing so the white belly can be seen clearly even several meters below the water surface using this technique. The same holds true for any fish visible in the water.

*The porpoises are approached with a kajak* to obtain detailed behavioural observations using video and acoustics close or in the centre of the feeding frenzies.

**Wahlberg and Ratcliffe: ASCOBANS Project Proposal**

<b>Outputs</b>	<p>This project uses novel and state-of-the-art technologies to address an important question in harbour porpoise biology. This will open up for better comparisons across species of toothed whales and also be of great value to simply better understand the behavioural ecology of Denmark's only inner-water whale species. The results are to be published in high-ranked journals and presented at international scientific conferences. The results will be of great value for addressing conservation issues, such as the mitigation measures decided for in the newly established Natura2000 areas. For example, if animals are known to collaborate during foraging, it is realistic to assume they use acoustic signals for coordinating their movements, and therefore they may be more prone to noise disturbances that what would otherwise be the case.</p> <p>Fjord&amp;Bælt will produce educational material from the project, both for the exhibits of the centre and for internet-based outreach material targeting Denmark and Northern European countries.</p>
<b>Work Plan and Timetable</b>	<p>One of the applicants (Magnus Wahlberg) is responsible for all activities in the project:</p> <p>Project starts on 1<sup>st</sup> of May, 2012.  May-June, 2012. Preparation of field gear.  August-September, 2012. Field work, Little Balt.  October, 2012, - March, 2013. Analysis of data and completion of scientific papers and reports.  Project ends by 31<sup>st</sup> of March, 2013.</p>
<b>Project Personnel</b>	<p>Dr. Magnus Wahlberg is chief scientist at Fjord&amp;Bælt, a research and outreach center focusing on whales and biosonar as well as the local marine environment. The center houses four harbour porpoise for animal training and husbandry. Magnus has 15 years of experiences studying whales in the lab and in the field and is also an associate professor at the Institute of Biology in the University of Southern Denmark.</p> <p>Dr. John Ratcliffe has made many ground-breaking studies in the foraging behaviour of bats, both in Denmark, in the US and Canada, as well as in Central America and has lately been working on the influence of toothed whales on each others echolocation behaviour. John is a currently an assistant professor at the University of Southern Denmark.</p>

## Wahlberg and Ratcliffe: ASCOBANS Project Proposal

<b>Budget Estimates</b>	One of the applicants (Magnus Wahlberg) is responsible for all activities. Items indicated with an asterix (*) are applied for from ASCOBANS. Other financial sources are applied for from Oticon Foundation in Denmark.		
	<b>Item</b>	<b>Specifics</b>	<b>Amount (€)</b>
	Ship rental*	7 days ( €1,000 pr. day)	7,000
	Sonar rental*	7 days ( €1,500 pr. day)	10,500
	Field expenses*	5 people, 20 days (€30 pr. day)	3,000
	Sea kajak installations	Hydroacoustic and video equipm	1,500
	Mini helicopter rental	5 days at €300 pr. day	1,500
	Underwater equipment	Underwater camera	3,000
	<b>TOTAL</b>		<b>26,500</b>
	Co financing	Fjord&Bælt and other funds	<b>13,500</b>
<b>Applied from ASCOBANS</b>		<b>13,000</b>	

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# Curriculum Vitae, Magnus Wahlberg

43 years old, married, 1 child, Swedish citizen

## Education

M. Sc. in Physics & Biology, Göteborg University, Sweden (1999)

Ph. D. in Biology, University of Southern Denmark (2002)

## Academic positions

- Chief scientist, Fjord&Bælt (2006-).
- Adjunct Professor (University of Southern Denmark, 2006-12)
- External Associate Professor (Murdoch University, Australia, 2007-2013)
- Visiting scientist (Woods Hole Oceanographic Institution, USA, January, 2005)
- Assistant Professor (Aarhus University, Denmark, 2003-06)
- Post Doc (Tjärnö Marine Biological Laboratory, Sweden 2003-04)
- Post Doc (University of Southern Denmark 2002-03)
- Visiting Scholar (Hawaiian Institute of Marine Biology February, 2001)
- Visiting Scholar (University of Pennsylvania, USA, 2000-01);

## Professional service

- *Chairman*, session at the 1<sup>st</sup> Conference on Acoustic Communication by Animals, Maryland, July 27-30, 2003
- *Scientific Board*, 2<sup>nd</sup> Conference on Acoustic Localization, Monaco, Nov. 16-18, 2005
- *Chairman*, ICES study group on marine animals and human-induced noise, 2006-09
- *Co-organizer*, International conference on the effects of noise on aquatic life, Nyborg 2007
- *Invited expert*, Workshop on the effects of naval sonar on fish, Duke University, April 2007, and Workshop on the effects of noise on fish and turtles, Mote Marine Lab, January 2008
- *Referee*: ACTA-Acustica, Aquatic Mammals, Bioacoustics, Fish biology, ICES Journal of Marine Science, IEEE Transactions of Signal Processing, the Journal of the Acoustical Society of America, Marine Mammal Science, Nature London, NERC and NSF proposals

## Teaching and Student supervision:

- *Teaching biology and bioacoustics* at undergraduate and graduate level (University of Southern Denmark and Aarhus University, Denmark, and Göteborg University, Sweden, 1999-2006)
- *Main and co-organizer* of 6 International Ph. D. class in Marine Bioacoustics, Research Training of Aquatic Animals and Acoustic Communication (University of Southern Denmark, Göteborg Universitet and University of Azores)
- Supervised five completed B. Sc. students, and five completed M. Sc. Students; currently supervisor one M.Sc. Students, main supervisor of one Ph. D. student and co supervisor of three Ph.D. students.

## Invited lectures (selection)

- Institute of Freshwater Research, Sweden (1999)
- Danish International Study Program, Denmark (1999-2003)
- Cornell University, USA (2001)
- University of Maryland, USA (2001)
- Danish Institute for Fisheries Research, Denmark (2003)
- University of Copenhagen, Denmark (2003)
- Alfred Wegener Institut, Germany (2005)
- Woods Hole Oceanographic Institution, USA (2005)
- Universität Tübingen, Germany (2007)
- Hel Marine Station, Gdansk University (2010)
- Cornell University (2011)

## Field expeditions (selection)

- Andenes, Norway (sperm whales, 1997-2005, 6 expeditions)
- Maui, Hawaii (humpback whales, 2001)
- Kelfavik, Iceland (whitebeaked dolphins, 2001)
- North Atlantic (bottlenose whales, 2006)
- Azores, Portugal (common dolphin and bottlenose dolphins, 2006)
- Tenerife, Spain (bottlenose dolphins and pilot whales, 2006)
- Bunbury Bay, Australia (bottlenose dolphins, 2007)
- Brittany, France (play back, Allis shad, 2006, 2007 and 2008)
- Fuerteventura, Spain (sperm whales, 2007)
- Azores (sperm whales, 2010)

# Curriculum Vitae, John Ratcliffe

37 years old, Canadian citizen

## Education

B. Sc. In Biology, McMaster University, Canada (1998)

M. Sc. in Biology, York University, Canada (2001)

Ph. D. in Zoology, University of Toronto, Canada (2005)

## Academic positions

- Research Associate, Fjord & Bælt (2009-).
- Assistant Professor (University of Southern Denmark, 2009-)
- FNU Postdoctoral Associate (University of Southern Denmark, 2007-2009)
- NSERC Postdoctoral Associate (Cornell University, USA, 2005-2007)
- Research Associate (McMaster University, 2004-2005)
- Research Associate, Montreal BioDome (2000-)

## Professional service

- *Consultant*, National Geographic Society, Discovery Channel, British Broadcasting Corporation (2000-2006)
- *Co-organizer*, "Cognitive Ecology: the Evolutionary Ecology of Learning, Memory and Information Use", a symposium for the Animal Behaviour Society meeting (2007)
- *Co-organizer*, "Adaptation and Evolutionary Ecology", a symposium for the 2010 International Bat Research Conference (2010)
- *Co-organizer*, "Special Session: James Fullard and Don Thomas", a symposium for the North American Bat Research Meeting (2011)
- *Member*, Animal Behaviour Society Animal Care Committee (2010-)
- *Referee*: Agricultural and Forest Entomology; Animal Behaviour; Animal Biology; Behavioral Ecology; Behavioral Ecology and Sociobiology; Behavioral Processes; Biological Reviews; Biology Letters; Brain, Behavior and Evolution; Canadian Journal of Zoology; Current Biology; Entomologia Experimentalis et Applicata; Ethology; Journal of Comparative Physiology A; Journal of Experimental Biology; Journal of Insect Science; Journal of Mammalogy; Journal of Zoology; Proceedings B; Public Library of Science One; National Geographic Society and European Research Council proposals

## Teaching and Student supervision:

- *Teaching biology and bioacoustics* at undergraduate and graduate level (University of Southern Denmark, 2008-)
- *Instructor* of 2 International Ph. D. class in Acoustic Communication (University of Southern Denmark)
- Supervised four completed B. Sc. students, and two completed M. Sc. Students; currently supervisor of two B. Sc. students, one Ph. D. student, and co-supervisor of one postdoc.

## Invited lectures (selection)

- Madurai Kamaraj University, India (2003)
- University of Tübingen, Germany (2005)
- University of Zurich, Switzerland (2005)
- Harvard University, United States of America (2006)
- University of Cape Town, South Africa (2006)
- Brown University, United States of America (2007)
- University of Maryland, United States of America (2007)
- Max Planck Institute of Ornithology, Germany (2008)
- University of Copenhagen, Denmark (2009)
- University College London, United Kingdom (2011)

## Fieldwork (selection)

- Near Chaffey's Locks, Canada (bats and insects, 1997-2011, 10+ summers)
- Near Palmira, Colombia (common vampire bats, 2000)
- Montserrat, eastern Caribbean (bats, 2000)
- Near Orange Walk, Belize (bats, 2000)
- Throughout South Africa (bats and insects, 2001, 2006, 2011)
- Mo'orea and Tahiti, French Polynesia (insects, 2002, 2005)
- Tamil Nadu, India (bats, 2003)
- Barro Colorado Island, Panama (bats, 2008)

