2009 Program Review

Antarctic Ecosystem Research Division

U.S. Antarctic Marine Living Resources Program

NOAA

Letter of Introduction

Dear Colleagues,

Welcome to the Southwest Fisheries Science Center, and thank you for attending this review of our Antarctic Ecosystem Research Division. The review provides NOAA Fisheries, the Center, and the Division a timely and important opportunity to evaluate its current program of applied research in the Antarctic (a program known as the U.S. AMLR Program). Perhaps more importantly, the review also provides *you* an opportunity to influence how, in the future, the U.S. AMLR Program might expand and adapt to supply results that can be used to advise on an emerging suite of topics related to ecosystem-based management and the impacts of climate change.

I encourage all of you to participate in the review by thinking about the future, considering the current research undertaken by the AERD, asking questions aimed to determine whether the current research will be sufficient to meet the real and perceived needs for advice in the future, and providing commentary that will ultimately help the Division to meet these needs. I look forward to hearing your views over the coming three days.

Sincerely,

Norm Bartoo, Acting Director
Southwest Fisheries Science Center

Table of Contents

Terms of Reference	2
Agenda	3
Plans for the Review	4
Personnel	5
Leadership in CCAMLR	6
Submissions to CCAMLR	8
Peer-Reviewed Publications	11
Other Publications Technical Reports	16
Student and Post-doc Support	17
Major External Partners and Collaborators	18
Substantive Publications	19
Appendix I	21
Guide to Acronyms used in the Review Packet	

Terms of Reference

The Antarctic Ecosystem Research Division (AERD) conducts research to fulfill NOAA's mandate of providing scientific advice that supports United States interests related to resource management by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), of which the U.S. is a Member. NOAA's Antarctic research is mandated by the U.S. Antarctic Marine Living Resources (AMLR) Convention Act of 1984, and, thus, the program of work undertaken and managed by the AERD is widely known as the U.S. AMLR Program. The U.S. AMLR Program is internationally recognized for its ongoing contributions to ecosystem-based management of fisheries that impact krill, finfishes, krill-dependent predators, and other components of the Antarctic ecosystem, but the Program's scientific endeavor has not been comprehensively reviewed by a panel external to NOAA Fisheries since 1992.

A contemporary review of the U.S. AMLR Program is needed because the CCAMLR requires scientific advice on an evolving suite of issues that now extends beyond the requirements for advice which formed the initial basis of the Program. Thus, NOAA's mandate has evolved. Furthermore, NOAA's interests in the Antarctic extend beyond the CCAMLR's needs for advice, and the U.S. AMLR Program is continually being asked to contribute to broader Antarctic- and climate-science efforts. Securing the resources necessary to conduct work in the Antarctic (e.g., suitable research vessels) has been difficult, and the AERD must evaluate how the U.S. AMLR Program might evolve so that it can advise on "traditional" issues related to the ecosystem-based management of krill and finfish fisheries while simultaneously contributing information relevant to emerging topics such as climate change, vulnerable marine ecosystems and the conservation of biodiversity, and marine spatial planning. Given this background, NOAA Fisheries will host a review that is structured to address three terms of reference.

1. To review present and future needs for scientific advice related to ecosystem-based management of krill and finfish fisheries in the Southern Ocean; evaluate the ability of the AERD to provide critical elements of advice given the design and conduct of its present research and monitoring efforts, the financial and physical resources available to accomplish such work, and its present staffing level and expertise; and identify areas where directed research, expanded field operations, and investments in new technologies can improve or expand the advice that can be provided on such topics.

2. To review needs for scientific advice related to emerging issues such as climate change, the conservation of marine biodiversity, and marine spatial planning; evaluate whether the design and conduct of the AERD's work to provide scientific advice related to the management of krill and finfish fisheries constrains its ability to provide advice on these emerging issues; and determine how the U.S. AMLR Program might be expanded to increase the quantity and quality of advice that can be delivered on emerging issues while simultaneously maintaining the commitment to advise on ecosystem-based management of krill and finfish fisheries.

3. To identify ways by which NOAA, through the AERD, might leverage its resources and expertise with the resources and expertise of internal (e.g., other research divisions within NOAA Fisheries and other line offices within NOAA) and external (e.g., the NSF, academia, the British Antarctic Survey, etc.) partners to build synergies that simultaneously address NOAA's broad interests in Antarctic research, the mandates of the US AMLR Program, and other national or international research programs.

These terms of reference demand a review that is forward-looking, but due recognition needs to be given to the maintenance of existing time series. NOAA's AERD collects time-series data that are unique in the region and unequivocally valuable for providing the context needed to infer how, in the future, climate change and fishing will jointly impact Antarctic marine ecosystems. The review should therefore aim to identify core components of and data streams provided by the existing Program that need to be kept intact. Furthermore, while the review must emphasize discussions that address how the U.S. AMLR Program might evolve and expand in the future, equal emphasis should be placed on discussions that focus on how such evolution and expansion might tradeoff with the Program's existing approach and affect the continuity of existing time series. While looking forward, the review should also reflect on the AERD's present leadership roles within the CCAMLR scientific community and consider how such leadership can be maintained by recruiting and training a future generation of AERD staff members.

Agenda

Monday, 31 August 2009

1. Introduction -- 0830-1130
   1.1. Welcome, personal introductions, terms of reference, agenda, etc.
   1.2. Mandates, personnel, physical resources (e.g., equipment, camps, and ships), budget, etc.
   1.3. A year in the life of the US AMLR Program
   1.4. U.S. AMLR data sets

2. Krill and krill-dependent predators -- 1300-1600
   2.1. The Program's scientific approach and requirements for advice
   2.2. Gaps, threats, and opportunities
   2.3. Extending the Program and addressing climate change

Evening reception -- 1630-?

Tuesday, 1 September 2009

2. Krill and krill-dependent predators continued -- 0830-1000

3. Finfishes and benthic invertebrates -- 1000-1130
   3.1. The Program's scientific approach and requirements for advice
   3.2. Gaps, threats, and opportunities
   3.3. Extending the Program and addressing climate change

4. Marine biodiversity and spatial management -- 1300-1430
   4.1. The Program's scientific approach and requirements for advice
   4.2. Gaps, threats, and opportunities
   4.3. Extending the Program and addressing climate change

5. Leveraging resources in partnership with other programs, recruiting and training new scientists, and maintaining leadership roles within the CCAMLR scientific community -- 1430-1530

6. Summary and general wrap up -- 1530-1600

Wednesday, 2 September 2009

Further discussions, interviews, etc. as required by the Review Panel; panelists shall also work to prepare their reports.

Plans for the Review

The review will be conducted over a period of three days, from 31 August - 2 September 2009. Presentations and open discussion will occur during the first two days. The third day will be reserved for private discussions between members of the Review Panel, interviews between members of the Review Panel and staff of the AERD, and discussions with SWFSC and NMFS leadership. The Review Panel will be provided with a conference room in which they can have discussions, prepare their reports, etc.

Five experts who are external to NOAA Fisheries have been invited to conduct the review; these panelists are identified in the following list.

Professor Eileen Hofmann (Old Dominion University)
Professor Marc Mangel (University of California, Santa Cruz) – Panel Chair
Dr. Denzil Miller (Executive Secretary, CCAMLR)
Dr. Polly Penhale (National Science Foundation)
Dr. Phil Trathan (British Antarctic Survey)

These well-respected individuals are familiar with various aspects of the CCAMLR's requirements for scientific advice and Antarctic science more generally. The Panel Chair will act to coordinate conduct of the review, ensuring that discussions occurring over the course of the review provide sufficient information for the Panel to provide commentary and advice (both verbally and within written reports) that directly addresses the Terms of Reference. Each panelist will provide a written report. Although these reports must be independent, the Panel Chair will work to coordinate the reporting, for example, by providing the Panel with a common outline.

