

**Appendix D**

**BENEFIT-BCLME Project Ref. No. EV/PROVARE/02/05**

**Retrospective Analysis of Plankton Community Structure in the Benguela Current Large Marine Ecosystem (BCLME), to provide an Index of Long-term Changes in the Ecosystem**

**Progress report of the Data Manager on development of the inventory and database for plankton data in the Benguela Current  
Submitted by the International Ocean Institute, Southern Africa**

**28 February 2006**



This report details progress made by the Data Manager on the development of the inventory for plankton data in the Benguela Current Large Marine Ecosystem between 5 August 2005 and 28 February 2006

### **The form of the inventory**

In the previous report (5 August 2005), a concern was raised regarding the capacity of SADC to host the BCLME plankton inventory and database. During a meeting with SADC in June 2005 it was made clear to IOI-SA that while the architecture and data tables exist for a plankton database and meta-database, there are currently no systems in place at SADC for entering, querying or retrieving data from the system. Building such functionality would require expensive programming input, for which SADC does not at present have resources available. It was further highlighted in the report that this presents an important stumbling block in the development of the BCLME plankton inventory.

Dr Mick O'Toole, Dr Neville Sweijd, and Dr Hans Verheye were e-mailed to alert them to this issue, although no response was received from them. In January 2006, a response was received from Ms Lesley Staegeman, the Director of the BCLME Activity Centre for Environmental Variability, asking for additional information, and in particular an estimate of what it would cost for SADC to develop the necessary functionality. A meeting with SADC to discuss this issue remains necessary.

In the interim, the Metadata Authoring Tool (MATT) has been investigated as a possible expedient tool for authoring the inventory of metadata, and the SADC Marine Fisheries/ Environmental Metadata Directory as a possible interim host for the metadata. MATT was developed by the SADC Regional Fisheries Information Systems Project through support from BENEFIT, and is operational via the SADC Marine Fisheries/ Environmental Metadata Directory at <http://196.21.45.131:8080/metadata/index.html>. The MATT tool allows simple online authoring of the metadata via the internet, and does not require either input or output users to have specialized or advanced computing skills. Metadata descriptions submitted via MATT can be searched and viewed as web pages over the internet, and are thus very accessible to users.

The SADC Marine Fisheries/ Environmental Metadata Directory currently contains 37 fisheries-related metadata databases. These 37 metadata databases are listed in Table 1 below, extracted directly from the website.

Appendix A contains, as an example of the metadata captured, a full record for the metadata database "MCM\_20060227\_14474: Pelagic pre-recruit survey", copied directly from the SADC Marine Fisheries/ Environmental Metadata Directory.

Table 1. Fisheries-related metadata databases currently in place on the SADC Marine Fisheries/ Environmental Metadata Directory (<http://196.21.45.131:8080/metadata/index.html>).

Entry Id	Title (Click to View Entry)	Edit
AtlantNIRO_20060213_12958	<a href="#">Namibian Data stored in the former USSR (AtlantNIRO): Environmental Data from Namibian and Angolan Waters (1952-1990)</a>	<a href="#">XML</a>
AtlantNIRO_20060213_14411	<a href="#">Namibian Data stored in the former USSR (AtlantNIRO): Catch and Effort Data for Merluccius capensis, Trachurus capensis and Scomber japonicus between 1961-1996.</a>	<a href="#">XML</a>
AtlantNIRO_20060213_17993	<a href="#">Namibian Data stored in the former USSR (AtlantNIRO): Ichthyoplankton Surveys for Hake, HorseMackerel, Pilchard, Anchovy (1987-1990)</a>	<a href="#">XML</a>
AtlantNIRO_20060214_14259	<a href="#">Namibian Data stored in the former USSR (AtlantNIRO): Information relating to Shrimp (Funchalia woodwardi) and Squid (Todarodes sagittatus angolensis) Fisheries</a>	<a href="#">XML</a>
AtlantNIRO_20060216_13840	<a href="#">Namibian Data stored in the former USSR (AtlantNIRO): Biological Data from Commercial Catches for M.capensis,T.capensis and S.japonicus between 1961-1990</a>	<a href="#">XML</a>
AWI_20060209_11454	<a href="#">Namibian Whale Fishery Data 1990-1999</a>	<a href="#">XML</a>
CSIC/CEAB_20060227_16342	<a href="#">Otolith data used to see whether first annual ring is correctly interpreted, collected from 1998 annual hake survey in Namibia</a>	<a href="#">XML</a>
IIM_20060208_19511	<a href="#">The Angola Dome</a>	<a href="#">XML</a>
IOW_20060208_16727	<a href="#">sdrfghjk</a>	<a href="#">XML</a>
MCM_20060207_12565	<a href="#">BENEFIT Horse Mackerel age - determination workshops, May 2000 and November 2001</a>	<a href="#">XML</a>
MCM_20060208_19730	<a href="#">Age reading calibration for M. capensis and M. paradoxus of the coast off Namibia and South Africa.</a>	<a href="#">XML</a>
MCM_20060213_13707	<a href="#">Age reading calibration for M. capensis and M. paradoxus of the coast off Namibia and South Africa</a>	<a href="#">XML</a>
MCM_20060216_14925	<a href="#">Horse mackerel age - determination workshops, May 2000 and November 2001</a>	<a href="#">XML</a>
MCM_20060227_14474	<a href="#">Pelagic Pre-recruit Survey</a>	<a href="#">XML</a>
NatMIRC_20060201_13208	<a href="#">Available data on research of Deep-sea red crab</a>	<a href="#">XML</a>
NatMIRC_20060202_14499	<a href="#">South West African Pelagic Egg and Larval Surveys (SWAPELS)</a>	<a href="#">XML</a>
NatMIRC_20060203_19361	<a href="#">Egg and larvae data off the Namibian coast from 198? to 198?</a>	<a href="#">XML</a>
NatMIRC_20060203_19910	<a href="#">Commercial Pelagic Data 1984 - 1992</a>	<a href="#">XML</a>
NatMIRC_20060206_11942	<a href="#">Acoustic surveys for the period from 1990 to present of sardine off the Namibian coast</a>	<a href="#">XML</a>
NatMIRC_20060207_11016	<a href="#">Commercial catch and landings data for the Namibian purse seine fleet from 1993 to present</a>	<a href="#">XML</a>
NatMIRC_20060207_11295	<a href="#">Deep-sea red crab- Distribution, structure &amp; dynamics</a>	<a href="#">XML</a>
NatMIRC_20060207_11382	<a href="#">Sardine Acoustic Attenuation and Target Strength Experiment in South African Waters, False Bay, 21-29 April 2002.</a>	<a href="#">XML</a>