## Publication List, Magnus Wahlberg

### Peer-reviewed publications (out of 50 published and 2 submitted)

20. Linnenschmidt, M., Linnenschmidt, M., K. Beedholm, **M. Wahlberg**, J. H. Kristensen, P. E. Nachtigall (2012). *Keeping returns optimal: gain control elicited by dynamic hearing thresholds in a harbour porpoise*. Proceedings of the Royal Society B, doi 10.1098/rspb.2011.2465.
19. Nielsen, T. P., **M. Wahlberg**, S. Heikillä, M. Jensen, P. Sabinsky, T. Dabelsteen (in press). *Swimming patterns of wild harbour porpoises (Phocoena phocoena) show detection and avoidance of gill nets at very long ranges*. Marine Ecology Progress Series.
18. **Wahlberg, M.**, K. Beedholm, A. Heerfordt, B. Møhl (2011). *Characteristics of biosonar signals from the Northern bottlenose whale, Hyperoodon ampullatus*. Journal of the Acoustical Society of America, in press.
17. **Wahlberg, M.**, F. H. Jensen, N. A. Soto, K. Beedholm, L. Bejder, C. Oliveira, M. Rasmussen M. Simon, A. Villadsgaard, P. T. Madsen (2011). *Source parameters of echolocation clicks from wild bottlenose dolphins (Tursiops truncatus and T. aduncus)*. Journal of the Acoustical Society of America, in press.
16. Clausen, K. T., **M. Wahlberg**, K. Beedholm, S. DeRuiter, P. T. Madsen (2010). *Click communication in harbour porpoises (Phocoena phocoena)*. Bioacoustics vol 20: 1-28.
15. Blanchet, M.-A., T. Ishigami, **M. Wahlberg** (2009). *First observations of the parturition and peripartum events in a harbor porpoise (Phocoena phocoena)*. Aquatic Mammals 35(4): 473-480.
14. Atem, A. C., M. H. Rasmussen, **M. Wahlberg**, H. C. Petersen, L. A. Miller (2009). *Changes in click source levels with distance to targets: studies of free-ranging white-beaked dolphins (Lagenorhynchus albirostris) and captive harbor porpoises (Phocoena phocoena)*. Bioacoustics, 19.1.: 49-65.
13. DeRuiter, S., A. Bahr, M.-A. Blanchet, S. F. Hansen, J. H. Kristensen, P. T. Madsen, P. L. Tyack, **M. Wahlberg** (2009). *Acoustic behaviour of echolocating porpoises during prey capture*. Journal of Experimental Biology 212: 3100-3107.
12. Kyhn, L. A., J. Tougaard, F. Jensen, **M. Wahlberg**, G. Stone, A. Yoshinaga, K. Beedholm, P. Madsen (2009). *Feeding at a high pitch: Source parameters of narrow band, high-frequency clicks from echolocating off-shore hourglass dolphins and coastal Hector's dolphins*. Journal of the Acoustical Society of America 125(3): 1783-1791.
11. Kyhn, L. A., J. Tougaard, J. Teilmann, **M. Wahlberg**, P. B. Jørgensen, N. I. Bech (2008). *Harbour porpoise (Phocoena phocoena) static monitoring: laboratory detection thresholds of T-PODs are reflected in field sensitivity*. J. Mar Biol. Ass. U. K. 88(6): 1085-1091.
10. Hansen, M., **M. Wahlberg**, P. T. Madsen (2008). *Low-frequency components in harbor porpoise (Phocoena phocoena) clicks for echolocation and communication - facts or artefacts?* Journal of the Acoustical Society of America 124(6): 4059-4068.
9. Blanchet, M., T. Nance, C. Ast, **M. Wahlberg**, M. Acquarone (2008). *First case of a monitored pregnancy of a harbour porpoise (Phocoena phocoena) under human care*. Aquatic Mammals 34.1:9-20.
8. Madsen, P. T. M., **M. Wahlberg** (2007). *Recording and quantification of ultrasonic echolocation clicks from free-ranging toothed whales*. Deep-Sea Research 54(8): 1421-1444.
7. Heerfordt, A., B. Møhl, **M. Wahlberg** (2007). *A wideband link to sperm whales: a fiber-optically linked deep-sea linear hydrophone array*. Deep-Sea Research 54: 428-436.
6. Villadsgaard, A., **M. Wahlberg**, J. Tougaard (2007). *Echolocation clicks of wild harbour porpoises, Phocoena phocoena*. Journal of Experimental Biology 210: 56-64.
5. Møhl, B., **M. Wahlberg**, P. T. Madsen, A. Heerfordt, A. Lund (2003). *The monopulsed nature of sperm whale clicks*. Journal of the Acoustical Society of America, 114(2): 1143-1154.
4. Madsen, P. T., **M. Wahlberg**, B. Møhl (2002). *Male sperm whale (Physeter catodon) acoustics in polar waters: implications for echolocation and communication*. Behavioural Ecology and Sociobiology 53: 31-41.
3. **Wahlberg, M.** (2002). *The acoustic behaviour of diving sperm whales observed with a hydrophone array*. The Journal of Experimental Marine Biology and Ecology 281: 53-62.
2. Møhl, B., **M. Wahlberg**, A. Heerfordt (2001). *A large-aperture array of non-linked receivers for acoustic positioning of biological sound sources*. Journal of the Acoustical Society of America 109 (1): 434 - 437.
1. **Wahlberg, M.**, B. Møhl, P. T. Madsen (2001). *Estimating source position accuracy of a large aperture hydrophone array for bioacoustics*. Journal of the Acoustical Society of America 109 (1): 397 - 406.

## Publication List, John Ratcliffe

### Peer-reviewed publications (out of 34 published and 1 submitted)

20. ELEMANS, C. P. H., MEAD, A. F., JAKOBSEN, L. & **RATCLIFFE, J. M.** (2011). Superfast muscles set maximum call rate in echolocating bats. *SCIENCE* 333, 1885-1888.
19. **RATCLIFFE, J. M.**, JAKOBSEN, L., KALKO, E. K. V. & SURLYKKE, A. (2011). Frequency alternation and an offbeat rhythm indicate foraging behavior in the echolocating bat, *Saccopteryx bilineata*. *J. COMP. PHYSIOL. A* 197, 413-423.
18. MCGUIRE, L. P. & **RATCLIFFE, J. M.** (2011). Light enough to travel: migrating bats have smaller brains, but not larger hippocampi, than sedentary species. *BIOL. LETT.* 7, 233-236.
17. BRINKLØV, S., JAKOBSEN, L., **RATCLIFFE, J. M.**, KALKO, E. K. V. & SURLYKKE, A. (2011). Echolocation call intensity and directionality in flying short-tailed fruit bats, *Carollia perspicillata* (Phyllostomidae). *J. ACOUST. SOC. AM.* 129, 427-435.
16. **RATCLIFFE, J. M.**, FULLARD, J. H., ARTHUR, B. J. & HOY, R. R. (2011). Adaptive auditory risk assessment in the dogbane tiger moth when pursued by bats. *PROC. R SOC. B* 278, 364-370.
15. CARTER, G. G., **RATCLIFFE, J. M.** & GALEF, B. G. (2010). Flower bats (*Glossophaga soricina*) and fruit bats (*Carollia perspicillata*) rely on spatial cues over shapes and scents when relocating food. *PLOS ONE* 5, e10808.
14. DUKAS, R. & **RATCLIFFE, J. M.**, EDITORS. (2009). *COGNITIVE ECOLOGY II*. Chicago: University of Chicago Press. 400 pp.
13. **RATCLIFFE, J. M.**, FULLARD, J. H., ARTHUR, B. J. & HOY, R. R. (2009). Tiger moths and the threat of bats: decision-making based on the activity of a single sensory neuron. *BIOL. LETT.* 5, 368-371.
12. **RATCLIFFE, J. M.** (2009). Neuroecology and diet selection in phyllostomid bats. *BEHAV. PROC.* 80, 247-251.
11. **RATCLIFFE, J. M.** & NYDAM, M. L. (2008). Multimodal warning signals for a multiple predator world. *NATURE* 455, 96-99.
10. JACOBS, D. S., **RATCLIFFE, J. M.** & FULLARD, J. H. (2008). Beware of bats, beware of birds: the auditory responses of eared moths to bat and bird predation. *BEHAV. ECOL.* 19, 1333-1342.
9. MANDEL, J. T., **RATCLIFFE, J. M.**, CERASALE, D. & WINKLER, D. W. (2008). Laterality and flight: concurrent tests of side-bias and optimality in flying tree swallows. *PLOS ONE* 3, e1748.
8. TER HOFSTEDÉ, H. M., **RATCLIFFE, J. M.** & FULLARD, J. H. (2008). Nocturnal activity positively correlated with auditory sensitivity in eared moths. *BIOL. LETT.* 4, 262-265.
7. FULLARD, J. H., **RATCLIFFE, J. M.** & TER HOFSTEDÉ, H. M. (2007). Neural evolution in the bat-free habitat of Tahiti: partial regression in an anti-predator auditory system. *BIOL. LETT.* 3, 26-28.
6. **RATCLIFFE, J. M.**, FENTON, M. B. & SHETTLEWORTH, S. J. (2006). Behavioral flexibility positively correlated with relative brain volume in predatory bats. *BRAIN BEHAV. EVOL.* 67, 165-176.
5. **RATCLIFFE, J. M.** & FULLARD, J. H. (2005). The adaptive function of tiger moth clicks against echolocating bats: an experimental and synthetic approach. *J. EXP. BIOL.* 208, 4689-4698.
4. **RATCLIFFE, J. M.**, RAGHURAM, H., MARIMUTHU, G., FULLARD, J. H. & FENTON, M. B. (2005). Hunting in unfamiliar space: echolocation in the Indian false vampire bat, *Megaderma lyra*, when gleaning prey. *BEHAV. ECOL. SOCIOBIOL.* 58, 157-164
3. **RATCLIFFE, J. M.** & TER HOFSTEDÉ, H. M. (2005). Roosts as information centres: social learning of food preferences in bats. *BIOL. LETT.* 1, 72-74.
2. **RATCLIFFE, J. M.** & DAWSON, J. W. (2003). Behavioural flexibility: the little brown bat, *Myotis lucifugus*, and the northern long-eared bat, *M. septentrionalis*, both glean and hawk prey. *ANIM. BEHAV.* 66, 847-856.
1. **RATCLIFFE, J. M.**, FENTON, M. B. & GALEF, B. G. (2003). An exception to the rule: common vampire bats do not learn taste aversions. *ANIM. BEHAV.* 65, 385-389.

**FORMAT FOR PROJECT PROPOSALS  
FOR THE CONSIDERATION OF THE ASCOBANS ADVISORY COMMITTEE**

<b>Title</b> SAMBAH – supplementing CPOD anchoring	<b>Justification:</b> Conservation and Management Plan Jastarnia Plan	<b>Project ID:</b> 2012/11
<b>Implementing Agency / Applicant</b>	Mats Amundin, coordinator for SAMBAH Kolmardens Djurpark, SE61892 Kolmarden	
<b>Collaborating Agencies / Other Sponsors</b>	Please refer to <a href="http://www.sambah.org">www.sambah.org</a> . However, the applied funding will be used entirely for gear in the Swedish sector of the SAMBAH study area.	
<b>Background / Problem</b>	SAMBAH aims at producing better population density and abundance estimates, distribution maps and indentifying areas of increase conflicts with anthropomorphic activities	
<b>Objectives</b>	SAMBAH has soon completed its first year of data collection, which is based on a total of 300 CPODs. In the Swedish sector, comprising 99 CPODs, the winter period with two months of severe storms resulted in big losses (ca 30%) of equipment. A large part was due to ship collisions, others was caused by batteries that went flat due to the delayed servicing. Besides the loss of expensive equipment, more importantly, vital data was lost. Some may be retrieved by extraordinary actions, such as diving and towed wires with grapples. In order to eliminate or at least considerably reduce future such losses, we want to replace some exposed buoy positions with acoustic releases, and also to supplement the majority of the anchoring with a system where the units can be retrieved using a grapple, should the buoy anchor rope have been cut by a ship propeller or the acoustic release unit fail to respond.	
<b>Relevance to ASCOBANS</b>	The Jastarnia plan stresses the need for better abundance estimates, and SAMBAH will be able to provide just that. The results will be of great importance for the designation of protected areas with the Natura 2000 framework.	
<b>Activities</b>	The buoy configuration consists of two anchors connected with a 5m long steel wire. The buoy anchor rope is connected to one of the anchors and the CPOD is attached to the other. The supplement includes a third anchor, placed 100-200m away from the CPOD, and connected to the CPOD anchor with a float rope. The exact GPS positions of both anchor positions are recorded. Should the buoy be lost, the ship can be steered between the anchor positions, and the float rope can be hooked using a grapple towed several hundred meters behind the ship. In the acoustic release configuration, the CPOD anchor is supplemented like described above with a second anchor,	