The review will be attended by a number of *ex-officio* participants who will have equal opportunity to ask questions and participate in discussions. These *ex-officio* participants include:

Mr. Evan Bloom (Department of State, US Commissioner to the CCAMLR)
Dr. Ned Cyr (Director, Office of Science and Technology, NOAA Fisheries)
Dr. Rebecca Lent (Director, Office of International Affairs, NOAA Fisheries)
Dr. Steve Murawski (Director of Scientific Programs and Chief Science Advisor, NOAA Fisheries).

A number of other individuals have also been invited to attend the review. These individuals include various stakeholders (including NGOs) and interested parties who will be able to ask questions and participate in discussions as time allows. The Panel Chair will be responsible for providing opportunity for the *ex-officio* participants and other invitees to ask questions and provide commentary.

The Review Panel, *ex-officio* participants, and other invited attendees are asked to consider four questions that are relevant to the Terms of Reference.

1. Under budget-neutral conditions, is the AERD's current approach to implementing the U.S. AMLR Program sufficient to address NOAA's mandates? If not, what science should be conducted to expand the U.S. AMLR Program and, simultaneously, what aspects of the present approach (including time-series data) should be de-emphasized to facilitate such expansion? Alternatively, if the AERD budget grows, what science should be added to the Program as a priority?
2. In the future, how should the AERD balance the collection of time-series data with project-based studies (e.g., projects that aim to characterize baselines in new areas or for new taxa)? Has the existing approach that aims to conduct both types of work by adding approximately 30 days to every other research cruise been sufficient?
3. Is the U.S. AMLR survey area the most appropriate area and is the U.S. AMLR Program focused on the most appropriate taxa given the evolving needs for advice and the likely impacts of climate change?
4. What specific aspects of climate change and its impacts on the Antarctic marine ecosystem should be the focus of future research within the U.S. AMLR Program?

Personnel

Director
George Watters, PhD

"Deputy Director"
Stephanie Sexton

Leader, Krill and oceanography
Christian Reiss, PhD

Leader, Finfishes and benthic invertebrates
Christopher Jones, PhD

Leader, Seabirds
Wayne Trivelpiece, PhD

Leader, Pinnipeds
Mike Goebel, PhD

Pinnipeds and logistics (camps)
Doug Krause

Acoustic and logistics (ships)
Tony Cossio

Administration and scientific technician
Amy Van Cise

Seabirds (NOAA Student Career Experience)
Jefferson Hinke

Stock assessment
Vacant

Camp manager and scientific observer coordination (NOAA Corps officer)
Raul Vasquez del Mercado

Leadership in CCAMLR
2000 - present

George Watters

2009	**Co-Convener**, Joint CEP \ SC-CAMLR Workshop
2009	**Co-Convener**, CCAMLR 2nd Workshop on Fisheries and Ecosystem Models in the Antarctic
2008-present	**Convener**, WG-EMM, CCAMLR
2005	**Co-Convener**, Workshop on Management Procedures, WG-EMM

Christopher Jones

2009	**Convener**, CCAMLR Workshop on Vulnerable Marine Ecosystems
2009	**Co-Convener**, CCAMLR 2nd Workshop on Fisheries and Ecosystem Models in the Antarctic
2008-present	**Convener**, WG-FSA
2007	**Convener**, WG-SAM
2005-2006	**Convener**, WG-FSA-SAM
2005-present	Editorial Board of *CCAMLR Science*

Wayne Trivelpiece

2002	**Convener**, Workshop on Small Scale Management Units

Mike Goebel

2005-present	**Convener**, Sub-group on Methods, WG-EMM

Christian Reiss

2006	**Co-Convener**, Second Workshop on Management Procedures, WG-EMM

Rennie Holt

2005-2008	**U.S. Scientific Representative** to CCAMLR
2001-2005	**Chair**, CCAMLR Scientific Committee
2000-2001	**U.S. Scientific Representative** to CCAMLR

Roger Hewitt

2001-2005	**U.S. Scientific Representative** to CCAMLR
2000-2005	**Convener**, WG-EMM
2001	**Convener**, Workshop on Future Agenda of WG-EMM
2000	**Convener**, B_0 Workshop

Participation in CCAMLR meetings

Support of CCAMLR by Year										
Participant	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
George Watters										
WG-EMM			x	x	x	x	x	x	x	x
WG-SAM								x	x	x
Scientific Committee									x	x
Commission										x
Christopher Jones										
WG-FSA	x	x	x	x	x	x	x	x	x	x
WG-EMM			x	x	x	x	x	x	x	x
WG-SAM								x	x	x
Scientific Committee	x	x	x	x	x	x	x	x	x	x
Commission		x		x	x	x	x	x	x	x
Christian Reiss										
WG-EMM						x	x	x	x	x
WG-SAM								x	x	x
Mike Goebel										
WG-EMM	x	x	x	x	x	x	x	x	x	x
WG-SAM								x	x	
Wayne Trivelpiece										
WG-EMM	x	x	x	x	x	x	x	x	x	x
WG-SAM								x	x	
Rennie Holt										
WG-FSA	x	x	x	x	x	x	x	x	x	x
WG-EMM	x	x	x	x	x	x	x	x	x	x
WG-SAM								x	x	x
Scientific Committee	x	x	x	x	x	x	x	x	x	x
Commission	x	x	x	x	x	x	x	x	x	x
Roger Hewitt										
WG-EMM	x	x	x	x	x	x				
Scientific Committee	x	x	x	x	x	x				
Commission	x	x	x	x	x					
Jefferson Hinke										
WG-EMM						x	x	x	x	x
WG-SAM								x	x	
Dave Demer										
WG-EMM	x	x	x	x	x			x		

- Members of the AERD have also participated in other meetings and workshops; these include the CCAMLR WG-FSA Subgroup on Assessment Methods, the Bioregionalization Workshop, the Workshop on Estimating Age in Patagonian Toothfish, the Workshop on the Assessment and Management of Mackerel Icefish, the Subgroup on Methods, the Subgroup on Acoustic Survey Analysis Methods, the Predator Survey Workshop, the CEP, and the SCAR Standing Scientific Group of Life Sciences.

Submissions to CCAMLR
2000 - present

2009

Hinke, J, C Reiss and W Trivelpiece. 2009. Strong effects of environmental conditions on reproductive success of penguins at King George Island. WG-EMM-09/43.

Hinke, J, S Trivelpiece and W Trivelipece. 2009. Rapid climate change and life history: how plastic is the Adélie penguin? WG-EMM-09/34.

*Lockhart, SJ and CD Jones. 2009. Detection of vulnerable marine ecosystems in the Southern Scotia Arc (CCAMLR subareas 48.1 and 48.2) through research bottom trawl sampling and underwater imagery. WG-EMM-09/32.

Santora, JA, CS Reiss, VJ Loeb and RR Veit. 2009. Demographic patterns of Antarctic krill (*Euphausia superba*) explain the spatial segregation of baleen whales (Mysticeti) around the South Shetland Islands, Antarctica. WG-EMM-09/33.

Southwell, C, J Forcada, M Goebel, J Hinke, H Lynch, P Lyver, J McKinlay, N Ratcliffe, D Ramm, K Reid, C. Reiss, W Trivelpiece, S Trivelpiece and P Trathan. 2009. Update on progress in intersessional work from the Predator Survey Workshop. WG-EMM-09/39.

*Trivelpiece, WZ, JT Hinke, AK Miller, CS Reiss, SG Trivelpiece, and GM Watters. 2009. Chinstrap penguins: vulnerable monitors of ecosystem changes in the Scotia Sea region of Antarctica. WG-EMM-09/17.

*Watters, GM, S Hill, JT Hinke, and P Trathan. 2009. The risks of not deciding to allocate the precautionary krill catch limit among SSMUs and allowing uncontrolled expansion of the krill fishery up to the trigger level. WG-EMM-09/12.

Wilson, NG. 2009. Using genetic connectivity to identify vulnerable marine ecosystems (VMEs) in Antarctica - the issue of scale. WS-VME-09/6.

---

* These papers are some of the most substantive contributions by the AERD, and are available online. See page 20 for more information.

2008

Forcada, J, M Goebel, J Hinke, D Ramm, K Reid, P Trathan and W Trivelpiece. 2008. Report of the Predator Survey Workshop. WG-EMM-08/08.

