

**Germany**  
**Progress report on cetacean research,**  
**May 2007 to April 2008 with statistical data for the calendar year 2007**

compiled by

Karl-Hermann Kock<sup>1)</sup>, Ursula Siebert<sup>2)</sup> & Harald Benke<sup>3)</sup>

<sup>1)</sup> Johann Heinrich von Thünen Institut, Institut für Seefischerei, Bundesforschungsanstalt für Fischerei, Palmaille 9, D-22767 Hamburg,

<sup>2)</sup> Forschungs- und Technologiezentrum Westküste, Christian-Albrechts-Universität zu Kiel, Werftstraße 6, D-25761 Büsum

<sup>3)</sup> Deutsches Meeresmuseum, Katharinenberg 14-20, D-18439 Stralsund

This report summarizes information on various fields of cetacean research and historical aspects of whaling .

## 1. Species and Stocks Studied

Common name	Scientific name	Area/stock	Items referred to
Harbour porpoise	<i>Phocoena phocoena</i>	Baltic Sea	2., 4.2, 4.3, 4.4, 5., 7.1, 8., 9.
Harbour porpoise	<i>Phocoena phocoena</i>	North Sea	2., 4.2, 4.3, 4.4, 5., 7., 8., 9.
Various species		worldwide	9.

## 2. Sightings data

### 2.1 Field work

Line transect surveys on small cetaceans, primarily harbour porpoise, were conducted during early summer 2007 in all parts of the German EEZ and 12nm zone of the North and in February 2008 in the western Baltic Sea.

Since summer 2002, a public awareness campaign is addressing yachts people in the Baltic to report opportunistic sightings of harbour porpoise. Most of these sightings were confined to the western Baltic Sea. By 2003, the programme was well established in yachting circles.

Over 3000 sightings were reported in 2006. In addition to scientific data this information will serve as a basis for the designation of protected areas for harbour porpoise.

The German Oceanographic Museum in Stralsund deployed up to 42 porpoise detectors (TPODS) in the German part of the Baltic from Kiel Bight to the Pomeranian Bay from 2004 to 2007 in three different projects. The purpose of the deployment was to study the habitat use of harbour porpoise more closely. Results of preceding projects showed evidence of significant geographic differences and seasonal changes in habitat use with a prominent decline in occurrence of porpoises from west to east, and lower occurrence in winter than in summer (Verfuss et al., 2007). The findings indicated geographic differences and seasonal changes in the relative porpoise density. One project part contributing to this study is the Jastarnia project focussing on the implementation of the ASCOBANS 'Recovery Plan for Harbour Porpoise in the Baltic (Jastarnia Plan). Within the project the GOM (German Oceanographic Museum) is focusing on the habitat use of harbour porpoise in the Pomeranian Bay from June 2005 to August 2007.

## 2.2 Analyses/development of techniques

Data on harbour porpoise in the German EEZ and North Sea are currently being analyzed.

To further test and calibrate static acoustic measuring equipment (T-PODs) the AMPOD project is currently carried out at the German Oceanographic Museum. T-PODs are calibrated in a test tank environment to derive absolute thresholds. Additionally the project focuses on field trials in areas with a wide range of porpoise densities, where a number of T-PODs are deployed close together to compare their results at different thresholds, settings and densities. The aim is, to find methods for data analysis for comparison of results from different areas with differently set T-PODs or T-PODs with different threshold levels.

## **3. Marking data**

### 3.1 Field Work

#### 3.1.1 + 2 *Natural and artificial marking data*

No marking using artificial marks was conducted. As a result, no photographs of whales of one of the IWC management area/stocks are currently held which can be utilized in photo ID studies.

### 3. 1. 3 *Telemetry data*

No new developments were available. A study has been conducted to compare echolocation of coastal and oceanic dolphins in collaboration with Danish scientists (Akamatsu et al., 2007).