**ASCOBANS Project Proposal Format**

	connected with the float rope. The retrieval is done in the same way as with the buoy setup.
<b>Outputs</b>	The actions will ensure that complete data can be collected. These data is essential for the density and abundance calculations, and in turn vital for the habitat modelling also included in the analysis.
<b>Work Plan and Timetable</b>	This supplement will be deployed in late March-April, when the next CPOD servicing is planned. The data collection will continue until May-June 2013, with servicing every 4 months. The remaining project period, completed in December 2014, will be used for data analysis, report writing, and production of scientific papers. The main project results will be presented at an international end-of-project conference.
<b>Project Personnel</b>	Mats Amundin, PhD, adj prof Linköping University, research director Kolmardens djurpark. Main SAMBAH project coordinator. Daniel Wennerberg, MSc, PhD student, Linkoping University, research assistant, Kolmardens Djurpark Cinthia Ljungqvist, MSc, research assistant, Kolmardens Djurpark.
<b>Budget Estimates</b>	<p>10 Desert Star ARC-1 acoustic release units á 1260 USD = 9560€</p> <p>100 extra concrete anchors á 150SEK/piece = 1700€</p> <p>100 shackles á 15SEK/piece = 170€</p> <p>15000m 12mm float line á 3SEK/m = 5130€</p> <p>Total applied funds: 16560€</p> <p>The ordinary SAMBAH budget will cover the ship and personnel costs for visiting the CPOD positions to deploy the extra gear and subsequently to carry out further servicing. Other additional funds from the Swedish Agency for Marine and Water Management will cover costs for replacing those of the lost CPODs and ARC-1 units that cannot be retrieved by extraordinary actions, such as diving and towed wires and grapples.</p>

For more information please contact the ASCOBANS Secretariat at [ascobans@ascobans.org](mailto:ascobans@ascobans.org).

**FORMAT FOR PROJECT PROPOSALS  
FOR THE CONSIDERATION OF THE ASCOBANS ADVISORY COMMITTEE**

<p><b>Title</b> Contaminant profiles in harbour porpoise foetuses</p>	<p><b>Justification:</b> Conservation and Management Plan North Sea Plan</p>	<p><b>Project ID:</b> 2012/12</p>
<p><b>Implementing Agency / Applicant</b></p>	<p>Martine van den Heuvel-Greve IMARES Wageningen UR Postal address: P.O Box 77, 4400 AB Yerseke, the Netherlands Telephone: +31 317 483823 Email: martine.vandenheuvel-greve@wur.nl Internet: www.imares.nl</p>	
<p><b>Collaborating Agencies / Other Sponsors</b></p>	<p>Not yet identified. Cooperation with institutes bordering the North Sea is highly welcomed to be able to obtain samples of harbour porpoises foetuses stranded around the southern North Sea. Co-authoring on reports and possible future manuscripts is welcomed.</p>	
<p><b>Background / Problem</b></p>	<p>Harbour porpoises are one of the most dominant marine mammals in the southern North Sea. They possess a place at the top of the North Sea food web making them vulnerable to contaminants that are transferred and biomagnified in their food web via their diet. Lipophilic contaminants can also be transferred from females to their foetus via the placenta and, even more important, lactation. Contaminants may cause effects by e.g. influence their immune and reproductive system. Especially the early life stages of organisms are sensitive to contaminant effects.</p> <p>In the past decade increasing numbers of harbour porpoises are beaching along the Dutch coast, consisting of foetuses, juveniles and adults.</p> <p>This proposal is a new activity. The purpose is to achieve an initial assessment of contaminant profiles in harbour porpoise foetuses. This provides information on the baseline contamination in harbour porpoises, assess whether concentrations (esp. PCBs) may have had the potential to cause adverse effects and can be used as parameter for modelling contaminant uptake and exposure in harbour porpoises.</p>	
<p><b>Objectives</b></p>	<p>The objective is to determine contaminant profiles in samples of harbour porpoises foetuses beached along the Dutch coast, and, if available, in samples of foetuses stranded on other beaches surrounding the southern North Sea.</p>	
<p><b>Relevance to ASCOBANS</b></p>	<p>The results will be directly relevant for the Conservation plan for harbour porpoises in the North Sea. As it determines the initial contaminant burden and extrapolates to effect levels (e.g. PCBs) in</p>	

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	<p>harbour porpoises, it provides valuable information for the ASCOBANS long-term goal of restoring and/or maintaining populations at 80% or more of the carrying capacity (ASCOBANS, 1997).</p>																																								
<p><b>Activities</b></p>	<p>The activities include:</p> <ol style="list-style-type: none"> <li>1. Selection of relevant samples (liver and/or blubber) of beached harbour porpoises fetuses and collection of samples in case they need to be transported from other institutes. Focus on liver and/or blubber will be determined based on available samples;</li> <li>2. Quantification of PCBs and PBDEs in blubber and/or of PFCs in liver using standard GC-MS techniques, and fingerprint analysis in blubber (for more lipophilic compounds like PCBs and PBDEs) and/or liver samples (lipophilic and somewhat polar compounds) on GC-GC-MS;</li> <li>3. Development of a report describing the obtained results.</li> </ol>																																								
<p><b>Outputs</b></p>	<p>A report in the form of a manuscript focusing on 1) contaminant profiles in harbour porpoises fetuses, and 2) a comparison between contaminant profiles between locations if samples from beaches surrounding the Dutch North Sea can be obtained.</p> <p>The obtained results will provide a first assessment of the contaminant burden in harbour porpoise fetuses.</p>																																								
<p><b>Work Plan and Timetable</b></p>	<p>The activities are planned as following (number indicating the number of months needed):</p> <table border="1"> <thead> <tr> <th>Activity</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> </tr> </thead> <tbody> <tr> <td>Selection and collection</td> <td>X</td> <td>X</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Analyses</td> <td></td> <td></td> <td></td> <td>X</td> <td>X</td> <td>X</td> <td>X</td> <td></td> <td></td> </tr> <tr> <td>Manuscript</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> <td>X</td> </tr> </tbody> </table> <p>If the project starts in May 2012, the report can be delivered in January 2013.</p>	Activity	1	2	3	4	5	6	7	8	9	Selection and collection	X	X	X							Analyses				X	X	X	X			Manuscript								X	X
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Manuscript								X	X																																
<p><b>Project Personnel</b></p>	<p>Mrs. Martine van den Heuvel-Greve (MSc), scientist and project manager, IMARES Wageningen UR, P.O Box 77, 4400 AB Yerseke, the Netherlands. Mrs van den Heuvel-Greve has more than 14 years of experience in the topics of bioavailability, food web transfer and effects of contaminants to marine species (amongst others harbour seals and harbour porpoises). She has ample experience in project management as well as development and conduction of lab and field experiments in temperate and polar areas.</p> <p>Role: project leader and responsible for the report.</p> <p>Mr. Michiel Kotterman (PhD), scientist and project manager,</p>																																								

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	<p>IMARES Wageningen UR, P.O Box 68, 1970 AB IJmuiden, the Netherlands. Mr Kotterman has a PhD on 'PAH degradation by white-rot fungi' (1998) and consequently over 12 years of experience as project leader involved in aquatic monitoring programmes, analysing contaminants in biota (fish, mussels, mammals), suspended particulate matter and sediments. Role: responsible for coordination of chemical analysis and co-author of the report.</p> <p>Mr. Christiaan Kwadijk (MSc), lab technician, . IMARES Wageningen UR, P.O Box 68, 1970 AB IJmuiden, the Netherlands. Role: responsible for chemical analysis and co-author of the report.</p>																									
<b>Budget Estimates</b>	<p>Budget estimate is a total of 15 k€. This consists of:</p> <table border="1"> <thead> <tr> <th>Activity</th> <th>Unit</th> <th>Cost per unit (€)</th> <th>Number of units</th> <th>Total (€)</th> </tr> </thead> <tbody> <tr> <td>Selection and collection</td> <td>Hour</td> <td>100</td> <td>16</td> <td>1600</td> </tr> <tr> <td>Chemical analysis</td> <td>Sample</td> <td>470</td> <td>20</td> <td>9600</td> </tr> <tr> <td>Report</td> <td>Hour</td> <td>100</td> <td>40</td> <td>4000</td> </tr> <tr> <td><b>TOTAL</b></td> <td></td> <td></td> <td></td> <td><b>15000</b></td> </tr> </tbody> </table>	Activity	Unit	Cost per unit (€)	Number of units	Total (€)	Selection and collection	Hour	100	16	1600	Chemical analysis	Sample	470	20	9600	Report	Hour	100	40	4000	<b>TOTAL</b>				<b>15000</b>
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<b>TOTAL</b>				<b>15000</b>																						

For more information please contact the ASCOBANS Secretariat at [ascobans@ascobans.org](mailto:ascobans@ascobans.org).

**FOR THE CONSIDERATION OF THE ASCOBANS ADVISORY COMMITTEE**

<p><b>Title</b> Effects of stress in common dolphins – monitoring stress and reproductive hormone levels in blubber tissue</p>	<p><b>Justification:</b> Conservation and Management Plan Triennium Work Plan</p>	<p><b>Project ID:</b> 2012/13</p>
<p><b>Implementing Agency / Applicant</b></p>	<p><b>Dr Sinéad Murphy,</b> Marie Curie International Outgoing Fellow Institute of Zoology Zoological Society of London Regent's Park London NW1 4RY UK</p> <p>&amp;</p> <p>Coastal-Marine Research Group Institute of Natural Sciences Massey University Private Bag 102 904 Auckland 0745 New Zealand Phone: + 64 (0) 9 414 0800 ext. 41524 Fax: +64 (0) 9 443 9790 Email: <a href="mailto:s.n.murphy@massey.ac.nz">s.n.murphy@massey.ac.nz</a></p> <p><b>Dr Paul Jepson and Rob Deaville,</b> UK Cetacean Strandings Investigation Programme Institute of Zoology Zoological Society of London Regent's Park London NW1 4RY UK Email: <a href="mailto:paul.jepson@ioz.ac.uk">paul.jepson@ioz.ac.uk</a> Email: <a href="mailto:rob.deaville@ioz.ac.uk">rob.deaville@ioz.ac.uk</a> <a href="http://www.ukstrandings.org">www.ukstrandings.org</a></p>	
<p><b>Collaborating Agencies / Other Sponsors</b></p>	<p><b>Associate Professor John Cockrem,</b> Conservation Endocrinology Research Group, Institute of Veterinary, Animal and Biomedical Sciences, Massey University, Private Bag 11 222 Palmerston North 4442 New Zealand Email: <a href="mailto:J.F.Cockrem@massey.ac.nz">J.F.Cockrem@massey.ac.nz</a></p>	