Goebel, ME, DE Torres, A Miller, J Santora, D Costa and P Diaz. 2008. Antarctic fur seal pup production and population trends in the South Shetland Islands with special reference to sources of error in pup production estimates. WG-EMM-PSW-08/14.

Hanchet, SM, ML Stevenson, CD Jones, PM Marriott, PJ McMillan, RL O'Driscoll, D Stevens, A Stewart and BA Wood. 2008. Biomass estimates and size distributions of demersal finfish on the Ross Sea shelf and slope from the New Zealand IPY-CAML survey, February-March 2008. WG-FSA-08/31.

Hill, S, JT Hinke, E. Plagányi and GM Watters. 2008. Reference observations for validating and tuning operating models for krill fishery management in Area 48. WG-EMM-08/10.

Hinke, JT, GM Watters and WZ Trivelpiece. 2008. Down-scaling FOOSA to model the Admiralty Bay Pygoscelid penguin colonies: a work in progress. WG-EMM-08/51.

Lynch, H, R Naveen, J McKinlay, C Southwell, P Trathan, W Trivelpiece, S Trivelpiece and D Ramm. 2008. Preliminary estimation of penguin breeding abundance at spatial-scales of relevance to CCAMLR: incorporating uncertainty in count data. WG-EMM-08/53.

Reiss, CS. 2008. Calibration error in the AMLR plankton time series. WG-EMM-08/19.

Reiss, CS. 2008. Updated krill recruitment data for the Elephant Island region of the South Shetland Islands, Antarctica; 2002-2008. WG-EMM-08/41.

Reiss CS and A Cossio. 2008. Comparison of the biomass of Antarctic krill (*Euphausia superba*) around the South Shetland and South Orkney Islands in three years: 1999, 2000 and 2008. WG-EMM-08/26.

Watters, GM, JT Hinke and S Hill. 2008. A risk assessment to advise on strategies for subdividing a precautionary catch limit among small-scale management units during stage 1 of the staged development of the krill fishery in Subareas 48.1, 48.2 and 48.3. WG-EMM-08/30.

Watters, GM, JT Hinke, and S Hill. 2008. Developing four plausible parameterisations of FOOSA (a so-called reference set of parameterisations) by conditioning the model on a calendar of events that describes changes in the abundances of krill and their predators in the Scotia Sea. WG-EMM-08/13.

2007

Demer, DA, AM Cossio and CS Reiss. 2007. CCAMLR 2000 revisited. WG-EMM-07/30 Rev 1.

Hinke, JT. 2007. Time and energy budgets during winter for gentoo penguins (*Pygoscelis* papua) in the South Shetland Islands. WG-EMM-07/10.

Reiss, CS and AM Cossio. 2007. Krill biomass update of the South Shetland and Elephant Island regions of Area 48. WG-EMM-07/31.

Southwell, C, P Trathan, W Trivelpiece, M Goebel and P Wilson. 2007. Developments, considerations and recommendations by the land-based predator survey correspondence group: a second summary and up-date. WG-EMM-07/20.

2006

Croll, DA, DA Demer, RP Hewitt, JK Jansen, ME Goebel and BR Tershy. Effects of variability in prey abundance on reproduction and foraging in Chinstrap penguins (*Pygoscelis Antarctica*). WG-EMM-06/06.

Goebel, M.E., B.I. McDonald, J.D. Lipsky, V. Vallejos, R.A. Vargas, O. Blank, D.P. Costa, N.J. Gales. 2006. A life table for female Antarctic fur seals breeding at Cape Shirreff, Livingston Island. WG-EMM-06/39.

Hinke, J, G Watters, S Hill and K Reid. 2006. A comparison of model predictions from KPFM1 and KPFM2. WG-EMM-06/20.

Jones, CD and K-H Kock . 2006. Standing stock, spatial distribution and biological features of demersal finfish from the 2006 US AMLR bottom trawl survey of the northern Antarctic Peninsula and Joinville/D'Urville islands (Subarea 48.1). WG-FSA-06/14.

Reiss, CS and AM Cossio. 2006. A review and update of krill biomass trends in the South Shetland Islands, Antarctica, using the simplified stochastic wave born approximation. WG-EMM-06/32.

Watters, GM, JT Hinke, K Reid and S Hill. 2006. KPFM2, be careful what you ask for – you just might get it. WG-EMM-06/22.

2005

Lipsky, JD, ME Goebel, CS Reiss and VJ Loeb. 2005. Using carapace measurements to determine the sex of Antarctic krill (*Euphausia superba*). WG-EMM-05/26.

Southwell, C, P Trathan, W Trivelpiece, M Goebel and P Wilson. 2005. Developments, considerations and recommendations by the land-based predator survey group: a summary and up-date. WG-EMM-05/ 24.

Watters, GM, JT Hinke, K Reid, and S Hill. 2005. A krill-predator-fishery model for evaluating candidate management procedures. WG-EMM-05/13.

Watters, GM, JT Hinke, K Reid, and S Hill. 2005. Summary of work done to augment and enhance that presented in WG-EMM-05/13. WG-EMM-05/13 Appendix 3.

2004

Jones, CD, SJ Lockhart and DF Doolittle, 2004. Observations of demersal fish, benthic communities, and seafloor habitats of the Southern Ocean Atlantic sector. WG-FSA-04/61.

Goebel, ME, V Loeb, DP Costa, SN Sexton, AR Banks, JD Lipsky and AC Allen. 2004. Krill caught by predators and nets revisited: interpreting prey selection in proper temporal–spatial scales. WG-EMM-04/49.

Reid, K and G Watters. 2004. Approaches to the simplification of the summary and presentation of CEMP data. WG-EMM-04/61.

Rutishauser, MR, DP Costa, ME Goebel and TM Williams. 2004. Ecological implications of body composition and thermal capabilities in young Antarctic fur seals (*Arctocephalus gazelle).* WG-EMM-04/69.

Southwell, C, J Clarke, K Reid, G Watters, and D Ramm. 2004. Review of the CEMP standard methods and their delivery to the CEMP database. WG-EMM-04/70.

Watters, G and K Reid. 2004. Approaches to evaluating and testing of CEMP methods for parameters A1, A5 and A7. WG-EMM-04/60.

2003

Corsolini, S, WZ Trivelpiece and S Focardi. 2003. Developing a non-lethal approach for assessing endocrine disruptors in Antarctic seabirds. WG-EMM-03/57.

Goebel, ME. 2003. Antarctic fur seal predator performance indices for the South Shetland Islands 1987/88–2002/03. WG-EMM-03/54.

Jones, CD, K-H Kock, J Ashford, A DeVries, K Dietrich, S Hanchet, T Near, T Turk and S Wilhelms. 2003. Standing stock, biology, diet and spatial distribution of demersal finfish from the 2003 US AMLR bottom trawl survey of the South Shetland Islands (Subarea 48.1). WG-FSA-03/38.

Kock, K-H, H Flores, CD Jones, S Wilhelms and S Schöling. 2003. The food and feeding of five species of icefish in the Elephant Island – South Shetland Islands Region in March 2003. WG-FSA-03/60.

Trivelpiece WZ, S Salwicka and SG Trivelpiece. 2003. Synopsis of CEMP and non-CEMP predator parameters from Admiralty Bay and Cape Shirreff, South Shetland Islands, Antarctica: their relationships to krill abundance and sea ice cover, 1978-2003. WG-EMM-03/61.

Watters, GM, RP Hewitt, WZ Trivelpiece and ME Goebel. 2003. Power Analyses of CEMP indices for penguins and seals at Admiralty Bay and fur seals at Cape Shirreff and Seal Island. WG-EMM-03/52.

2002

Goebel, ME 2002. Foraging range and at-sea locations of female Antarctic fur seals, Cape Shirreff, Livingston Island, from 1999 to 2002. WG-EMM-02/53.

Goebel, ME 2002. A proposal for modifications to standard method C2: fur seal pup growth. WG-EMM-02/52.