## 4. Tissue/biological samples collected

### 4.1 Biopsy samples

No biopsy samples were collected

### 4.2 Samples from by-catches

Species	Area/stock	2007: total no. of individuals	Archived	Tissue Types(s)	Contact person
Harbour porpoise	Baltic Sea Schleswig-Holstein	3	3	all organs, central nervous system, skeletal system	U. Siebert
Harbour porpoise	North Sea Schleswig-Holstein	0	0		
Harbour porpoise	Baltic Sea Meckl.-Prepom.	5	5	organs, parts and whole skeletal system and genetic samples	H. Benke

### 4.3 Samples from stranded animals

Species	Area/stock	2007: total no. of individuals	Archived	Tissue Type(s)	Contact person
Harbour porpoise	North Sea Schleswig-Holstein	147	107	Different tissues for histopathology, toxicology, teeth, genetics	U. Siebert
White sided dolphin	North Sea Schleswig-Holstein	1	1	Different tissues for histopathology, toxicology, genetics	U. Siebert
White beaked dolphin	North Sea Schleswig-Holstein	1	1	Different tissues for histopathology, toxicology, genetics	U. Siebert
Harbour porpoise	Lower Saxony	42	42	Lung, liver, different tissues	M. Stede
	Baltic Sea Schleswig-Holstein	102	102	Different tissues for histopathology, teeth toxicology, genetics	U. Siebert
	Baltic Sea Meckl.-Prepomerania	51	31	Skeleton, various tissues, genetics	H. Benke

#### 4.4 Analyses/development of techniques

An audiometry study has been carried out at the Research and Technology Centre Büsum of the University of Kiel as part of the project MINOSplus on harbour seals (*Phoca vitulina*) and harbour porpoise (*Phocoena phocoena*). The aim of the study is to obtain data on the auditory sensitivity as well as the auditory capacity of the animal's hearing. The reason why such experiments are conducted is the proposed construction of offshore windmills and their potential noise pollution in German waters of the North Sea and the Baltic. Pathological investigations of the inner and middle ear of harbour porpoise have been conducted in order to investigate the potential impact of pingers on the hearing abilities of the porpoises.

The development and testing of effective mitigation methods for sound induced impacts on marine mammals is the topic of an ongoing study at the FTZ Westküste which is funded by the European Union and the State of Schleswig-Holstein. An air-bubble curtain has been tested for its sound absorption in Kerteminde harbour (Denmark) during construction work to replace the harbour wall. Attenuation of the ramming impulse noise due to the air-bubble curtain was observed up to 19 dB. While the harbour porpoises which are housed within the harbour in a semi-natural pool at a nearby research facility initially showed clear avoidance reactions to the sound emissions of the construction work, they returned to their normal behaviour after installation and use of the air-bubble curtain.

As part of the national monitoring funded by the State Ministry of Environment, Nature Protection and Agriculture of Schleswig - Holstein cetaceans stranded or by-caught were systematically investigated. These investigations include necropsies, histology, immunohistology, microbiology, serology, parasitology, virology, age determination and more.

The ribosomale DNS of different lung nematodes of harbour porpoise were analyzed and sequences from different regions were compared.

## **5. Pollution studies**

At the GKSS Research Centre in Geesthacht, metals and metalloids were analyzed by total X-ray fluorescence spectrometry (TXRF) and inductively coupled plasma-mass spectrometer (ICP-MS) in liver and muscle tissue of harbour porpoise taken as by-catch in the North Sea and the Baltic.

## **6. Statistics for large cetaceans**

### 6.1 Corrections to earlier years

No corrections to earlier years have been made

### 6.2 Direct catches of large cetaceans for 2007

Germany was not engaged in any whaling activity neither commercial nor aboriginal nor under scientific permits

### 6.3. Anthropogenic mortality of large whales for the calendar year 2007

#### 6.3.1 *Observed or reported ship strikes of large whales (including non-fatal events)*

No ship strikes of large cetaceans was observed in 2007

#### 6.3.2 Fishery by-catch of large whales

No large whales have been taken as by-catch in fisheries

## 7. Statistics for small cetaceans

### 7.1 Corrections to earlier years

No corrections to earlier years have been made

### 7.2 Fishery by-catch of small cetaceans in the calendar year 2007

Species	Area/stock	Incidental Mortality			Live capture
		Reported	Estim. total	Source	
Harbour porpoise	North Sea	0	unknown		
Harbour porpoise	Baltic Sea Schleswig- Holstein	3	unknown	gill net	none
Harbour porpoise	Baltic Sea Mecklenburg- Prepomerania	5	unknown	mostly gill net	none

In addition to three by-caught harbour porpoises from the Baltic Sea (Schleswig-Holstein) which were directly delivered by fishermen 19 stranded harbour porpoises (18 from the Baltic and 1 from the North Sea) were clearly identified from pathological findings as by-catch.