<p><b>Background / Problem</b></p>	<p>Within the ASCOBANS area, the degree of human disturbance to marine mammals (offshore construction activities, boat traffic) including the level of underwater noise (e.g. seismic surveys, active sonar, piling) has been increasing in recent years. Not only can noise cause injury or death to marine organisms though short but intense noise sources, the long-term exposure to less intense sound sources can have sub-lethal effects, including effects related to stress (Tasker et al. 2010). The long-term cumulative effects of increased disturbance on individual cetaceans, and population level effects, are currently unknown.</p> <p>The stress response, i.e. endocrine and physiological responses, can suppress reproductive function, inhibit growth, modulate the immune system and alter behaviour in mammals (Romero and Butler 2007). This suite of effects is believed to be an adaptive response for the conservation of energy during times of hardship, i.e. shutting down those systems that can be offset until the risk has passed, which may be caused by disease states or environmental influences (Curry 1999, Romero and Butler 2007). If the stress effect is ongoing, i.e. chronic stress, this may affect (via the adrenal stress response and production of glucocorticoids) reproductive success and potential of wild populations, in some cases through development of various pathologies (Moberg 1991, Curry 1999). The effect of any given stressor will be conditional on multiple factors, including sex, age and reproductive condition, as well as other stressors currently affecting the individual. The timing of such effects is also important, as the closer an individual is to allostatic overload when subjected to an additional stressor, the more likely it will have an adverse effect (NRC 2005). Further, individuals may be more susceptible during certain periods, e.g. the stage from estrus to implantation appears to be the most vulnerable to the effects of stress in females, as this is dependent on the delicate balance and timing of interactions between the hypothalamus, pituitary, gonadotrophins and feedback activities of estradiol (Moberg 1976, Moberg 1991, Curry 1999). In addition, <i>in utero</i> exposure to glucocorticoids via the mother and/or through mother's milk to newborns has been shown to alter the stress response itself in these neurologically-vulnerable young, leading to life-long health and psychological problems (Wright et al. 2009).</p> <p>Cetacean blubber, a lipid rich tissue, accumulates high concentrations of steroid hormones (Kellar et al. 2006). In the current study, the endocrine stress response will be evaluated through measuring blubber glucocorticoids (e.g. cortisol) concentrations. Other steroid blubber hormone levels such as progesterone and estradiol will also be assessed, in order to correlate stress (cortisol) levels with reproductive activity in females.</p> <p>The focal species will be the short-beaked common dolphin (<i>Delphinus delphis</i>), an abundant species that frequently strands in the North-east Atlantic. Previous research undertaken by Dr Murphy et al. identified low reproduction rates (26% pregnancy rates, 3-4 year calving intervals) in the North-east Atlantic population compared to</p>
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	<p>other common dolphin populations where higher pregnancy rates (&gt;40%) exist (Murphy et al. 2009).</p> <p>In order to develop and validate the cortisol assay, hormone concentrations will be compared between a control group of healthy animals that died from acute trauma i.e. incidental capture in fishing gear (sufficient time would not have passed for any increased circulating cortisol levels to be incorporated into blubber tissue) against those that may exhibit high blubber cortisol levels due to prolonged illness, starvation and involvement in a mass stranding incident. The estradiol assay will be developed and verified by comparing females in different reproductive states, i.e. ovulating, pregnant, and resting.</p>
<p><b>Objectives</b></p>	<p>The objective of this study is threefold</p> <ol style="list-style-type: none"> <li>1. Develop and validate blubber cortisol (stress hormone) and estradiol assays for cetaceans</li> <li>2. Measure stress and reproductive hormones in the blubber tissue of 70 UK stranded common dolphins, including 'healthy' individuals diagnosed as by-caught for production of baseline cortisol levels</li> <li>3. Assess the effects of stress on reproductive activity in female common dolphins in the North-east Atlantic</li> </ol> <p>Within the current study cortisol (stress) and progesterone and estradiol (reproductive hormones) levels will be assessed in common dolphins that stranded along the UK coastline. Only one common population exists in the North-east Atlantic, and these individuals will be taken as a representative sample of that population.</p> <p>One of the main issues to date with measuring stress levels in cetaceans blubber tissue is the development (assay optimization and kit evaluation) and validation (replicating a standard assay procedure) of blubber cortisol assays using commercial kits. Cortisol assay development will be accomplished by comparing levels in a control group of 'healthy' bycaught animals that washed ashore, with cortisol levels in animals that either died due to ill health or starvation, in addition to individuals that died during a mass stranding event in Cornwall in 2008 (see (Jepson and Deaville 2009).</p> <p>Cortisol, progesterone and estradiol assay validation will be assessed by measuring levels in three sub-samples from five individuals.</p> <p>The sampling period extends from 2000 onwards.</p>

<p><b>Relevance to ASCOBANS</b></p>	<p>The research undertaken by this study has important implications for conservation of both these species in the ASCOBANS area.</p> <p>This project will contribute to:</p> <ul style="list-style-type: none"> <li>- ASCOBANS Conservation and Management Plan <ul style="list-style-type: none"> <li>2. Surveys and Research</li> <li>3. Use of by-catches and strandings</li> </ul> </li> <li>- ASCOBANS Triennium Work Plan 2010-2012 <ul style="list-style-type: none"> <li>4. Review new information on cetacean population size, distribution, structure, and causes of any changes in the ASCOBANS area and based on implications for conservation to make appropriate recommendations to Parties and other relevant authorities</li> </ul> </li> </ul>
<p><b>Activities</b></p>	<p>Laboratory work will be undertaken in collaboration with wildlife endocrinologist Assoc. Professor John Cockrem, Head of the Conservation Endocrinology research Group at the Institute of Veterinary, Animal and Biomedical Sciences, Massey University, New Zealand. This is where Dr. Murphy is currently based, during the outgoing phase of her EU-funded Marie Curie International Outgoing Fellowship.</p> <p>Massey University has successfully extracted and examined blubber progesterone levels in pregnant and non-pregnant female New Zealand <i>D. delphis</i>. This molecular technique will be adapted to determined blubber cortisol and estradiol. Initially blubber tissues will be homogenized and steroids will be extracted and isolated using the multistep organic solvent approach outlined in Kellar et al. (2006). Steroid hormone concentrations will then be determined and validated using commercially available enzyme-immunoassays.</p> <p><b>Work that will be undertaken during the current project:</b></p> <ol style="list-style-type: none"> <li>I. Development and validation of blubber cortisol assay, and measurement of cortisol concentrations in 70 female common dolphins. For validation purposes, measurements of cortisol levels will be undertaken in two extra sub-samples from five individuals.</li> <li>II. Development and validation of blubber estradiol assay, and measurement of estradiol in 70 females. For validation purposes, measurements of estradiol levels will be undertaken in two extra sub-samples from five individuals.</li> <li>III. Measurement of blubber progesterone concentrations in 70 females. For validation purposes, measurements of progesterone levels will be undertaken in two extra sub-samples from five individuals</li> <li>IV. Statistical analysis incorporating information on age, reproductive and health status. Production of the final report.</li> </ol>

<p><b>Outputs</b></p>	<p><b>Expected outputs from this project include:</b></p> <ul style="list-style-type: none"> <li>- Development and validation of blubber cortisol (stress hormone) and estradiol assays for cetaceans</li> <li>- Measurements of cortisol concentrations, and hormones indicative of female reproductive activity (progesterone and estradiol) in the blubber tissue of UK common dolphins</li> <li>- Production of baseline cortisol measurements in blubber tissue of 'healthy' UK common dolphins</li> <li>- Investigation of the effects of increased stress levels on reproductive activity in UK female common dolphins.</li>   <li>- Production of the final report</li> <li>- Production of scientific papers for peer review on (1) development and validation of blubber cortisol and estradiol assays for cetaceans, and (2) effects of stress on reproductive activity in female common dolphins in the North-east Atlantic</li>   <li>- Results from the current project will be incorporated within the larger Marie Curie International Outgoing Fellowship project <i>CETACEAN-STRESSORS The independent and interactive effects of multiple stressors on reproduction and development in cetaceans</i> (2011-2013).</li> </ul>
<p><b>Work Plan and Timetable</b></p>	<p>This project will be undertaken within a one year period commencing on the 1<sup>st</sup> August 2012.</p> <p>The work plan is attached to this proposal. Dr Sinéad Murphy is responsible for implementation of all project activities.</p>
<p><b>Project Personnel</b></p>	<p><b>Dr Sinéad Murphy,</b>  Marie Curie International Outgoing Fellow  Institute of Zoology  Zoological Society of London  Regent's Park  London NW1 4RY  UK</p> <p>Correspondence address: Coastal-Marine Research Group  Institute of Natural Sciences  Massey University  Private Bag 102 904  Auckland 0745  New Zealand  Phone: + 64 (0) 9 414 0800 ext. 41524</p>

Fax: +64 (0) 9 443 9790  
Email: [s.n.murphy@massey.ac.nz](mailto:s.n.murphy@massey.ac.nz)

Role within the Project: Principal Investigator  
A succinct CV is attached to this proposal

Dr Murphy's research has concentrated on evaluation of different existing measures for assessing population biology in marine mammals, including determination, interpretation and use of life history data. Work undertaken has analysed post-mortem data obtained from stranded and bycaught marine mammals. The researcher has applied her skill sets to comparative studies on marine mammal life history and dietary requirements, assessments of population structure, growth and survival and the relationships between populations and their environment; including changes in the dynamics of populations through human interactions, both directly and indirectly. Above all, she has worked to develop the use of marine mammals as indicators of ecosystem health and the extrapolation of post-mortem data as a valuable tool for assessment of marine mammal population status.

**Dr Paul D. Jepson,**  
UK Cetacean Strandings Investigation Programme  
Institute of Zoology  
Zoological Society of London  
Regent's Park  
London NW1 4RY  
UK

Role within the Project: Co-investigator  
A succinct CV is attached to this proposal

**Associate Professor John Cockrem,**  
Conservation Endocrinology Research Group,  
Institute of Veterinary, Animal and Biomedical Sciences,  
Massey University,  
Private Bag 11 222  
Palmerston North 4442  
New Zealand  
Email: [J.F.Cockrem@massey.ac.nz](mailto:J.F.Cockrem@massey.ac.nz)

Role within the Project: Co-investigator  
A succinct CV is attached to this proposal

Dr Cockrem has worked in comparative endocrinology since his PhD, and is currently the Secretary-General of the Asia and Oceania Society of Comparative Endocrinology. Dr Cockrem has studied stress endocrinology in New Zealand fur seals and New Zealand common dolphins, and in a wide

	<p>range of vertebrate species including amphibians, reptiles, birds and terrestrial mammals. This work has included the measurement of hormones in serum, plasma, saliva, faeces, urine and blubber, and he has extensive experience in the development of methods to measure stress in animals in which it is not practical to collect blood samples. He has been a visiting scientist in the Roslin Research Institute, Edinburgh, United Kingdom, the Department of Zoology, University of Gothenburg, Sweden, the Department of Biology, Waseda University, Tokyo, Japan, and the Department of Animal Science, Louisiana State University, Baton Rouge, United States.</p> <p>He has reviewed more than 100 manuscripts for 34 journals since 2005, and has reviewed grant applications for the following organisations since 2005: Australian Research Council, Australia; Biotechnology and Biological Sciences Research Council, United Kingdom; Natural Environment Research Council, United Kingdom; Netherlands Organisation for Scientific Research, the Netherlands.</p> <p>Dr. Cockrem has published 63 journal articles, four book chapters and seven conference papers.</p>
<b>Budget Estimates</b>	The budget for the project is attached to this proposal.

## Work Plan

Measurement of blubber steroid hormone levels in 70 females from the North-east Atlantic common dolphin population

<b>Activity</b>	<b>1<sup>st</sup> Quarter</b>	<b>2<sup>nd</sup> Quarter</b>	<b>3<sup>rd</sup> Quarter</b>	<b>4<sup>th</sup> Quarter</b>
Cortisol assessment	X			
Progesterone assessment		X		
Estradiol assessment			X	
Statistical analysis and production of final report				X

## BUDGET

### Investigating steroid hormone levels in the blubber of 70 common dolphins

Laboratory costs, including overhead costs, for extraction of steroid hormones from blubber tissue and purchasing of commercial enzyme-immunoassays and garnet tubes.