Goebel, ME 2002. Antarctic fur seals in the South Shetland Islands: pup production and population trends. WG-EMM-02/51.

Jones, CD and M Hull. 2002. The US commercial krill fishery in Area 48: development, fishing patterns, and decision making. WG-EMM-02/18.

2001

Ashford, JR and CD Jones. 2001. Using hierarchical methods for sub-sampling hauls by trawl during fisheries surveys. WG-FSA-01/68.

Goebel, ME 2001. Pinniped research at Cape Shirreff, Livingston Island, Antarctica, 2000/01. WG-EMM-01/43.

Jones, CD and JH Emery. 2001. Notes on *Champsocephalus gunnari* biology, availability, diet and spatial distribution in the South Shetland Islands and South Orkney Islands. WG-WAMI-01/10.

Jones, CD, K-H Kock, D Ramm, J Ashford, S Wilhelms, T Near, N Gong and H Flores. 2001. Results and standing stock biomass estimates of finfish from the 2001 US AMLR bottom trawl survey of the South Shetland Islands (Subarea 48.1). WG-FSA-01/33.

Trivelpiece, WZ and SG Trivelpiece. 2001. Penguin demography and winter distributions in the Antarctic Peninsula region. WG-EMM-01/32.

2000

Carten, TM, WZ Trivelpiece, MR Taft and RS Holt. 2000. Seabird Research at Cape Shirreff, Livingston Island, Antarctica, 1999-2000. WG-EMM-00/62.

Goebel, ME. 2000. Krill length distribution in fur seal diet at Cape Shirreff, Livingston Island, 1999/2000. WG-EMM-00/59.

Goebel, ME. 2000. Pinniped research at Cape Shirreff, Livingston Island, Antarctica, 1999/2000. WG-EMM-00/47.

Jones, CD. 2000. Notes on the commercial krill harvest of the Japanese stern trawler Chiyo Maru No. 5 in subarea 48.1. WG-EMM-00/15.

Trivelpiece WZ, S Salwicka, L Shill and S Trivelpiece. 2000. The length-frequency distribution of krill in the diets of predators at Admiralty Bay, King George Island, Antarctica in the austral summer of 1999-2000. WG-EMM-00/41.

Peer-reviewed Publications
2000 - present

In press

Hewes CD. 2009. Cell size of Antarctic phytoplankton as a biogeochemical condition. *Antarctic Science*. doi:10.1017/S0954102009990125

La Mesa, M, A DeFelice, CD Jones and K-H Kock. In press. Age and growth of spiny icefish, *Chaenodraco wilsoni* (Regan, 1914), off Joinville-D'Urville Islands Antarctic Peninsula. *CCAMLR Science*.

Lynch, H, R Fagan, R Naveen, SG Trivelpiece and WZ Trivelpiece. In press. Timing of clutch initiation in *Pygoscelis* penguins on the Antarctic Peninsula: towards an improved understanding of off-peak census correction factors. *CCAMLR Science*.

McDonald, BI, ME Goebel, DE Crocker, Y Tremblay and DP Costa. In press. Impacts of maternal traits, environment, and individual behavior on foraging strategies and provisioning of an income breeder, the Antarctic fur seal. *Marine Ecology Progress Series.*

Miller, AK, N Karnovsky and WZ Trivelpiece. In press. Flexible foraging strategies of gentoo penguins provide a buffer against inter-annual changes in prey availability. *Marine Biology.*

Polito, MJ, A Miller, SG Trivelpiece and WZ Trivelpiece. In press. Effects of female age, breeding experience and laying date on clutch and egg size in the Adélie penguin (*Pygoscelis adeliae*). *Ibis.*

Polito, MJ, S Fisher, CR Tobias and S Emslie. In press. Tissue-specific isotopic discrimination factors in gentoo penguin (*Pygoscelis papua*) egg components: Implications for dietary reconstruction using stable isotopes. *Journal of Experimental Marine Biology and Ecology*.

Santora, JA, KS Dietrich and D Lombard. In press. Fish trawling activity and seabird-vessel attendance near the northern Antarctic Peninsula. *Marine Ornithology*

2009

Atkinson A, V Siegel, EA Pakhomov, MJ Jessop, and V Loeb. 2009. A re-appraisal of the total biomass and annual production of Antarctic krill. *Deep Sea Research* 56: 727-740.

Hewes C.D. 2009. Cell size of Antarctic phytoplankton as a biogeochemical condition. *Antarctic Science*. doi:10.1017/S0954102009990125

Hewes CD, CS Reiss, and O Holm-Hansen. 2009. A quantitative analysis of sources for summertime phytoplankton variability over 18 years in the South Shetland Islands (Antarctica) region. *Deep Sea Research* 56: 1230-1241.

Kuhn, KL, TJ Near, CD Jones and JT Eastman. 2009. Aspects of the biology and population genetics of the Antarctic nototheniid fish *Trematomus nicolai*. *Copeia* 2:320-327.

Loeb VJ, EE Hofmann, J Klinck, O Holm-Hansen and WB White. 2009. ENSO and variability of the Antarctic Peninsula pelagic marine ecosystem. *Antarctic Science* 21:135-148.

Near, TJ, CD Jones and JT Eastman. 2009. Geographic intraspecific variation in buoyancy within each of four species of Antarctic notothenioid fishes. *Antarctic Science* 21:123–129.

Reiss, CS, CD Hewes and O Holm-Hansen. 2009. Influence of atmospheric teleconnections and. Upper Circumpolar Deep Water on phytoplankton biomass around Elephant Island, Antarctica. *Marine Ecology Progress Series* 377: 51-62.

Santora, JA, CS Reiss, AM Cossio and RR Veit. 2009. Interannual spatial variability of krill (*Euphausia superba*) influences seabird foraging behavior near Elephant Island, Antarctica. *Fisheries Oceanography* 18:20-35

Schiavone, A, S Corsolini, K Kannan, L Toa, WZ Trivelpiece, D Torres and S Focardi. 2009. Perfluorinated contaminants in fur seal pups and penguin eggs from South Shetland, Antarctica. *Science of the Total Environment* 407: 3899-3904.

Warren, JD, JA Santora and DA Demer. 2009. Submesoscale distribution of Antarctic krill and its avian and pinniped predators before and after a near gale. *Marine Biology* 156: 479-491.

Wiedenmann, J, KA Cresswell and M Mangel. 2009. Connecting recruitment of Antarctic krill and sea ice. *Limnology and Oceanography* 54: 799–811.

Wilson, NG, M Schrodl & KM Halanych. 2009. Ocean barriers and glaciation: evidence for explosive radiation of

mitochondrial lineages in the Antarctic sea slug *Doris kerguelenensis* (Mollusca, Nudibranchia). *Molecular Ecology* 18:965-984.

2008

Atkinson, A, V Siegel, EA Pakhomov, P Rothery, V Loeb, R Ross, L Quetin, K Schmidt, P Fretwell, E Murphy, G Tarling and A Fleming. 2008. Oceanic circumpolar habitats of Antarctic krill. *Marine Ecology Progress Series* 362: 1-23.

*Charrassin, J-B, M Hindell, SR Rintoul, F Roguet, S Sokolov, M Biuw, D Costa, L Boehme, P Lovell, R Coleman, R Timmerman, A Meijers, M Meredith, Y-H Park, R Bailleul, M Goebel, Y Tremblay, C-A Bost, CR McMahon, IC Field, MA Fedak, C Guinet. 2008. Southern Ocean frontal structure and sea-ice formation rates revealed by elephant seals. *Proceedings of the National Academy of Sciences* 105: 11634-11639

Hewes, CD, CS Reiss, M Kahru, BG Mitchell and O Holm-Hansen. 2008. Control of phytoplankton biomass by dilution and mixed layer depth in the western Weddell-Scotia Confluence (WSC). *Marine Ecology Progress Series* 366:205-213.

*Hewitt, RI, CD Jones and I Everson. 2008. Reconciling fisheries with conservation: three examples from the Southern Ocean. *American Fisheries Society Symposium* 49:1681-1697.