## 8. Strandings in 2007

Species	Total	North Sea Lower Saxony	North Sea Schl.-Holstein	Baltic Schl.- Holstein	Baltic Mec.-Prepomm.
Harbour porpoise	348	43 <sup>1)</sup>	147	102	56
Common dolphin	1 <sup>2)</sup>	1			
White-beaked dolphin	1		1		
Atlantic white- sided dolphin	1		1		

1) In addition 3 harbour porpoises stranded at the coast of Schleswig-Holstein. Unknown if of Baltic or North Sea origin

2) In addition, 1 common dolphin live stranded, released

## 9. Other studies and analyses

Species	Area/stock	Type of investigation	Contact address <sup>*)</sup>
Harbour porpoise	North Sea/Baltic Sea/Black Sea /North Atlantic	Stock structure, genetics	R. Tiedemann
Harbour porpoise	Belts, Baltic Sea	Stock discrimination	H. Benke
Harbour porpoise	Belt Sea, Baltic Sea	Reproduction, age structure, health status	H. Benke, U. Siebert,
Harbour porpoise	North Sea/Baltic Sea	Pathology, life history, toxicology, stock identity, habitat use, telemetry, Impact of sounds,	U. Siebert

		nutrition	
Harbour porpoise	North Sea	Histological, anatomical investigation of the nasal diverticula	S. Prahl
Harbour porpoise, other small cetaceans	North Sea/Baltic Sea	Distribution and abundance, aerial surveys	H. Herr
Harbour porpoise, other small cetaceans	North Sea/Baltic Sea	Anthropogenic impacts	H. Herr, U. Siebert, K. Lucke, H. Seibel
Harbour porpoise	North Sea/Baltic Sea	Habitat use, distribution and abundance, nutrition	A. Gilles
Harbour porpoise	North Sea/Baltic Sea	Impact of sounds	K. Lucke, J. Sundermeyer
Harbour porpoise	North Sea, Baltic Sea	Acoustic surveys, porpoise detectors (PODs)	U. Verfass, C. Honnef, A. Meding K. Lucke, M. Dähne
Harbour porpoise	Baltic Sea (Pomeranian Bay)	Acoustic surveys, porpoise detector (PODs)	A. Meding, M. Dähne
Harbour porpoise	Baltic Sea	Standardisation and methodology of static acoustic monitoring	U. Verfass M. Dähne C. Honnef
Harbour porpoise	Baltic	Creation of a management – orientated data base	D. Sonnenschmidt H. Giewat U. Siebert
Harbour porpoise	North Sea	Acoustic surveys, porpoise detectors (PODs)	U. Siebert K. Lucke, J. Sundermeyer
Harbour porpoise	Baltic, North Sea	Telemetry	U. Siebert, K. Lucke
Harbour porpoise	North Sea/Baltic Sea	Pathology, Immunology, Virology	H. Seibel
Harbour porpoise	North Sea/Baltic	Life History	I. Hasselmeier
Harbour porpoise	North Sea/Baltic Sea	Pollutants, Immunology, Endocrinology	K. Das, J. Schnitzler, U. Siebert
Harbour porpoise	North Sea/Baltic	Parasitology	K. Lehnert



Harbour porpoise	North Sea/Baltic Sea	Incidental sightings, data bases	U. Siebert M. Rademaker S. Mueller D. Sonnenschmidt
Harbour porpoise	North Sea/Baltic	Immunology, Pollutants	A. Kakuschke
Harbour porpoise	North Sea/Baltic Sea	Primary cell culture, Pollutants	V. Hellwig
Harbour porpoise	North Sea, Baltic	Feeding ecology	A. Gilles, U. Siebert
Harbour porpoise	North Sea, Denmark	Distribution and abundance	W. Piper
Harbour porpoise	Europe	Assesment of impact of offshore windfarm noise	W. Piper
Bottlenose dolphin, short-finned pilot whale, Atlantic spotted dolphin, rough-toothed dolphin	La Gomera	Abundance, distribution, behaviour, Photo-ID	F. Ritter
Bottlenose dolphin, short-finned pilot whale, Atlantic spotted dolphin, rough-toothed dolphin	La Gomera	Land-based estimation of abundance and distribution	F. Ritter
Toothed whales, <i>Stenella</i>	worldwide	Morphology, development, evolution	S. Huggenberger