	<b>NZD</b>	<b>Euros</b>
Development and validation of blubber cortisol assay, and measuring blubber cortisol concentrations in 80 samples (including sub-samples)	\$5,100	
Development and validation of blubber estradiol assay, and measuring estradiol concentrations in 80 samples (including sub-samples)	\$4,300	
Assessment of blubber progesterone concentrations in 80 samples (including sub-samples)	\$4,300	
<b>Total costs</b>	\$13,700	8,770

## References

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- Jepson, P. D. and R. Deaville. 2009. Investigation of the common dolphin mass stranding event in Cornwall, 9th June 2008. UK Cetacean Strandings Investigation Programme. Funded under a variation to contract number CR0364.
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- Moberg, G. P. 1976. Effects of environment and management stress on reproduction in the dairy cow. *Journal of Dairy Science* **59**:168-162.
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# CURRICULUM VITAE

## Sinéad Murphy

### Academic qualifications

- 2004: PhD in Zoology, University College Cork, Ireland. PhD thesis: "The biology and ecology of the common dolphin *Delphinus delphis* in the North-east Atlantic"
- 1999: BSc Degree in Zoology, University College Cork, Ireland (2.1 Hons)

### Professional positions held

- May 2011- to present: Marie Curie International Outgoing Postdoctoral Fellow, Massey University
- 2010: International Visiting Research Fellow, Massey University, NZ. "Life history of the New Zealand common dolphin"
- 2005- 2011: Postdoctoral Research Fellow, SMRU, University of St Andrews, UK
- Principal investigator. "Effects of contaminants on reproduction in small cetaceans: Phase II". Funded by ASCOBANS
  - Principal investigator. "Effects of contaminants on reproduction in small cetaceans: Phase I". Funded by ASCOBANS
  - Lead author - "Marine mammal Strategic Environmental Assessments (SEA) for offshore oil & gas licensing and wind leasing". Funded by UK DECC
  - Co-investigator "Cetacean stock assessment in relation to exploration and production industry sound". JIP contract 07-02
  - Research Fellow - "Monitoring impact and mitigation of marine mammal bycatch". UK DEFRA contract MF0736
  - Research Fellow – EC-funded 6<sup>th</sup> Framework project "NEphrops and CEtacean Species Selection Information and Technology". EC NECESSITY contract 501605
- 2000 - 2004: Research assistant, University College Cork, Ireland
- Research assistant - EC-funded 6<sup>th</sup> Framework project "NEphrops and CEtacean Species Selection Information and Technology". EC NECESSITY contract 501605.
  - Research assistant EC-funded 5<sup>h</sup> Framework project "BIOaccumulation of persistent organic pollutants in small CETaceans in European waters: transport pathways and impact on reproduction". EC BIOCET contract EVK3-2000-00027.
  - Coordinator of responses to strandings and leading necropsy conductor "Irish marine mammal stranding project". Partially funded by EC BIOCET contract and the Irish National Parks and Wildlife Service

### Professional activities:

- 2011 – onwards: Honorary Research Fellow, University College London, UK
- 2010 – onwards: Honorary Research Fellow, University of St Andrews, UK
- 2009: UK delegate of International Whaling Commission Scientific Committee
- 2009-2011: Chair of the International council for exploration of the Seas (ICES) Working Group on Marine Mammal Ecology (WGMME)
- 2009-2010: Member of ICES Advice Drafting Group
- 2007: Invited expert to ASCOBANS/HELCOM small cetacean population structure workshop
- 2005-onwards: UK appointed member of ICES WGMME

## MEASURES OF ESTEEM

- 49 publications; including 22 peer-review publications and 1 book chapter
- Referee for sixteen journals

## Scholarships, grants and awards:

- Awarded a three-year Marie Curie International Outgoing Fellowship in 2010
- Principal Investigator of both Phase I and Phase II of "Effects of contaminants on reproduction in small cetaceans", which were selected as a priority conservation projects by the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS), awarded 2008 and 2010.
- Co-investigator on a Joint Industry Program (JIP) funded project "Cetacean stock assessment in relation to exploration and production industry sound (JIP 07-02)", with colleagues from SMRU and SMRU Ltd, awarded 2007
- British Council travel grant, awarded 2001
- Forbairt International Collaboration Program travel grant, awarded 2000
- Séan Moylan Scholarship, awarded 1999

## Selected research outputs

### Peer-reviewed journal articles

- Learmonth, J.A., **Murphy, S.**, Luque, P.L., Reid, R.J., Patterson, I.A.P., Ross, H.M., Barley, J., Santos, M. B., and G. J. Pierce. in review. Life history and population structure of harbor porpoises (*Phocoena phocoena*) in Scottish (UK) waters: long-term variation and comparison with other populations. *Marine Mammal Science*.
- Murphy, S.**, Spradlin, T., Mackey, B., McVee, J., Androukaki, E., Tounta, E., Karamanlidis, A. A., Dendrinos, P., Joseph, E., Lockyer, C., and J. Matthiopoulos. in press. Age determination, growth and age-related mortality of Mediterranean monk seals (*Monachus monachus*). *Endangered Species Research*.
- Murphy, S.**, Deaville, R., Monies, R. J., Davison, N., and P. D. Jepson. 2011. True hermaphroditism: First evidence of an ovotestis in a cetacean species. *Journal of Comparative Pathology* 144: 195-199
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- Pierce, G.J., Santos, M.B., **Murphy, S.**, Learmonth, J.A., Zuur, A.F., Rogan, E., Bustamante, P., Caurant, F., Lahaye, V., Ridoux, V., Zegers, B.N., Mets, A., Addink, M., Smeenk, C., Jauniaux, T., Law, R.J., Dabin, W., Lopez, A., Alonso Farre, J.M., Gonzalez, A.F., Guerra, A., Garcia-Hartmann, M., Reid, R.J., Moffat, C.F., Lockyer, C., and J.P. Boon. 2008. Bioaccumulation of persistent organic pollutants in female common dolphins (*Delphinus delphis*) and harbour porpoises (*Phocoena phocoena*) from western European seas: Geographical trends, causal factors and effects on reproduction and mortality. *Environmental Pollution* 153: 401-41
- McHugh, B., Law, R.J., Allchin, C.R., Rogan, E., **Murphy, S.**, Foley, M.B., Glynn, D., and E. McGovern.

2007. Bioaccumulation and enantiomeric profiling of organochlorine pesticides and persistent organic pollutants in the killer whale (*Orcinus orca*) from British and Irish waters. *Marine Pollution Bulletin* 54(11): 1724-1731.

**Murphy, S.**, and E. Rogan. 2006. External morphology of the short-beaked common dolphin, *Delphinus delphis*: growth, allometric relationships and sexual dimorphism. *Acta Zoologica* 87(4): 315-329.

**Murphy, S.**, Herman, J.S., Pierce, G.J., Rogan, E., and A.C. Kitchener. 2006. Taxonomic status and geographical cranial variation of common dolphins (*Delphinus*) in the eastern North Atlantic. *Marine Mammal Science* 22(3): 573-599.

**Murphy, S.**, Collet, A., and E. Rogan. 2005. Mating strategy in the male common dolphin *Delphinus delphis*: what gonadal analysis tells us. *Journal of Mammalogy* 86(6): 1247-1258.

### Book chapter

**Murphy, S.**, Evans, P.G.H., and Collet, A. 2008. Common dolphin *Delphinus delphis*. In *Mammals of The British Isles. Handbook 4th Edition. Edited by S. Harris and D.W. Yalden*. The Mammal Society. pp. 719-724.

### Reports and non-peer reviewed articles

**Murphy, S.** 2012. Effects of contaminants on reproduction in small cetaceans. Final report of Phase II to ASCOBANS. Sea Mammal Research Unit, University of St Andrews, St Andrews

ICES WGMME 2011. Report of the Working Group on Marine Mammal Ecology. 21-24 February, Berlin, Germany. 206pp.

ICES WGMME. 2010. Report of the Working Group on Marine Mammal Ecology. 12-15 April, Horta, The Azores. 212pp.

Brophy, J., **Murphy, S.**, and E. Rogan. 2009. The diet and feeding ecology of the common dolphin (*Delphinus delphis*) in the northeast Atlantic. International Whaling Commission, SC/61/SM14

ICES WGMME. 2009. Report of the Working Group on Marine Mammal Ecology. 2-6 February 2009, Vigo, Spain. 129pp.

Mirimin, L., Viricel, A., Amaral, A.R., **Murphy, S.**, Northridge, S., Ridoux, V., and E. Rogan. 2009. Population genetic structure of common dolphins in the northeast Atlantic using microsatellite loci and mtDNA control region markers. International Whaling Commission, SC/61/SM27

**Murphy, S.** 2009. Effects of contaminants on reproduction in small cetaceans. Final report of Phase I to ASCOBANS. Sea Mammal Research Unit, University of St Andrews, St Andrews, 66pp.

**Murphy, S.**, Gordon, J.C.D., McConnell, B., Matthiopoulos, J., Isojunno, S., and P.S. Hammond. 2009. Background information on marine mammals for Offshore Strategic Environmental Assessment. Consultation document for the UK Department for Business, Enterprise and Regulatory Reform's [BERR] offshore energy Strategic Environmental Assessment programme. 148pp.

**Murphy, S.**, Natoli, A., Amaral, A.R., Mirimin, L., Viricel, A., Caurant, F., Hoelzel, R., and Evans, P. 2009. Short-beaked common dolphin *Delphinus delphis*. In Report of ASCOBANS/HELCOM small cetacean population structure workshop. 8-10 October 2007, UN Campus, Hermann-Ehlers-Str. 10, 53113 Bonn, Germany. 111-130.

Winship, A.J., **Murphy, S.**, Deaville, R., Jepson, P.D., Rogan, E., & P.S. Hammond. 2009. Preliminary assessment and bycatch limits for northeast Atlantic common dolphins. International Whaling Commission, SC/61/SM19.

Hammond, P.S., Northridge, S.P., Thompson, D., Gordon, J.C.D., Hall, A.J., **Murphy, S.**, and C.B. Embling. 2008. Background information on marine mammals for Strategic Environmental Assessment 8. Consultation document for the UK Department of Trade and Industry's offshore energy Strategic Environmental Assessment programme.

ICES WGMME. 2008. Report of the Working Group on Marine Mammal Ecology. 25-28 February 2008, St Andrews, Scotland. 86pp.

**Murphy, S.** 2008. Environmental and anthropogenic factors linked to influencing or controlling cetacean population growth rates. Task 3 Report for the Joint Industry Program project "Cetacean stock assessment in relation to exploration and production industry sound" (JIP 07-02), September 2008. Sea Mammal Research Unit Ltd. 64pp.