Jones, CD, ME Anderson, AV Balushkin, G Duhamel, RR Eakin, JT Eastman, KL Kuhn, G Lecointre, TJ. Near, AW North, DL Stein, M Vacchi, and HW Detrich III. 2008. Diversity, relative abundance, new locality records and population structure of Antarctic demersal fishes from the northern Scotia Arc islands and Bouvetøya. *Polar Biology* 31:1481-1497.

Kock, K-H, LV Pshenichnov, CD Jones, J Gröger and R Riehl. 2008. The Biology of the spiny icefish (*Chaenodraco wilsoni* Regan, 1914). *Polar Biology* 31:381-393.

Lockhart, SJ and CD Jones. 2008. Biogeographic patterns of benthic invertebrate megafauna on shelf areas within the Southern Ocean Atlantic sector. *CCAMLR Science* 15:167-192.

Miller, AK and WZ Trivelpiece. 2008. Chinstrap penguins alter foraging and diving behavior in response to the size of their principle prey, Antarctic krill. *Marine Biology* 154: 201-208.

O'Loughlin, PM and C Ahearn. 2008. Antarctic and sub-antarctic species of *Psolidium* Ludwig (Echinodermata: Holothuroidea: Psolidae). *Memoirs of Museum Victoria* 65: 23-42.

Polito, MJ and WZ Trivelpiece. 2008. Transition to independence and evidence of extended parental care in the gentoo penguin (*Pygoscelis papua*). *Marine Biology* 154: 231-240.

*Reiss, CS, AM Cossio, VJ Loeb and DA Demer. 2008. Variations in the biomass of Antarctic krill (*Euphausia superba*) around the South Shetland Islands, 1996–2006, ICES *Journal of Marine Science* 65: 497-508.

2007

Biuw, M, L Boehme, C Guinet, M Hindell, D Costa, J-B Charrassin, F Roquet, F Bailleul, M Meredith, S Thorpe, Y Tremblay, B McDonald, Y-H Park, SR Rintoul, N Bindoff, M Goebel, D Crocker, P Lovell, J Nicholson, F Monks and MA Fedak. 2007. Variations in behavior and condition of a Southern Ocean top predator in relation to in situ oceanographic conditions. *Proceedings of the National Academy of Science* 104(34): 13705–13710.

Goebel, ME, JD Lipsky, CS Reiss and VJ Loeb. 2007. Using carapace measurements to determine the sex of Antarctic krill, *Euphausia superba. Polar Biology* 30(3):307-315.

Hill, SL, K Reid, SE Thorpe, J Hinke and GM Watters. 2007. A compilation of parameters for ecosystem dynamics models of the Scotia Sea - Antarctic Peninsula region. *CCAMLR Science*. 14:1-25.

Hill, SL, GM Watters, AE Punt, MK McAllister, C Le Quere and J Turner. 2007. Model uncertainty in the ecosystem approach to fisheries. *Fish and Fisheries* 8: 1-22.

*Hinke, J, K Salwicka, SG Trivelpiece, GM Watters and WZ Trivelpiece. 2007. Divergent responses of *Pygoscelis* penguins reveal a common environmental driver. *Oecologia* 153: 845-855.

Kawaguchi, S, L Finley, S Jarmin, S Candy, R Ross, L Quetin, V Siegel, WZ Trivelpiece, S Nicol and M Naganobu. 2007. Male krill grow fast and die young. *Marine Ecology Progress Series* 345:199-210.

Miller, AK and WZ Trivelpiece. 2007. Cycles of *Euphausia superba* recruitment evident in the diet of Pygoscelid penguins and net trawls. *Polar Biology* 30: 1615-1623.

Near, TJ, JB Kendrick, HW Detrich and CD Jones. 2007. Confirmation of neutral buoyancy in *Aethotaxix mitopteryx* De Witt and comment on the subspecies *A. mitopteryx pawsoni* Miller (Notothenioidei: Nototheniidae). *Polar Biology* 30:443–447.

Sander, M, TC Balbao, M Polito, ER Costa and AP Bertoldi. 2007. Recent decrease in chinstrap penguin populations at two of Admiralty Bay's islets on King George Island, South Shetland Islands, Antarctica. *Polar Biology* 30: 659-661.

Trivelpiece, WZ, S Buckelew, CS Reiss and SG Trivelpiece. 2007. The winter distributions of chinstrap penguins from two breeding sites in the South Shetland Islands of Antarctica. *Polar Biology* 30: 1231-1237.

Wilson, NG, RL Belcher, SJ Lockhart, and KM Halanych. 2007. Multiple lineages and absence of panmixia in the Antarctic circumpolar crinoid Promachocrincis kerguelensis from the Atlantic Sector of Antarctica. Mar. Biol. 152(4) 895-904.

* These papers are some of the most substantive contributions by the AERD, and are available online. See page 20 for more information.

2006

Conti, SG and DA Demer. 2006. Improved parameterization of the SDWBA for estimating krill target strength. *ICES Journal of Marine Science* 63 928-935.

Croll, DA, DA Demer, RP Hewitt, JK Jansen, ME Goebel and BR Tershy. 2006. Effects of variability in prey abundance on reproduction and foraging in chinstrap penguins (*Pygoscelis antarctica*). *Journal of Zoology* 269:506–513.

Tremblay, Y, SA Shaffer, SL Fowler, CE Kuhn, BI McDonald, MJ Weise, C Bost, H Weimerskirch, DE Crocker, ME Goebel, DP Costa. 2006. Interpolation of tracking data in a fluid environment. *The Journal of Experimental Biology* 209: 128-140.

2005

*Demer, DA and SG Conti. 2005. New target-strength model indicates more krill in the Southern Ocean. *ICES Journal of Marine Science* 62: 25-32.

Detrich, HW, CD Jones, S Kim, AW North, A Thurber and M Vacchi. 2005. Nesting behavior of the icefish *Chaenocephalus aceratus* at Bouvetøya Island, Southern Ocean. *Polar Biology* 28:828-832.

Holm-Hansen, O, M Kahru and CD Hewes. 2005. Deep chlorophyll-a maxima (DCMs) in Antarctic waters: II, Occurrence of DCMs in Circumpolar Pelagic Waters in relation to bathymetric features and dissolved iron concentrations. *Marine Ecology Progress Series* 297:71-81.

*Kock, K-H and CD Jones. 2005. Fish Stocks in the Southern Scotia Arc Region – A Review and Prospects for Future Research. *Reviews in Fishery Science* 13:75–108.

Siegel, V. 2005. Distribution and population dynamics of *Euphausia superba*: summary of recent findings. *Polar Biology* 29: 1-22.

2004

*Atkinson, A, V Siegel, E Pakhomov and P Rothery. 2004. Long-term decline in krill stock and increase in salps within the Southern Ocean. *Nature* 432: 100-103.

Berge, J, W. Vader and SJ Lockhart. 2004. A survey of amphipod associates of sea urchins with a description of new species in the genera *Lepidepecreella* and one new species of *Notopoma* from Antarctic cidaroids. Deep Sea Research II 51:1717-1732.

Brandon, MA, M Naganobu, DA Demer, P Chernyshkov, PN Trathan, SE Thorpe, T Kameda, OA Berezhinskiy, EJ Hawker and S Grant. 2004. Physical Oceanography in the Scotia Sea during the CCAMLR 2000 survey, austral summer 2000. *Deep Sea Research II* 51:1301-1322.

* These papers are some of the most substantive contributions by the AERD, and are available online. See page 20 for more information.

Demer, DA. 2004. An estimate of error for the CCAMLR 2000 survey estimate of krill biomass. *Deep Sea Research II* 51: 1237-1253.

Flores, H, K-H Kock, S Wilhelms and CD Jones. 2004. Diet of two icefish species from the Southern Shetland Islands and Elephant Island, *Champsocepalus gunnari* and *Chaenocephalus aceratus*. *Polar Biology* 27:119-129.