\*) contact addresses see section 12

## 10. Literature cited

Akamatsu et al., 2007

Verfuss et al., 2007 (see below)

## 11. Publications

Akamatsu T., Rune D., Miller L.A., Naito Y., Siebert U., Teilmann J., Tougaard J., Wang D. and Wang K. 2007. Comparison of echolocation behaviour between coastal oceanic and riverine porpoises. *Deep Sea Research II* 54, 290-297

Beineke, A., Siebert, U., Stott, G., Müller, G. and Baumgärtner, W. 2007. Phenotypical characterization of changes in thymus and spleen associated with lymphoid depletion in free ranging harbor porpoises (*Phocoena phocoena*). *Veterinary Immunology and Immunopathology* 117, 254-265

Beineke, A., Siebert, U., Müller, G. and Baumgärtner, W.. 2007. Increased blood interleukin-10 mRNA levels in diseased free-ranging harbor porpoises (*Phocoena phocoena*). *Veterinary Immunology and Immunopathology* 115, 100-106

Desportes, G., Buholzer, L, Anderson, K., Blanchet, M.A., Aquarone, M., Sheppard, G., Brando, S., Vossen, A., Siebert, U. 2007. Decrease stress: train your animals. The effect of handling methods on cortisol levels in harbour porpoises, *Phocoena phocoena*, under human care. *Aquatic Mammals*. 33(3), 286-292

Fonfara, S., Siebert, U., Prange, A. and Colijn, F. 2007. The impact of stress on cytokine and haptoglobin mRNA expression in blood samples from harbour porpoises (*Phocoena phocoena*). *Journal of the Marine Biological Association of the United Kingdom* 87, 305-311

Fonfara S.; Siebert, U.; Prange, A. Cytokines and acute phase proteins as markers for infection in harbour porpoises (*Phocoena phocoena*). *Marine Mammal Science*. 2007. 23(4): 931-942

Fontaine M.C., Tolley K.A., Siebert U., Gobert S., Lepoint G., Bouquegneau J.M. and Das K. 2007. Ecological variation of harbour porpoises (*Phocoena phocoena*) from Scandinavian

waters inferred from trace elements and stable isotopes. *BMC Ecology* , 1, doi: 10.1186/1472-6785-7-1.

Fontaine M.C., Baird S.J.E., Piry S., Ray N., Duke S., Birkun A.Jr., Bloch D., Ferreira M., Sequeira M., Jauniaux T., Llavona A., Øien N.I., Öztürk B., Öztürk A.A., Ridoux V., Rogan E., Siebert U., Vikingsson G.A., Bouquegneau J.M. and Michaux J.R. 2007 Rise of oceanographic barriers in continuous populations of a cetacean: the harbour porpoise in old world waters. *BMC Biology* 5 (30), 1-16, doi:10.1186/1741-7007-5-30.

Gilles, A., Herr, H., Lehnert, K., Scheidat, M. and Siebert, U. 2008. Harbour porpoises – abundance estimates and seasonal distribution patterns. In: Wollny-Goerke, K. and Eskildsen, K. (Eds.) *Marine mammals and seabirds in front of offshore wind energy*, Teubner, Wiesbaden, pp. 19-36.

Kock, K.-H., Scheidat, M. 2008. Der deutsche Walfang im Südpolarmeer – aus Wirtschaftsinteressen wird internationale wissenschaftliche und politische Kooperation. *Meer und Museum, Meeresmuseum Stralsund* 20: 48 – 56

Lucke, K., Lepper, P.A., Hoeve, B., Everaarts, E., van Elk, N. and Siebert, U. 2007. Perception of Low-Frequency Acoustic signals by a harbour porpoise (*Phocoena phocoena*) in the presence of simulated Offshore Wind turbine noise. *Aquatic Mammals* 33(1), 55-68.

Lucke, K., , Lepper, P.A., Blanchet, M.A. and Siebert, U. 2008. How tolerant are harbour porpoises to underwater sound?. In: Wollny-Goerke, K. and Eskildsen, K. (Eds.) *Marine mammals and seabirds in front of offshore wind energy*, Teubner, Wiesbaden, pp. 59-76.