- Murphy, S.** 2008. Investigating biological parameters in common dolphins and harbour porpoises. Final Report to the UK Department for Environment Food and Rural Affairs, Project MF0736, Sea Mammal Research Unit. 38pp.
- ICES WGMME. 2007. Report of the Working Group on Marine Mammal Ecology. 27-30 March 2007, Vilm, Germany. 58pp.
- Mirimin, L., Viricel, A., Amaral, A.R., **Murphy, S.**, Ridoux, V., and E. Rogan. 2007. Stock structure in the common dolphin *Delphinus delphis* in the Northeast Atlantic: analysis of genetic material. NECESSITY Contract 501605 Per. Act. Rep. No 2 – Annex 8.1.a. 13pp/
- Murphy, S.**, Dabin, W., Ridoux, V., Morizur, Y., Larsen, F., and E. Rogan. 2007. Estimation of Rmax for the common dolphin in the Northeast Atlantic. NECESSITY Contract 501605 Periodic Activity Report No 2 – Annex 8.4. 11pp.
- Murphy, S.**, Mirimin, L., and E. Rogan. 2007. Stock structure reports for bottlenose dolphins *Tursiops truncatus*, striped dolphins *Stenella coeruleoalba*, and white-sided dolphins *Lagenorhynchus acutus* in the Northeast Atlantic. NECESSITY Contract 501605 Per. Act. Rep. No 2 – Annex 8.1b. 27pp.
- Murphy, S.**, Northridge, S., Dabin W., Van Canneyt, O., Ridoux, V., Rogan, E., Philpott, E. Jepson, P., Deaville, R., Reid B., and Y. Morizur 2007. Biological parameters of common dolphin population resulting from stranded or bycaught animals in the Northeast Atlantic. EU NECESSITY Contract 501605 Per. Act. Rep. No 2 – Annex 6.2. 22pp.
- ICES WGMME. 2005. Report of the Working Group on Marine Mammal Ecology. 9-12 May 2005, Savollinna, Finland. 137pp.
- Learmonth, J.A., **Murphy, S.**, Dabin, W., Addink, M., Lopez, A., Rogan, E., Ridoux, V., Guerra, A., and G.J. Pierce. 2004. Measurement of reproductive output in small cetaceans from the Northeast Atlantic. BIO CET workpackage 5 - final report. Project Reference: EVK3-2000-00027. 53 pp.
- Learmonth, J.A., Santos, M.B., Pierce, G.J., Moffat, C.F., Rogan, E., **Murphy, S.**, Ridoux, V., Meynier, L., Lahaye, V., Pusineri, C., and J. Spitz. 2004. Dietary studies on small cetaceans in the NE Atlantic using stomach contents and fatty acid analyses. BIO CET workpackage 6 - final report. Project Reference: EVK3-2000-00027. 99 pp.
- Murphy S.**, and E. Rogan. 2004. Marine Mammal Stranding Project 2003-2004. Final report to National Parks and Wildlife (Ireland). 34pp.
- Pierce, G.J., Santos, M.B., Learmonth, J.A., Smeenk, C., Addink, M., García Hartmann, M., Boon, J.P., Zegers, B., Mets, A., Ridoux, V., Caurant, F., Bustamante, P., Lahaye, V., Guerra, A., González, A., López, A., Alonso, J.M., Rogan, E., **Murphy, S.**, Van Canneyt, O., Dabin, W., Spitz, J., Doemus, G., and L Meynier. 2004. Bioaccumulation of persistent organic pollutants in small cetaceans in European waters: transport pathways and impact on reproduction. Final Report to the European Commission's Directorate General for Research on Project EVK3-2000-00027.
- Rogan, E., **Murphy, S.**, Learmonth, J.A., González, A., and W. Dabin. 2004. Age Determination in Small Cetaceans from the NE Atlantic. BIO CET workpackage 4 - final report. Project Reference: EVK3-2000-00027. 34 pp.

### **Selected conference presentations**

- Murphy, S.**, Perrott, M, McVee, J., Roe, W., & K.A. Stockin. Investigating the deposition of growth layer groups in dentine tissue of captive common dolphins *Delphinus* sp. SMM-NAMMCO Workshop on Age Estimation in Marine Mammals. 17th Biennial Conference on the Biology of Marine Mammals, Tampa, Florida, US, 26-27 November 2011 [ORAL]
- Murphy, S.**, Pierce, G.J., Law, R. J., Santos, M.B., Learmonth, J.A., Addink, M., Dabin, W., Rogan, E., Jepson, P.D., Deaville, R., Zuur, A.F., Bustamante, P., Caurant, F., Lahaye, V., Ridoux, V., Zegers, B.N., Mets, A., Smeenk, C., Jauniaux, T., López, A., Alonso Farré, J.M., González, A.F., Guerra, A., García-Hartmann, M., Northridge S. P., Reid, R.J., Lockyer, C., and J.P. Boon. 2008. Assessing the effect of contaminants on reproductive success in small cetaceans in the eastern North Atlantic. NAFO/ICES/NAMMCO symposium "The role of marine mammals in the Ecosystem", 29 September - 1 October 2008, Dartmouth, Canada [ORAL]
- Murphy, S.** 2008. Marine Mammals in UK waters. UK Department for Business, Enterprise and

Regulatory Reform, UK Offshore Energy Sea Assessment Workshop, Bristol, 3<sup>rd</sup> – 4<sup>th</sup> September, 2008 [ORAL]

- Murphy S.**, Northridge, S. P., Morizur, Y., Mirimin, L., Viricel, A., Jepson, P. D., Deaville, R., Reid, R. J., Rogan, E., Silva, M., Ferreira, M., López, A., Pierce, G. J., Ridoux, V., and W. Dabin. 2007. Conservation status of the common dolphin *Delphinus delphis* in the Northeast Atlantic and implications for future management plans. 17th Biennial Conference on the Biology of Marine Mammals, 29<sup>th</sup> November - 3<sup>rd</sup> December, Cape Town, South Africa [ORAL]
- Murphy, S.** 2007. Common dolphins in the North-east Atlantic. Joint ASCOBANS/HELCOM Workshop on Small cetacean population structure in the ASCOBANS Area, 8– 9<sup>th</sup> October, Bonn, Germany [INVITED SPEAKER].
- Murphy, S.** 2007. Small cetaceans and bycatch. Presentation to the Scottish Executive Environment and Rural Affairs Department (SEERAD), May 2007, Sea Mammal Research Unit, St Andrews [ORAL]
- Murphy S.**, Northridge, S.P., Jepson, P.D., Deaville, R., and R.J. Reid. 2006. Are common dolphins in the North-east Atlantic close to their carrying capacity? 20th Conference of the European Cetacean Society, 2-7<sup>th</sup> April, Gdynia, Poland, pp 33 [ORAL]
- Murphy, S.**, Rogan, E., Collet, A., and M. Addink. 2004. Assessing the mating system of the short-beaked common dolphin *Delphinus delphis* in the North-east Atlantic using samples obtained from post mortem examinations. 18th Annual Conference of the European Cetacean Society. Kolmården, Sweden. pp 13-14 [ORAL]

# CURRICULUM VITAE

## Paul D Jepson

### Education & Qualifications

June 2010 – European Veterinary Specialist in Wildlife Population Health

July 2003 - PhD, University of London

July 1991 - Member, Royal College of Veterinary Surgeons

July 1991 - Bachelor of Veterinary Medicine & Surgery, University of Glasgow

### Professional History

September 2007-present: appointed to Graduate Tutor (Institute of Zoology)

August 2007-present: appointed to internal examiner (MSc Wild Animal Health/Wild Animal Biology) co-taught by the Royal Veterinary College (University of London) and the Institute of Zoology

January 2007-present: appointed to Senior Research Fellow (Institute of Zoology)

July 2006: awarded a 5-year RCUK Fellowship in Marine Mammal Epidemiology at the Institute of Zoology (start date: 1<sup>st</sup> October 2006).

July 2003-December 2006: Post Doctoral Researcher (Institute of Zoology) and Technical Co-ordinator (Defra-funded UK Cetacean Strandings Investigation Programme).

April 2000-July 2003: Veterinary Pathologist and Technical Co-ordinator (Defra-funded UK Cetacean Strandings Programme), Institute of Zoology, Zoological Society of London, Regent's Park, London.

October 1993-March 2000: Veterinary Pathologist and Technical Co-ordinator (Department of Environment-funded Marine Mammal Strandings Programme in England and Wales), Institute of Zoology, Zoological Society of London, Regent's Park, London.

November 1991-October 1993: Veterinary Surgeon; The Mount Veterinary Surgery, 1 The Mount, Fleetwood, Lancashire.

### Other Appointments and Affiliations

Member, International Council for Exploration of the Sea (ICES) Working Group on Marine Mammal Ecology (2010-present).

Member, International Council for Exploration of the Sea (ICES) Study Group on Effects of Sound in the Marine Environment (2005-present).

Member, ACCOBAMS Emergency Task Force for Unusual Cetacean Stranding Events in Mediterranean and Black Seas (2007-present).

Member, Scientific Committee for the Biennial Conference of the Society for Marine Mammalogy, *Greensboro, NC, USA, 15-19 December 2003* - responsible for peer-review process for all toxicology, microbiology and immunology abstracts.

Member, Scientific Committee for the First World Marine Mammal Science Conference, *Monaco, 20-24 January 1998* - responsible for peer-review process for all toxicology, microbiology and immunology abstracts.

## Grants Awarded

April 2011-July 2014 *Defra, Scottish Government and the Welsh Assembly Government* Cetacean Strandings around the UK coasts: UK Cetacean Strandings Investigation Programme (CSIP) (£1,113,673). Jepson, P.D. & Deaville, R.

June 2011-May 2014 EU-funded (FP7-PEOPLE-2010-IOF) Marie Curie International Outgoing Fellowship (for Sinead Murphy) entitled "The independent and interactive effects of multiple stressors on reproduction and development in cetaceans"(EU ref: 276145). Jepson, P.D. 247590.40 Euros (£206,269.54)

November 2010-November 2011 Pollutant exposure in coastal top predators: assessing current levels of exposure and toxic effects. United Nations (ASCOBANS Agreement) Jepson, P.D. & R. Deaville 9,750Euros

November 2010-November 2011 Feasibility study on the creation of a web-accessed strandings database covering Agreement Party and Range States within the ASCOBANS region. United Nations (ASCOBANS Agreement) R. Deaville & Jepson, P.D. 8,500Euros

March 2010-March 2011 - one-year extension of UK Cetacean Strandings Investigation Programme (CSIP) with several optional extra modules for stranded cetacean toxicology (£327,308). Jepson, P.D. & Deaville, R.

July 2008-April 2009 *Defra* Funding for UKCSIP national cetacean strandings database. Jepson, P.D. & R. Deaville £42,000

July 2008-April 2009 *Defra* Emergency funding to investigate a cetacean mass stranding in Cornwall (June 2008) £27,000. Jepson, P.D. & R. Deaville

April 2007-July 2011 *Defra, Scottish Government and the Welsh Assembly Government* Cetacean Strandings around the UK coasts. Jepson, P.D. £1,532,355.

December 2006-March 2009 *QinetiQ* Underpinning studies: Marine mammal decompression study. Jepson, P.D. £43,317

April 2006 – March 2007 *Defra* UK Cetacean Strandings Surveillance and Investigation. Jepson, P.D. £352,500

October 2004 – May 2006 *Defra* Post-mortem Research Feasibility Study on Cetacean Ears. Jepson, P.D. £32,500

December 2003 – March 2005 *Defra* Cetacean Strandings Investigation and Co-ordination in the United Kingdom. Jepson, P.D. & Cunningham, A.A. £219,450.

December 2003 – March 2004 *UK Ministry of Defence (Defence Science and Technology Laboratory)* In vivo gas bubble formation in cetaceans. Jepson, P. D. £2,950

August 2002 – August 2003 *Defra* Investigating the impact of the UK phocine distemper virus epizootic 2002-2003 on UK seal populations. Jepson, P.D. & Cunningham, A.A. £261,461.