Hewitt, RP, S Kim, M Naganobu, M Gutierrez, D Kang, Y Takao, J Quinones, Y-H Lee, H-C Shin, S Kawaguchi, JH Emery, DA Demer and VJ Loeb. 2004. Variation in the biomass density and demography of Antarctic krill in the vicinity of the South Shetland Islands during the 1999/2000 austral summer. *Deep Sea Research II* 51:1411-1420.

Hewitt, RP, J Watkins, M Naganobu, V Sushin, AS Brierley, D Demer, S Kasatkina, Y Takao, C Goss, A Malyshko, M Brandon, S Kawaguchi, V Siegel, P Trathan, J Emery, I Everson and D Miller. 2004. Biomass of Antarctic krill in the Scotia Sea in January/February 2000 and its use in revising an estimate of precautionary yield. *Deep Sea Research II* 51:1215-1236.

Hewitt, RP, GM Watters, PN Trathan, JP Croxall, ME Goebel, D Ramm, K Reid, WZ Trivelpiece and JL Watkins. 2004. Options for allocating the precautionary catch limit of krill among small-scale management units in the Scotia Sea. *CCAMLR Science* 11: 81-97.

Holm-Hansen, O and CD Hewes. 2004. Deep chlorophyll-a maxima (DCMs) in Antarctic waters. *Polar Biology* 27: 699-710.

Holm-Hansen, O, M Kahru, CD Hewes, S Kawaguchi, T Kameda, VA Sushin, I Krasovski, J Priddle, R Korb, RP Hewitt and BG Mitchell. 2004. Temporal and spatial distribution of cholorophyl-*a* in surface waters of the Scotia Sea as determined by both shipboard measurements and satellite data. *Deep Sea Research II* 51:1323-1333.

Holm-Hansen, O, M Naganobu, S Kawaguchi, T Kameda, I Krasovski, P Tchernyshkov, J Priddle, R Korb, M Brandon, D Demer, RP Hewitt, M Kahru and CD Hewes. 2004. Factors influencing the distribution, biomass, and productivity of phytoplankton in the Scotia Sea and adjoining waters. *Deep Sea Research II* 51:1333-1350.

Jones, CD and DC Ramm. 2004. The commercial harvest of krill in the southwest Atlantic before and during the CCAMLR 2000 Survey. *Deep Sea Research Part II* 51:1421-1434.

Kasatkina, SM, C Goss, JH Emery, Y Takao, FF Litvinov, AP Malyshko, VN Shnar and OA Berenzhinsky. 2004. A comparison of net and acoustic estimates of krill density in the Scotia Sea during the CCAMLR 2000 survey. *Deep Sea Research II* 51:1289-1300.

Kawaguchi, S, V Siegel, F Litvinov, V Loeb and J Watkins. 2004. Salp distribution and size composition in the Atlantic sector of the Southern Ocean. *Deep Sea Research* 51:1369-1382.

Kock, K-H, L Pshenichnov, CD Jones, K Shust, KE Skora and ZhA Frolkina. 2004. Joinville-D'Urville Islands (Subarea 48.1) – a former fishing found for the spiny icefish

(*Chaenodraco wilsoni*), at the tip of the Antarctic Peninsula – revisited. *CCAMLR Science* 11:1-20.

Kock, K-H, M Belchier and CD Jones. 2004. Is the attempt to estimate the biomass of Antarctic fish from a multi-species survey appropriate for all targeted species? *Notothenia rossii* in the Atlantic Ocean sector – revisited. *CCAMLR Science* 11:141-155.

Lockhart, SJ, R Mooi and CD Jones. 2004. Benthic imagery of echinoids living in Antarctic shelf habitats. *Integrative and Comparative Biology* 44(6):721.

Murphy, EJ, SE Thorpe, JL Watkins and R Hewitt. 2004. Modeling the krill transport pathways in the Scotia Sea: spatial and environmental connections generating the seasonal distribution of krill. *Deep Sea Research II* 51:1435-1456.

Pearse, JS and SJ Lockhart. 2004. Reproduction in cold water: paradigm changes in the 20th century and a role for cidaroid sea urchins. *Deep Sea Research II* 51:1533-1549.

Reilly, S, S Hedley, J Borbery, R Hewitt, D Thiele, J Watkins and M Naganobu. 2004. Biomass and energy transfer to baleen whales in the South Atlantic sector of the Southern Ocean. *Deep Sea Research II* 51:1397-1410.

Rutishauser, MR, DP Costa, ME Goebel and TM Williams. 2004. Ecological implications of body composition and thermoregulation in young Antarctic fur seals (*Arctocephalus gazella*). *Physiological and Biochemical Zoology* 77(4):669-681.

Siegel, V, S Kawaguchi, P Ward, F Litvinov, V Sushin, V Loeb and J Watkins. 2004. Krill demography and large-scale distribution in the southwest Atlantic during January/February 2000. *Deep Sea Research II* 51:1253-1274.

Ward, P, S Grant, M Brandon, V Siegel, V Sushin, V Loeb and H Griffiths. 2004. Mesozooplankton community structure in the Scotia Sea during the CCAMLR 2000 survey: January-February 2000. *Deep Sea Research II* 51:1351-1368.

Watkins, JL, R Hewitt, M Naganobu and V Sushin. 2004. The CCAMLR 2000 survey: a multinational, multi-ship biological oceanography survey of the Atlantic sector of the Southern Ocean. *Deep Sea Research II* 51:1205-1214.

2003

Demer, DA and SG Conti. 2003. Reconciling theoretical versus empirical target strengths of krill: effects of phase variability on the distorted-wave Born approximation. *ICES Journal of Marine Science* 60: 429-434.

Demer, DA and SG Conti. 2003. Validation of the Stochastic Distorted-Wave Born approximation model with broad bandwidth total target strength measurements of Antarctic krill. *ICES Journal of Marine Science* 60: 625-635.

Hewitt, RP, DA Demer and JH Emery. 2003. An 8-year cycle in krill biomass density inferred from acoustic surveys conducted in the vicinity of the South Shetland Islands during the austral summers of 1991-1992 through 2001-2002. *Aquatic Living Resources* 16: 205-213.

Near, TJ, SE Russo, CD Jones and AL DeVries. 2003. Ontogenetic shift in buoyancy and habitat in the Antarctic toothfish, *Dissostichus mawsoni* (Perciformes: Nototheniidae) *Polar Biology* 26: 124-128.

2002

Hewitt, RP, JL Watkins, M Naganobu, P Tshernyshkov, AS Brierley, DA Demer, S Kasatkina, Y Takao, C Goss, A Malyshko, MA Brandon, S Kawaguchi, V Siegel, PN Trathan, JH Emery, I Everson, DGM Miller. 2002. Setting a Precautionary Catch Limit for Antarctic Krill. *Oceanography* 15:26-33.

Kock, K-H and CD Jones. 2002. The biology of the icefish *Cryodraco antarcticus* Dollo, 1900 (Pisces, Channichthyidae) in the southern Scotia Arc (Antarctica). *Polar Biology* 25: 416-424.

Phleger, CF, MM Nelson, BD Mooney and PD Nichols. 2002. Interannual and between species comparison of the lipids, fatty acids and sterols of Antarctic krill from the US AMLR Elephant Island survey area. *Comparative Biochemistry and Physiology* 131: 733-747.

Reid, K, EJ Murphy, V Loeb and RP Hewitt. 2002. Krill population dynamics in the Scotia Sea: variability in growth and mortality within a single population. *Journal of Marine Systems* 36:1-10.

2001

Amos, AF. 2001. A decade of oceanographic variability in summertime near Elephant Island, Antarctica. *Journal of Geophysical Research* 106: 22,401-22,423.

Costa DP, NJ Gales and ME Goebel. 2001. Aerobic dive limit: How often does it occur in nature? *Comparative Biochemistry and Physiology; Part A: Molecular & Integrative Physiology* 129A: 771-783.

Eakin, R, J Eastman, and CD Jones. 2001. Mental barbel variation in *Pogonophryne scotti* Regan (Pisces: Perciformes: Artedidraconidae). *Antarctic Science* 13: 363-37.