Pavlov, V.V., Wilson, R.P. and Lucke, K. 2007. A new approach to tag design in dolphin telemetry: Computer simulations to minimise deleterious effects. *Deep-Sea Research Part II.*, Vol. 54, p. 404-414

Rehn, N., Teichert, S. and Thomsen, F. 2007. Structure and temporal emission patterns of variable pulsed calls in free – ranging killer whales (*Orcinus orca*). Behaviour 144, 307 – 329

Siebert, U. and Rye, J. 2008. Correlation between aerial surveys and acoustic monitoring. In: Wollny-Goerke, K. and Eskildsen, K. (Eds.) Marine mammals and seabirds in front of offshore wind energy, Teubner, Wiesbaden, pp. 37-40.

Siebert, U. and Rye, J. 2008. Harbour porpoises in the North Sea – Tidal dependency. In: Wollny-Goerke, K. and Eskildsen, K. (Eds.) Marine mammals and seabirds in front of offshore wind energy, Teubner, Wiesbaden, pp. 57-58.

Verfuss U.K., Honnef C.G., Meding A., Dähne M., Mundry R., and Benke H. 2007. Geographical and seasonal variation of harbour porpoise (*Phocoena phocoena*) presence in the German Baltic Sea revealed by passive acoustic monitoring. Journal of the Marine Biological Association of the United Kingdom 87: 165 – 176.

Verfuss, U.K., Honnef, C.G., Meding, A., Dähne, M., Adler, S., Kilian, A. and Benke, H. 2008. The history of the German Baltic Sea harbour porpoise acoustic monitoring at the German Oceanographic Museum. In: Wollny-Goerke, K. and Eskildsen, K. (Eds.) Marine mammals and seabirds in front of offshore wind energy, Teubner, Wiesbaden, pp. 41-56.

Wilson R.P., Liebsch N., 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. and McMahon C.R. 2007. All at sea with animal tracks; methodological and analytical solutions for the resolution of movement. Deep Sea Research II 54, 193-210

Wohlsein, P., Puff, C., Kreutzer, M., Siebert, U. and Baumgärtner, W. Distemper in a dolphin. 2007. Emerging Infectious diseases 13(12), 1959-1961

Fahrenholtz, S. 2007. Bestimmung von Elementen in verschiedenen Geweben von Schweinswalen (*Phocoena phocoena*) der Nord – und Ostsee mittels induktiv gekoppelter Plasma Massenspektrometrie und Totalreflexions-Röntgenfluoreszenzanalyse. M. Sc. Thesis, University of bremen, 116 pp.

Fitz, N. 2007. Methodenentwicklung zur Bestimmung polybromierter Diphenylether im Fettgewebe mariner Säuger mittels GC/MS. M. Sc. Thesis, University of Applied Science, Hamburg, 102 pp.

#### Working Papers

Fahrenholtz, S. Bestimmung von Elementen in verschiedenen Geweben von Schweinswalen (*Phocoena phocoena*) der Nord- und Ostsee mittels induktiv gekoppelter Plasma Massenspektrometrie und Totalreflexions-Röntgenfluoreszenzanalyse. Diplomarbeit, Universität Hamburg, 2007.

Fitz, N. Methodenentwicklung zur Bestimmung polybromierter Diphenylether im Fettgewebe mariner Säuger mittels GC/MS. Diplomarbeit, Hochschule für Angewandte Wissenschaften Hamburg, 2007

## **12. Contact addresses**

Benke, H., Director, Deutsches Meeresmuseum, Katharinenberg 14-20, D-18439 Stralsund, e-mail  
Harald.Benke@meeresmuseum.de

Stefan Bräger, Deutsches Meeresmuseum, Katharinenberg 14 – 20, D-18439 Stralsund, e-mail  
stefan.braeger@meeresmuseum.de

Czeck, Richard, Nationalparkverwaltung Nds Wattenmeer, Virchowstrasse, D-26382 Wilhelmshaven, e-mail [richard.czeck@nlpy-wattenmeer.niedersachsen.de](mailto:richard.czeck@nlpy-wattenmeer.niedersachsen.de)

Dähne, M., Deutsches Meeresmuseum, Katharinenberg 14 – 20, D-18439 Stralsund, e-mail [michael.daehne@meeresmuseum.de](mailto:michael.daehne@meeresmuseum.de)

Deimer, P., Gesellschaft zum Schutz der Meeressäuger, Garstedter Weg 4, Hasloh, e-mail [pdeimer@gsm-ev.de](mailto:pdeimer@gsm-ev.de)