October 2000 – December 2003 *DETR* UK Cetacean Strandings Investigation and Co-ordination in the United Kingdom. Jepson, P. D. £470,036

## Invited talks/participation in international scientific meetings and forums

I was an invited participant or speaker at a number of national/international scientific meetings and workshops on marine mammals including International Whaling Commission, International Council for Exploration of the Seas, US Marine Mammal Commission, US Office of Naval Research, NOAA/NMFS National Marine Animal Health and Stranding Conference, UK Interagency Committee for Marine Science and Technology, Society of Marine Mammalogy and European Cetacean Society.

## Selected publications

- De Luna CJ, Goodman SJ, Thatcher O, **Jepson PD**, Andersen L, Tolley K, Hoelzel AR (2012) Phenotypic and genetic divergence among harbour porpoise populations associated with habitat regions in the North Sea and adjacent seas. *Journal of Evolutionary Biology* doi: 10.1111/j.1420-9101.2012.02461.x.
- Yara Bernaldo de Quirós, Óscar González-Díaz, Pedro Saavedra, Manuel Arbelo, Eva Sierra, Simona Sacchini, **Paul D. Jepson**, Sandro Mazzariol, Giovanni Di Guardo & Antonio Fernández (2011) Methodology for *in situ* gas sampling, transport and laboratory analysis of gases from stranded cetaceans. *Scientific Reports* 1 doi:10.1038/srep00193
- Hooker, S.K., A. Fahlman, M. J. Moore, N. Aguilar de Soto, Y. Bernaldo de Quirós, A. O. Brubakk, D. P. Costa, A. M. Costidis, S. Dennison, K. J. Falke, A. Fernandez, M. Ferrigno, J. R. Fitz-Clarke, M. M. Garner, D. S. Houser, **P. D. Jepson**, D. R. Ketten, P. H. Kvadsheim, P. T. Madsen, N. W. Pollock, D. S. Rotstein, T. K. Rowles, S. E. Simmons, W. Van Bonn, P. K. Weathersby, M. J. Weise, T. M. Williams and P. L. Tyack (2011) Deadly diving: the physiological and behavioural management of decompression stress in diving mammals. *Proceeding of the Royal Society* doi: 10.1098/rspb.2011.2088
- Davison, N.J., Perrett, L.L., Law, R.J., Dawson, C.E., Stubberfield, E.J., Monies, R.J., Deaville, R. and **Jepson, P.D.** (2011) Infection with *Brucella ceti* and high levels of polychlorinated biphenyls (PCBs) in bottlenose dolphins (*Tursiops truncatus*) stranded in southwest England. *Veterinary Record* doi: 10.1136/vr.d2714.
- Murphy, Sinead; Deaville, Rob; Monies, Robert J; Davison, Nick; **Jepson, Paul D.** (2011) True hermaphroditism: First evidence of an ovotestis in a cetacean species. *Journal of Comparative Pathology* **144**, 195-199.
- Gottschling, M., Bravo, I.G., Schulz, E., Bracho, M.A., Deaville, R., **Jepson, P.D.**, Van Bresseem, M.F., Stockfleth, E. and Nindl, I. Modular organizations of novel cetacean papillomaviruses. *Mol. Phyl. Evol* **59:1**, 34-42.
- Law, R.J., Jon Barry, Philippe Bersuder, Jon Barber, Rob Deaville, Robert J. Reid and **Paul D. Jepson** (2010) Levels and trends of BDEs in blubber of harbor porpoises (*Phocoena phocoena*) from the UK, 1992 – 2008 *Environmental Science & Technology* **44**, 4447–4451.
- Law R.J., Philippe Bersuder, Jon Barry, Rob Deaville, Robert J. Reid and **Paul D. Jepson** (2010) Chlorobiphenyls in the blubber of harbour porpoises (*Phocoena phocoena*) from the UK: levels and trends 1991-2005 *Marine Pollution Bulletin* **60**, 470-473.
- Law, R.J., Bersuder, P., Barry, J., Wilford, B.H., Allchin, C.R. and **Jepson, P.D.** (2008) A significant downturn in levels of HBCD in the blubber of harbour porpoises (*Phocoena phocoena*) stranded or bycaught in the UK: an update to 2006 *Environmental Science & Technology* **42**, 9104-9109.
- Law, R.J., Bersuder, P., Mead, L.K. and **Jepson, P.D.** (2008) PFOS and PFOA in the livers of harbour porpoises (*Phocoena phocoena*) stranded or bycaught around the UK. *Marine Pollution Bulletin* **56**, 792-797.
- Valderrama, C.A., Macgregor, S.K., Rowcliffe, M and **Jepson, P.D.** (2008) Review of monophasic strain of *Salmonella* group B isolated from cetaceans in England and Wales between 1990 and 2002. *Environmental Microbiology* **10(9)**, 2462-2468.
- Hall, A.J., Hugunin, K., Deaville, R., Law, R.J., Allchin, C.R., **Jepson, P.D.** (2006) The risk of infection from polychlorinated biphenyl exposure in harbour porpoise (*Phocoena phocoena*) – A case-control approach. *Environmental Health Perspectives* **114**, 704-711
- Hall, A.J., **Jepson, P.D.**, Goodman, S.J. and Härkönen, T. (2006) Phocine Distemper Virus – Data and models, nature and nurture. *Biological Conservation* **131**: 221 –229

- Jepson, P.D.**, Deaville, R., Patterson, I.A.R., Pocknell, Ross, H.M., Baker, J.R., Howie, F.E., Reid, R.J., Colloff, A. and Cunningham, A.A. (2005) Acute and chronic gas bubble lesions in cetaceans stranded in the United Kingdom. *Veterinary Pathology* **42**: 291-305.
- Jepson, P.D.**, Bennett, P.M., Deaville, R., Allchin, C.R., Baker J.R. & Law, R.J. (2005) Relationships between PCBs and health status in UK-stranded harbour porpoises (*Phocoena phocoena*). *Environmental Toxicology and Chemistry* **24**, 238–248
- Fernandez, A., Arbelo, M., Deaville, R., Patterson, I.A.P., Castro, P., Baker, J.R., Degollada, E., Ross, H.M., Herráez, P., Pocknell, A.M., Rodriguez, E., Howie, F.E., Espinosa, A., Reid, R.J., Jaber, J.R., Martin, V., Cunningham, A.A., and **Jepson, P.D.** (2004) Whales, sonar and decompression sickness (reply). *Nature*, doi:10.1038/nature02528
- Jepson, P.D.**, Arbelo, M., Deaville, R., Patterson, I.A.R., Castro, P., Baker, J.R., Degollada, E., Ross, H.M., Herráez, P., Pocknell, A.M., Rodriguez, E., Howie, F.E., Espinosa, A., Reid, R.J., Jaber, J.R., Martin, V., Cunningham, A.A., and Fernandez, A. (2003) Gas-bubble lesions in stranded cetaceans. *Nature*, **425**, 575-576
- Jepson, P.D.**, Baker, J.R., Kuiken, T., Simpson, V.R., Kennedy, S. & Bennett, P.M. (2000) Pulmonary pathology of harbour porpoises stranded in England and Wales between 1990 and 1996. *Veterinary Record* **146**: 721-728
- Jepson, P.D.**, Bennett, P.M., Allchin, C.R., Law, R.J., Kuiken, T., Baker, J.R., Rogan, E., & Kirkwood, J.K. (1999) Investigating potential associations between chronic exposure to polychlorinated biphenyls and infectious disease mortality in harbour porpoises from England and Wales. *The Science of the Total Environment* **243/244**, 339-348.
- Jepson, P.D.** & Baker, J.R. (1998) Bottlenose dolphins (*Tursiops truncatus*) as a possible cause of acute traumatic injuries in porpoises (*Phocoena phocoena*). *Veterinary Record* **143**, 614-615.
- Jepson, P.D.**, Brew, S., Macmillan, A.P., Baker, J.R., Barnett, J., Kirkwood, J.K., Kuiken, T., Robinson, I.R. & Simpson, V.R. (1997) Antibodies to *Brucella* in marine mammals around the coast of England and Wales *Veterinary Record* **141**: 513-515

### **UK Government Reports**

- Jepson, P.D. and Deaville, R. (compilers); K. Acevedo-Whitehouse, J. Barnett, R.L. Brownell, A. Colloff, F. C. Clare, N. Davison, R. Law, J. Loveridge, S.K. Macgregor, S. Morris, R. Penrose, M. Perkins, E. Pinn, V. Simpson, M. Tasker, N. Tregenza, A.A. Cunningham and A. Fernández (2009). Investigation of the common dolphin mass stranding event in Cornwall, 9<sup>th</sup> June 2008. Report to the Department for Environment, Food and Rural Affairs (under a variation to Contract CR0364). [http://randd.defra.gov.uk/Document.aspx?Document=WC0601\\_8031\\_TRP.pdf](http://randd.defra.gov.uk/Document.aspx?Document=WC0601_8031_TRP.pdf)
- Deaville, R. and **Jepson, P.D.** (compilers) Annual Report for the period 1<sup>st</sup> January – 31<sup>st</sup> December 2008 (Contract number CR0346) UK Cetacean Strandings Investigation Programme Report to the Natural Environment Group Science Division, Defra, Bristol.
- Deaville, R. and **Jepson, P.D.** (compilers) Annual Report for the period 1<sup>st</sup> January – 31<sup>st</sup> December 2007 (Contract number CR0346) UK Cetacean Strandings Investigation Programme Report to the Natural Environment Group Science Division, Defra, Bristol.
- Jepson, P.D.** Prah, S., Deaville, R. and Siebert, U. (2006) Postmortem Research Feasibility Study on Cetacean Ears. Final Report to the Department for Environment, Food and Rural Affairs (Contract: CRO 303). 16pp. <http://www.defra.gov.uk/wildlife-countryside/resprog/findings/index.htm>

- Jepson, P.D.** (editor) (2006) Cetaceans Strandings Investigation and Co-ordination in the UK: Trends in cetacean strandings around the UK coastline and cetacean and marine turtle post-mortem investigations, 2000 to 2004 inclusive. Final report to Defra (Contract: CRO 238). 79pp.  
<http://www.defra.gov.uk/wildlife-countryside/resprog/findings/index.htm>
- Law, R.J., **Jepson, P.D.**, Deaville, R., Reid, R.J., Patterson, I.A.P., Allchin, C.R. and Jones, B.R. (2006). Collaborative UK Marine Mammals Strandings Project: summary of contaminant data for the period 1993-2001. Sci. Ser. Tech Rep., Cefas Lowestoft, 131: 72pp.
- Jepson, P.D.** (2004) In vivo bubble formation in cetaceans. Report to the Defence Science and Technology Laboratory (UK Ministry of Defence). 41pp.
- Lawson, B. and **Jepson, P.D.** (compilers) (2004) UK Phocine Distemper Virus Epizootic: Investigation Report 2002/2003. Report to the Department for Environment, Food and Rural Affairs. 221pp.  
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- Jepson, P.D.** and Bennett, P.M. (2000) Cetaceans Strandings Investigation in England and Wales and Poseidon Database. Department of the Environment, Transport and the Regions. (Contract: CRO 177). 38pp.

# CURRICULUM VITAE

## John Cockrem

### Academic qualifications

1983 - PhD Thesis directed by Prof. B.K. Follett entitled "Circadian rhythms of melatonin secretion from the pineal gland of the Japanese quail (*Coturnix coturnix japonica*)". Department of Zoology, University of Bristol, UK

1980 - BSc (Hons). First Class Honours in physiology, Massey University, Palmerston North.  
Project directed by Dr R.M. Greenway entitled "Modelling and nonlinear curve fitting in the analysis of ethanol pharmacokinetics".