Naveen, R, SC Forrest, RG Dagit, LK Blight, WZ Trivelpiece and SG Trivelpiece. 2001. Zodiac landings by tourist ships in the Antarctic Peninsula region, 1989-99. *Polar Record* 201:121-132.

Phleger, CF, MM Nelson, BD Mooney, PD Nichols. 2001. Interannual variations in the lipids of the Antarctic pteropods *Clione limacina* and *Clio pyramidata*. *Comparative Biochemistry and Physiology* 128: 553-564.

Trathan, PN, JL Watkins, AWA Murray, AS Brierley, I Everson, C Goss, J Priddle, K Reid, P Ward, R Hewitt, D Demer, M Naganobu, S Kawaguchi, V Sushin, SM Kasatkina, S Hedley, S Kim and T Pauly. 2001. The CCAMLR-2000 Krill Synoptic Survey: a description of the rationale and design. *CAMMLR Science* 8:1-24.

2000

Hewitt, RP, DA Demer. 2000. The use of acoustic sampling to estimate the dispersion and abundance of euphausiids,

with an emphasis on Antarctic krill, *Euphausia superba*. *Fisheries Research* 47: 215-229

Holm-Hansen O, AF Amos and CD Hewes. 2000. Reliability of estimating chlorophyll a concentrations in Antarctic waters by measurement of in situ chlorophyll a fluorescence. *Marine Ecology Progress Series* 196:103-110.

Jones, CD. 2000. Revised estimates of seabed areas within the 500 m isobath of the South Orkney Islands (subarea 48.2) and consequences for standing stock biomass estimates of nine species of finfish. *CCAMLR Science* 7:197-206.

Jones, CD, K-H Kock and E Balguerias. 2000. Changes in biomass of eight species of finfish around the South Orkney Islands (Subarea 48.2) from three bottom trawl surveys. *CCAMLR Science* 7:53-74.

Kock, K-H, CD Jones and S Wilhelms. 2000. Biological characteristics of Antarctic fish stock in the southern Scotia Arc region. *CCAMLR Science* 7:1-42.

Naveen R, SC Forrest, RG Dagit, LK Blight, WZ Trivelpiece and SG Trivelpiece. 2000. Censuses of penguin, blue-eyed shag, and s. giant petrel populations in the Antarctic Peninsula region, 1994-2000. *Polar Record* 199: 323-334.

Other Publications & Technical Reports

Field Season Reports

Lipsky, J(ed). 2001. AMLR 1999/00 Field Season Report: Objectives, Accomplishments and Tentative Conclusions. NOAA-TM-NMFS-SWFSC-302.

Lipsky, J(ed). 2001. AMLR 2000/01 Field Season Report: Objectives, Accomplishments and Tentative Conclusions. NOAA-TM-NMFS-SWFSC-314.

Lipsky, J(ed). 2002. AMLR 2001/02 Field Season Report: Objectives, Accomplishments and Tentative Conclusions. NOAA-TM-NMFS-SWFSC-350.

Lipsky, J(ed). 2003. AMLR 2002/03 Field Season Report: Objectives, Accomplishments and Tentative Conclusions. NOAA-TM-NMFS-SWFSC-355.

Lipsky, J(ed). 2004. AMLR 2003/04 Field Season Report: Objectives, Accomplishments and Tentative Conclusions. NOAA-TM-NMFS-SWFSC-367.

Lipsky, J(ed). 2005. AMLR 2004/05 Field Season Report: Objectives, Accomplishments and Tentative Conclusions. NOAA-TM-NMFS-SWFSC-385.

Lipsky, J(ed). 2006. AMLR 2005/06 Field Season Report: Objectives, Accomplishments and Tentative Conclusions. NOAA-TM-NMFS-SWFSC-397.

Lipsky, J(ed). 2007. AMLR 2006/07 Field Season Report: Objectives, Accomplishments and Tentative Conclusions. NOAA-TM-NMFS-SWFSC-409.

Van Cise, AM(ed). 2008. AMLR 2007/08 Field Season Report: Objectives, Accomplishments and Tentative Conclusions. NOAA-TM-NMFS-SWFSC-427.

*Van Cise, AM(ed). 2009. AMLR 2008/09 Field Season Report: Objectives, Accomplishments and Tentative Conclusions. NOAA-TM-NMFS-SWFSC-445.

*These papers are some of the most substantive contributions by the AERD, and are available online. See page 20 for more information.

Literary Contributions

Ballance, L, R Pitman, R Hewitt, D Siniff, W Trivelpiece, P Clapham and Brownell R. 2006. The removal of large whales from the Southern Ocean: evidence for long-term ecosystem effects. In: *Whales, Whaling and Ocean Ecosystems.* J. Estes (ed). University of California Press. 213-228.

Charrassin, J-B, F Roquet, Y-H Park, F Bailleul, C Guinet, M Meredith, K Nicholls, S Thorpe, B McDonald, I Tremblay, DP Costa, M Goebel, M Muelbert, MN Bester, J Plötz, H Bornemann, R Timmermann, M Hindell, A Meijers, RC Coleman, IC Field, CM McMahon, SR Rintoul, S Sokolov, L Boehme, P Lovell, MA Fedak, M Biuw, OA Nost, C Lydersen and CM Kovacs. 2009. New insights into Southern Ocean physical and biological processes revealed by instrumented elephant seals. *OceanObs. Community White Paper* 21-25.

Goebel, ME, DP Costa, DE Crocker, JT Sterling, and DA Demer. 2000. Foraging ranges and dive patterns in relation to bathymetry and time-of-day of Antarctic fur seals, Cape Shirreff, Livingston Island, Antarctica. In: Antarctic Ecosystems: Models for Wider Ecological Understanding. Davison, W, C Howard-Williams, and P Broady (eds). The Caxton Press. 47-50.

Jones, CD. 2007. Antarctica human impacts. *In:* Hidden Depths: Atlas of the Oceans. Theberge, AE (ed). HarperCollins, New York.

Loeb, VJ. 2007. Environmental variability and the Antarctic marine ecosystem. In: The Impact of Environmental Variability on Ecological Systems. Vasseur DA and KS McCann. Springer Inc 197–225.

Woehler, EJ, J Cooper, JP Croxall, WR Fraser, GL Kooyman, GD Miller, DC Nel, DL Patterson, H-U Peter, CA Ribic, K Salwicka, WZ Trivelpiece and H Weimerskirch. 2001. A statistical assessment of the status and trends of Antarctic and sub-Antarctic seabirds. Report on SCAR BBS workshop on Southern Ocean seabird populations. SCAR, 45 pp.

Student and Post-doc Support*

Auburn University
Rebecca Belcher

Moss Landing Marine Lab
Andrew Thurber
Cassandra Brooks

Old Dominion University
Tina Morgan
Tosca Ballerini

San Diego State University
Ryan Driscoll

Scripps Institution of Oceanography
Carolina Bonin
Jefferson Hinke
Nerida Wilson

Smithsonian National Museum
Chris Mah

University of California at Davis
Tom Near

University of California at Santa Cruz
Matthew Rutishauser
Briggite McDonald
Yann Tremblay
Greg Breed
Lisa Schwarz
Michelle Antolos
Rachel Orben
Stacey Bucklew
Susanne Lockhart
Luis Huckstadt

University Center in Svalbard, Norway
Jørgen Berge

University of Groningen, Netherlands
Hauke Flores

University of Hawaii
Stephen Krepidolovsky

University of Kiel, Germany
Malte Damerau

University of Oregon
David Loomis

University of Maine
Steve Agius

University of Miami
Daniel Doolittle

University of North Carolina at Wilmington
Mike Polito

University of San Diego
Jennifer Gafney
Jenny Moon

Virginia Institute of Marine Science
Heidi Geisz

Woods Hole Oceanographic Institute
Mark Mazloff

Yale University
Kristen Kuhn

---

* Students are supported in a variety of ways, including direct advisorship, mentoring, provision of data, field and laboratory research opportunities, and financial support.