NatMIRC_20060207_15012	<a href="#">Sardine, anchovy and round herring biological data collected from routine sampling of the northern Benguela commercial catches from 1993 to present</a>	XML
NatMIRC_20060208_10020	<a href="#">Annual acoustic and swept-area trawl surveys for the period from 1997 to 2001 of three orange roughy aggregations on edge of the Namibian continental shelf</a>	XML
NatMIRC_20060208_12416	<a href="#">Deep Water Fisheries Information System - Commercial catch data for Namibia 1995 to present (plus experimental data from 1988-1994)</a>	XML
NatMIRC_20060208_14038	<a href="#">Drifting Buoys in the Benguela Current Region, 1999 - 2002</a>	XML
NatMIRC_20060208_14736	<a href="#">Comparison of the meristic and morphometric characters of three commercially fished orange roughy, <i>Hoplostethus atlanticus</i> aggregations in the Namibian EEZ.</a>	XML
NatMIRC_20060208_16161	<a href="#">Endangered/Lost data (age,bulk samples,landings,sub-samples,catches) for pelagic fishes collected between 1950-87 off Namibia. (SWAPEL Historical Data Project)</a>	XML
NatMIRC_20060209_11323	<a href="#">Hake age lengths keys for NatMIRC (1997 -2000), ages were obtained from otolith annuli reading</a>	XML
NatMIRC_20060210_16405	<a href="#">Namibian Horse mackerel midwater commercial landings from 1961 to 2001</a>	XML

For the sake of expediency, it is thus suggested that advantage be taken of this tool which has already been developed, and that at this stage the plankton metadata are added to the SADC Marine Fisheries/ Environmental Metadata Directory. It is likely that this will necessitate some assistance to plankton data holders to learn to learn to navigate around the MATT tool.

Should it be desirable, SADC can be assisted at a later stage to develop the interfaces necessary to deliver a fully functional plankton inventory and related databases. If this is to happen, the plankton metadata from the SADC Marine Fisheries/ Environmental Metadata Directory, which will be in XML format, should be easily transferable to the SADC system.

### **Visit to Angola**

Dr Kim Prochazka visited Luanda from 13-16 September 2005 to make enquiries regarding data held in Angola. She was hosted by Dr Francisca Delgado and Mr Nkosi Luyeye. Dr Prochazka met with Angolan plankton experts, including Isobel Rangel, Catarina Ruby, Wsaso Andre and Domingos Paim. IIM and the individuals concerned were very supportive of an inventory of regional plankton data, and gave their assurance of co-operation and assistance on the project.

Dr Prochazka was provided with a basic inventory of national and foreign oceanographic cruises in the EEZ of Angola. This inventory includes only very basic information fields of: Cruise, Vessel, Description (e.g. Oceanographic

transect off Baia Farta), Dates/Period, Organization, Data (e.g. T, S, O<sub>2</sub>, CTD or ADCP), Holders, Contact.