Wolfgang Dinter, Bundesamt für Naturschutz, FG I 3.2 Meeres- und Küstennaturschutz, Insel Vilm, 18581 Putbus (Rügen), e-mail: [wolfgang.dinter@bfn-vilm.de](mailto:wolfgang.dinter@bfn-vilm.de)

Giewat, H., Forschungs – und Technologiezentrum Westküste der Christian Albrechts Universität Kiel, Werftstrasse 6, D-25761 Büsum, e-mail [Giewat@ftz-west.uni-kiel.de](mailto:Giewat@ftz-west.uni-kiel.de)

Gilles, A., Forschungs – und Technologiezentrum Westküste der Christian Albrechts Universität Kiel, Werftstrasse 6, D-25761 Büsum, e-mail [Gilles@ftz-west.uni-kiel.de](mailto:Gilles@ftz-west.uni-kiel.de)

Hasselmeier, I., Forschungs – und Technologiezentrum Westküste der Christian Albrechts Universität Kiel, Werftstrasse 6, D-25761 Büsum, e-mail [ih@ftz-west.uni-kiel.de](mailto:ih@ftz-west.uni-kiel.de)

Herr, H., Forschungs – und Technologiezentrum Westküste der Christian Albrechts Universität Kiel, Werftstrasse 6, D-25761 Büsum, e-mail [Herr@ftz-west.uni-kiel.de](mailto:Herr@ftz-west.uni-kiel.de)

Kock, K.-H., Institut für Seefischerei, Johann Heinrich von Thünen Institut, Palmaille 9, D-22767 Hamburg, e-mail [karl-hermann.kock@vti.bund.de](mailto:karl-hermann.kock@vti.bund.de)

Lucke, K., Forschungs – und Technologiezentrum Westküste der Christian Albrechts Universität Kiel, Werftstrasse 6, D-25761 Büsum, e-mail [lucke@ftz-west.uni-kiel.de](mailto:lucke@ftz-west.uni-kiel.de)

Meding, A., Deutsches Meeresmuseum, Katharinenberg 14 – 20, D-18439 Stralsund, e-mail [anja.meding@meeresmuseum.de](mailto:anja.meding@meeresmuseum.de)

Ritter, F., M.E.E.R. e.V., Bundesallee 123, 12161 Berlin, e-mail [meer@infocanarias.com](mailto:meer@infocanarias.com)

Seibel, H. ., Forschungs- und Technologiezentrum Westküste der Christian-Albrecht-Universität Kiel,  
Werftstraße 6, D-25761 Büsum, e-mail [seibel@ftz-west.uni-kiel.de](mailto:seibel@ftz-west.uni-kiel.de)

Siebert, U., Forschungs- und Technologiezentrum Westküste der Christian-Albrecht-Universität Kiel,  
Werftstraße 6, D-25761 Büsum, e-mail [siebert@ftz-west.uni-kiel.de](mailto:siebert@ftz-west.uni-kiel.de)

Sundermeyer, J., Forschungs- und Technologiezentrum Westküste der Christian-Albrecht-Universität Kiel,  
Werftstraße 6, D-25761 Büsum, e-mail [sundermeyer@ftz-west.uni-kiel.de](mailto:sundermeyer@ftz-west.uni-kiel.de)

Sonnenschmidt, D., Forschungs- und Technologiezentrum Westküste der Christian-Albrecht-Universität Kiel,  
Werftstraße 6, D-25761 Büsum, e-mail [sonne@ftz-west.uni-kiel.de](mailto:sonne@ftz-west.uni-kiel.de)

Schnall, U., Barthelmess, K., Deutsches Schiffahrtsmuseum. Hans Scharoun Platz 1, D-27568 Bremerhaven.

Tiedemann, R. Universität Potsdam, Institut für Biochemie und Biologie, Evolutionsbiologie/Spezielle Zoologie,  
Karl-Liebknecht-Strasse 24 – 25, Haus 25, D-14 476 Golm. e-mail [tiedemann@rz.uni-potsdam.de](mailto:tiedemann@rz.uni-potsdam.de)

Verfuss, U. K. Deutsches Meeresmuseum, Katharinenberg 14-20, D-18439 Stralsund, e-mail  
[ursula.verfuss@meeresmuseum.de](mailto:ursula.verfuss@meeresmuseum.de)