### Professional positions held

1989 - to present: Massey University, Palmerston North

Positions held include: Research Officer, Senior Research Officer, Senior Lecturer, and Associate Professor

1984-1989: Ecology Division, DSIR, Lower Hutt

### Professional distinctions and memberships

#### Awards and distinctions

Dr Cockrem's awards and distinctions include:

- Swedish National Research Council Visiting Fellowship, 1996.
- Waseda University, Tokyo, Japan, Visiting Fellowship, September - December 1997.
- Japan Society for the Promotion of Science Invitation Fellowship, 1997.
- Fulbright New Zealand Travel Award, 2004.
- Consultancy mission to the National Wildlife Research Center, National Commission for Wildlife Conservation and Development, Saudi Arabia, to advise on captive breeding programme for Houbara bustards, February 2007.
- Japan Society for the Promotion of Science Invitation Fellowship, 2008.
- Appointed as Adjunct Associate Professor at the Environmental Futures Centre, School of Environment, Griffith University, Queensland, Australia

#### Responsibilities in scientific societies

- Member of the International Committee of the International Symposia on Avian Endocrinology. 1992 - 2000, 2008 - .
- Member of the International Ornithological Committee. 1998 - present.
- Council member of the Asia and Oceania Society of Comparative Endocrinology. 2002 - present.
- Treasurer of the Asia and Oceania Society of Comparative Endocrinology. 2004 - 2008.
- Secretary-General of the Asia and Oceania Society of Comparative Endocrinology. 2009 - .

- Member of the Scientific Programme Committee for the 9<sup>th</sup> International Symposium on Avian Endocrinology, Leuven, Belgium, July 2008.
- Chair of the Scientific Programme Committee for the 25<sup>th</sup> International Ornithological Congress, Campos do Jordao, Brazil, August 2008 - December 2009.
- Organiser of the 6<sup>th</sup> Intercongress Symposium of the the Asia and Oceania Society of Comparative Endocrinology to be held in Palmerston North in January 2010.

## Selected research publications

### Peer-reviewed journal articles

- Adams, N.J., Parker, K.A., **Cockrem, J.F.**, Brunton, D.H. and Candy, E.J. (2010). Corticosterone responses to capture and post-release survival in translocated North Island saddlebacks (*Philesturnus rufusater*). *Emu* 110: 296-301.
- Barry, M. **Cockrem, J.F.** and Brunton, D.H. (2010). Seasonal variation in plasma corticosterone concentrations in wild and captive adult Duvaucel's geckos (*Hoplodactylus duvaucelii*) in New Zealand. *Australian Journal of Zoology* 58: 234-242.
- Rosa, B. Firth, E.C., Blair, H.T., Vickers, M., Morel, P. and **Cockrem, J.F.** (2010). Short-term voluntary exercise in the rat causes bone modelling without increasing physiologic stress response: a potential model for assessment of effects of exercise during gestation. *American Journal of Physiology* 299: R1037-R1043.
- Narayan, E.J., Molinia, F.C., Christi, K.S., Morley, C.G. and **Cockrem, J.F.** (2010). Urinary corticosterone metabolite responses to ACTH and to capture, and annual patterns of urinary corticosterone in wild and captive endangered Fijian ground frogs (*Platymantis vitiana*). *Australian Journal of Zoology* 58: 189-197.
- Park, E.K., Parkinson, T.J., **Cockrem, J.F.**, Han, K.S. and Blair, H.T. (2010). Reproductive and metabolic endocrinology in rams selected for high or low plasma IGF I concentrations. *Small Ruminant Research* 93: 186-192.
- Cockrem, J.F.**, Candy, E.J., Castille, S.A. and Satterlee, D.G. (2010). Plasma corticosterone responses to handling in Japanese quail selected for low or high plasma corticosterone responses to brief restraint. *British Poultry Science* 51: 453-459.
- Wall, J.P. and **Cockrem, J.F.** (2010). Effects of corticosterone treatment in laying Japanese quail. *British Poultry Science* 51: 278-288.
- Narayan, E.J., Molinia, F.C., Christi, K.S., Morley, C.G. and **Cockrem, J.F.** (2010). Annual cycles of urinary reproductive steroid concentrations in wild and captive endangered Fijian ground frogs (*Platymantis vitianus*). *General and Comparative Endocrinology* 166:172 - 179.
- Park, E.K., Chu, J.-P., Parkinson, T.J., **Cockrem, J.F.**, Han, K.S., Blair, H.T., Kim, T.Y., Yoon, J.T. and Lee, Y.-S. (2010). Rams genetically superior for IGF-1 do not exhibit improved male reproductive traits. *Animal Reproduction Science* 118: 223-230.
- Malisch, J.L., Satterlee, D.G., **Cockrem, J.F.**, Wada, H. and Breuner, C.W. (2010). How acute is the acute stress response? Baseline corticosterone and corticosteroid-binding globulin levels can

- change 24 hours after an acute stressor in Japanese quail. *General and Comparative Endocrinology* 165: 345-350.
- Wall, J.P. and **Cockrem, J.F.** (2009). Effects of corticosterone treatment on responses to fasting in Japanese quail. *Comparative Biochemistry and Physiology A* 154: 211-215.
- Cockrem, J.F.**, Barrett, D.P., Candy, E.J. and Potter, M.A. (2009). Corticosterone responses in birds: individual variation and repeatability in Adelie penguins (*Pygoscelis adeliae*) and other species, and the use of power analysis to determine sample sizes. *General and Comparative Endocrinology* 163: 158-168.
- Cockrem, J.F.**, Potter, M.A., Barrett, D.P. and Candy, E.J. (2008). Corticosterone responses to capture and restraint in emperor and Adelie penguins in Antarctica. *Zoological Science* 25: 291-298.
- Adams, N.J., **Cockrem, J.F.**, Candy, E.J. and Taylor, G.A. (2008). Non-precocial grey-faced petrel chicks (*Pterodroma macroptera gouldi*) show no age-related variation in corticosterone responses to capture and handling. *General and Comparative Endocrinology* 157: 86-90.
- Houston, D., McInnes, K., Elliott, G., Eason, D., Moorhouse, R. and **Cockrem, J.** (2007). The use of a nutritional supplement to improve egg production in the endangered kakapo. *Biological Conservation* 138: 248-255.
- Hull, K., **Cockrem, J.F.**, Bridges, J.P., Candy, E.J. and Davidson, C.M. (2007). Effects of corticosterone treatment on growth, development, and the corticosterone response to handling in young Japanese quail (*Coturnix coturnix japonica*). *Comparative Biochemistry and Physiology A* 148: 531-543.
- Cockrem, J. F.** (2007). Corticosterone stress responses and avian personalities. *J. Ornithol.* 148 (Suppl. 2): S169-S178.
- Cockrem, J.F.** (2006). The timing of breeding in the kakapo (*Strigops habroptilus*). *Notornis* 53: 153-159.
- Fraisse, F. and **Cockrem, J.F.** (2006). Corticosterone and fear behaviour in white and brown caged laying hens. *British Poultry Science* 47: 110-119.
- Cockrem, J.F.**, Potter, M.A. and Candy, E.J. (2006). Corticosterone in relation to body weight in Adelie penguins (*Pygoscelis adeliae*) affected by unusual sea ice conditions at Ross Island, Antarctica. *General and Comparative Endocrinology* 149: 244-252.
- Adams, N.J., **Cockrem, J.F.**, Taylor, G.A., Candy, E.J. and Bridges, J. (2005). Corticosterone responses of grey faced petrels (*Pterodroma macroptera gouldi*) are higher during incubation than other breeding stages. *Physiological and Biochemical Zoology* 78: 69-77.
- Adams, N.J., **Cockrem, J.F.**, Taylor, G.A., Candy, E.J. and Bridges, J. (2005). Corticosterone responses of hand-reared and parent-reared grey faced petrel chicks (*Pterodroma macroptera gouldi*). *Zoo Biology* 24: 283-290.
- Cockrem, J. F.** (2005). Conservation and behavioral neuroendocrinology. *Hormones and Behaviour* 48: 492-501.
- Hesterman, H., Wasser, S.K. and **Cockrem, J.F.** (2005). Longitudinal monitoring of fecal testosterone in male Malayan sun bears (*U. malayanus*). *Zoo Biology* 24: 403-417.

- Cockrem, J.F.** and Silverin, B. (2002). Variation within and between birds in corticosterone responses of great tits (*Parus major*). *General and Comparative Endocrinology* 125: 197-206.
- Cockrem, J.F.** and Silverin, B. (2002). Sight of a predator can stimulate a corticosterone response in the great tit (*Parus major*). *General and Comparative Endocrinology* 125: 248-255.
- Kobayashi, M., **Cockrem, J. F.** and Ishii, S. (2002). Effects of starvation and refeeding on gonadotropin and thyrotropin subunit mRNAs in male Japanese quail. *Zoological Science* 19: 449-461.
- Girling, J.E., Bennett, E.J., Henderson, K. and **Cockrem, J. F.** (2002). Persistence of pregnant mare serum gonadotrophin in plasma of Japanese quail (*Coturnix coturnix japonica*). *Reproduction, Fertility and Development* 14: 287-290.
- Langmore, N., **Cockrem, J. F.** and Candy, E.J. (2002). Competition for male reproductive investment elevates testosterone levels in female dunnocks *Prunella modularis*. *Proceedings of the Royal Society of London Series B* 269: 2473-2478.
- Cockrem, J. F.** (2002). Reproductive biology and conservation of the endangered kakapo (*Strigops habroptilus*) in New Zealand. *Avian and Poultry Biology Reviews* 13: 139-144.
- Littin, K.E. and **Cockrem, J.F.** (2001). Individual variation in corticosterone secretion in laying hens. *British Poultry Science* 42: 536-546.

#### **Book chapters**

- Cockrem, J.F.** (in press). Individual variation in glucocorticoid stress responses in animals. In: Peter, M.C.S. and Bonga, J.W. (Eds.). *Stress physiology*. Springer, Berlin.
- Cockrem, J.F.** (2007). Stress endocrinology and conservation. pp. 346-353. In: Maitra, S.K. (Ed.). *Hormone Biotechnology*. Daya Publishing House, Delhi.

#### **Other forms of dissemination**

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- Narayan, E.J., Molinia, F.C., Christi, K.S., Morley, C.G. and **Cockrem, J.F.** (2010). Non-invasive urinary corticosterone stress responses and reproductive steroids in wild and captive endangered Fijian frog. *Proceedings of the Sixth Intercongress Symposium of the Asia and Oceania Society for Comparative Endocrinology*, Palmerston North, New Zealand, 19 - 22 January 2010: 58.
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- Cockrem, J.F.**, Potter, M.A., Barrett, D.P. and Candy, E.J. (2007). Stress in Adelie and emperor penguins. Proceedings of Antarctica New Zealand Annual Antarctic Conference 2007, Antarctica New Zealand, Christchurch: 98.
- Cockrem, J.F.**, Potter, M.A., and Barrett, D.P. (2006). Stress and fear in Adelie penguins. Proceedings of Antarctica New Zealand Annual Antarctic Conference 2006, Victoria University of Wellington, Wellington, 5 July 2006: 34.
- Cockrem, J.F.** (2006). Corticosterone stress responses and avian personalities. *Journal of Ornithology* 147 (Suppl. 1): 6.