Major External Partners and Collaborators

Australian Antarctic Program
Drs S Kawaguchi and N Gales

Brazilian Antarctic Program
Dr M Sander

British Antarctic Survey
Drs J Forcada, P Trathan, K Reid and S Hill

California Academy of Sciences
Drs R Mooi, B Van Syoc, T Gosliner and G Williams

The CCAMLR Secretariat

Dalhousie University, Canada
Dr S Iverson

Dokuz Eylul University, Turkey
Dr C Biszel

Farrollones Institute & CUNY CSI
Drs J Santora and R Veit

Florida Atlantic University
Dr. J Moore

Institut für Seefischerei, Germany
Dr V Seigel and K-H Kock

Istituto di Scienze Marine, Italy
Dr M LaMesa

Instituto Antártida de Chile
V Vallejos, D Torres and O Blank

Moss Landing Marine Lab
Drs S Kim and V Loeb

National Science Foundation, Office of Polar Programs

National Institute of Water & Atmospheric Research
Dr S Hanchet

Norwegian University of Science and Technology
Dr M Van Ardelaan

Ohio University
Dr J Eastman

Old Dominion University
Dr J Ashford

Polish Antarctic Program
Drs A Tatur, M Zanowky and M Korczak

Pomona College
Dr N Karnovsky

Siena University, Italy
Drs S Corsolini, A Schiavone and S Focardi

Sonoma State University
Dr D Crocker

Smithsonian National Museum
Dr C Ahearn

Universidad de Chile
Dr P Abalos

University of California at Santa Barbara
Drs R Ross and L Quetin

University of California Santa Cruz
Drs DP Costa, M-A Lea and M Hindell

University of California at San Diego
Drs G Mitchell and O Holm-Hansen

University of Maryland
Drs H Lynch and R Fagan

University of North Carolina at Wilmington
Dr S Emslie and M Polito

University of Tasmania
Drs M-A Lea and M Hindell

Yale University
Dr T Near

Substantive Papers
2000 - present

- Atkinson, A, V Siegel, E Pakhomov and P Rothery. 2004. Long-term decline in krill stock and increase in salps within the Southern Ocean. *Nature* 432: 100-103.
    - *This paper uses historical data collated from surveys conducted around Antarctica, a large proportion of which was derived from U.S. AMLR surveys; the authors document an 80% decline in krill density that they attribute to a decline in sea ice.*

- Charrassin, J-B, M Hindell, SR Rintoul, F Roguet, S Sokolov, M Biuw, D Costa, L Boehme, P Lovell, R Coleman, R Timmermann, A Meijers, M Meredith, Y-H Park, R Bailleul, M Goebel, Y Tremblay, C-A Bost, CR McMahon, IC Field, MA Fedak, C Guinet. 2008. Southern Ocean frontal structure and sea-ice formation rates revealed by elephant seals. *Proceedings of the National Academy of Sciences* 105:11634-11639.
    - *This paper reports on sea-ice formation and maps frontal zone structure south of 60 degrees latitude - areas traditionally with little coverage - using elephant seals, and uses these data to test predictions of an Ocean-Sea-Ice Model (FESOM). It firmly establishes the importance of large phocids for collecting data on the changing Southern Ocean.*

- Demer, DA and SG Conti. 2003. Validation of the stochastic distorted-wave Born approximation model with broad bandwidth total target strength measurements of Antarctic krill. *ICES Journal of Marine Science* 60: 625-635.
    - *Using the SDWBA model the authors show how krill abundance estimates can differ in the Scotia Sea, based on the same survey (CCAMLR 2000). The increased abundance estimate is attributed to the physically based model, rather than the semi-empirical model of Greene et al. (1991).*

- Hewitt, RP, CD Jones and I Everson. 2008. Reconciling fisheries with conservation: three examples from the Southern Ocean. *American Fisheries Society Symposium* 49:1681-1697.
    - *This paper presents an overview and discussion of CCAMLR's management of the krill, icefish, and toothfish fisheries under the unifying paradigm of the precautionary approach.*

- Hewitt, RP, GM Watters, PN Trathan, JP Croxall, ME Goebel, D Ramm, K Reid, WZ Trivelpiece and JL Watkins. 2004. Options for allocating the precautionary catch limit of krill among small-scale management units in the Scotia Sea. *CCAMLR Science* 11: 81-97.
    - *This paper explores a number of options for managing the krill fishery; the Commission subsequently agreed that these options should be considered in future work to evaluate management strategies for the fishery.*

- Hinke, J, K Salwicka, SG Trivelpiece, GM Watters and WZ Trivelpiece. 2007. Divergent responses of *Pygoscelis* penguins reveal a common environmental driver. *Oecologia* 153: 845-855.
    - *This paper examines 10-30 years of Adélie, chinstrap and gentoo penguin reproductive, foraging and population data from two sites in the South Shetland Islands, and reveals that changes in populations are largely driven by reductions in recruitment of young penguins to breeding populations.*

- Kock, K-H and CD Jones. 2005. Fish Stocks in the Southern Scotia Arc Region – A Review and Prospects for Future Research. *Reviews in Fishery Science*. 13:75–108.
    - *This paper provides a summary of biological aspects and population trends of demersal finfish stocks in the southern Scotia Arc region of Antarctica. Much of the data is drawn from U.S. AMLR demersal fish surveys.*

- Lockhart, SJ and CD Jones. 2009. Detection of vulnerable marine ecosystems in the Southern Scotia Arc (CCAMLR subareas 48.1 and 48.2) through research bottom trawl sampling and underwater imagery. WG-EMM-09/32.
    - *This paper provides a rationale for the 28 vulnerable marine ecosystem notifications in CCAMLR Subareas 48.1 and 48.2 proposed by the U.S., and AMLR's approach for triggering presence of a VME.*

- Reiss, CS, AM Cossio, VJ Loeb and DA Demer. 2008. Variations in the biomass of Antarctic krill (*Euphausia superba*) around the South Shetland Islands, 1996–2006, ICES *Journal of Marine Science* 65: 497-508.
    - *This paper presents comparisons of acoustic methods used to assess krill biomass. Results show that patterns in time series can vary significantly, affecting estimates of biomass and temporal correlations between krill, the environment and other biological phenomenon.*

- Trivelpiece, WZ, JT Hinke, AK Miller, CS Reiss, SG Trivelpiece, and GM Watters. 2009. Chinstrap penguins: vulnerable monitors of ecosystem changes in the Scotia Sea region of Antarctica. WG-EMM-09/17.
    - *This paper challenges the "pack-ice hypothesis" with new data suggesting that krill declines throughout the Scotia Sea are driving declines in both Adélie and chinstrap penguins.*

- Van Cise, AM(ed). 2009. AMLR 2008/09 Field Season Report: Objectives, Accomplishments and Tentative Conclusions. NOAA-TM-NMFS-SWFSC-445.
    - *The latest field season report is a comprehensive review of the accomplishments from the 2008/09 U.S. AMLR field season, as well as the preliminary results from the data collected.*

- Watters, GM, S Hill, JT Hinke, and P Trathan. 2009. The risks of not deciding to allocate the precautionary krill catch limit among SSMUs and allowing uncontrolled expansion of the krill fishery up to the trigger level. WG-EMM-09/12.
    - *This paper summarizes modeling work to advise on management strategies for the Antarctic krill fishery; this work has been a significant topic of discussion at CCAMLR for many years.*

Full versions of these papers are available on-line at: http://swfsc.noaa.gov/textblock.aspx?id=15360&ParentMenuId=42

Appendix I: Guide to Acronyms used herein

AERD
Antarctic Ecosystem Research Division

SWFSC
Southwest Fisheries Science Center

U.S. AMLR
United States Antarctic Marine Living Resources

CCAMLR
Commission for the Conservation of Antarctic Marine Living Resources

SC-CAMLR
Scientific Committee for the Conservation of Antarctic Marine Living Resources

WG-EMM
Working Group on Ecosystem Modeling and Management

WG-FSA
Working Group on Fisheries Stock Assessment

WG-SAM
Working Group on Statistical Assessment Methods

CEP
Committee for Environmental Protection

SCAR
Scientific Committee for Antarctic Research

NSF
National Science Foundation

BAS
British Antarctic Survey