### Russian data

Substantial data sets gathered by Russian scientists working in the BCLME region exist. One of these datasets, that belonging to the Institute of the Southern Seas in the Ukraine, is freely available via the internet on the COPEPOD database (Coastal and Oceanic Plankton Ecology, Production and Observation Database) hosted by NOAA. These data can be downloaded from the website at <http://www.st.nmfs.gov/plankton/intro/index.html>. The full data set consists of 23 Excel files spanning the central and southern Atlantic between 1963 and 1989. The files contain the following fields: SHIP/CRUISE, YEAR, MONTH, DAY, TIMEloc, LATITUDE, LONGITUDE, UPPER\_Z, LOWER\_Z, MESH (size), IT IS\_TSN, GPDB\_BGC, BSC, T, COUNT/BIOMASS, UNITS, QF, SCIENTIFIC NAME, RECORD\_ID, DATASET\_ID.

The 23 files contain a total of 162 769 records (Table 2).

Table 2. Numbers of records contained within the 23 data files belonging to the Institute of the Southern Seas, Ukraine.

File	Number of records
90AK-640901_AK7_1	1 785
90AK-641029_AK7_2	2 418
90AK-641204_AK7_3	1 254
90AK-650115_AK7_4	1 202
90AK-650220_AK7_5	3 324
90ML-630317_ML13	9 640
90ML-630905_ML14	12 507
90ML-640514_ML15	1 964
90ML-700125_ML24	5 428
90ML-700827_ML25	1 302
90ML-730202_ML27	17 610
90ML-760429_ML30	14 956
90ML-770630_ML32	10 764
90V2-781216_PV05	14 276
90V2-811210_PV11	11 766
90V2-820724_PV13	24 915
90V2-841218_PV18	2 816
90V2-851211_PV20	2 392
90V2-861018_PV21	1 880
90V2-870717_PV24	3 187
90V2-981007_PV29	4 548
90VE-701108_AV03	11 533

90VE-741106_AV09	1 302
<b>Total records</b>	<b>162 769</b>

Not all of these, however, fall within the BCLME region as defined in this project. For this reason, those data pertinent to the BCLME region were extracted to a new set of files. A total of 13 of the original 23 files contained data pertinent to the BCLME region (Table 3). These files have been 'cleaned' to include only data within the BCLME region, i.e. all data falling outside of the pre-defined BCLME region were deleted from the files. These files contain a total of 85 444 records spanning 324 samples at 259 stations between 1963 and 1989. A map of the sample locations is attached separately.

Table 3. 'Cleaned' data files containing records from the BCLME region only.

<b>File</b>	<b>No. records</b>	<b>BCLME records</b>	<b>BCLME stations</b>	<b>*BCLME samples</b>
90ML-630317_ML13	9 640	9 640	21	25
90ML-630905_ML14	12 507	10 115	17	17
90ML-640514_ML15	1 964	588	1	1
90ML-700125_ML24	5 428	5 428	3	7
90ML-730202_ML27	17 610	17 610	18	35
90ML-770630_ML32	10 764	10 764	14	24
90V2-781216_PV05	14 276	6 700	12	17
90V2-811210_PV11	11 766	6 557	49	64
90V2-820724_PV13	24 915	7 326	24	31
90V2-841218_PV18	2 816	2 693	60	63
90V2-861018_PV21	1 880	1 209	15	15
90V2-870717_PV24	3 187	2 934	11	11
90V2-981007_PV29	4 548	3 880	14	14
<b>Total</b>	<b>121 301</b>	<b>85 444</b>	<b>259</b>	<b>324</b>

\* BCLME samples = total number of samples (i.e. total number of timelocs across all stations where more than one sample was taken at a particular station over time).

We have previously been lead to understand that there is another dataset comprising the "Russian data". Discussions with local plankton researchers indicate that there were attempts to sell this second data set to the countries of the BCLME region some years ago, without success. Although preliminary enquiries have been made, we have not been unable to ascertain any reliable information regarding these data, their whereabouts or their owner(s).

### Literature search

A literature search was initiated in order to identify databases and data sources through publications and authors, and to provide an additional product for the project. This literature search was performed by an MSc student at the University of Cape Town, and thus also provided an aspect of capacity building to the project.

A total of 178 publications in 42 journals (Table 4) dealing with plankton in the BCLME region have been sourced to date and entered into a plankton bibliography using the Endnote software. The bibliography is searchable by author, date, title and journal. The publications, however, remain to be keyworded before the bibliography will be able to be searched by subject/keywords. Hard copies of all publications in the bibliography have been collected.

Table 4. Sources of publications dealing with plankton in the BCLME.

<b>Journal</b>	<b>Number of publications</b>
African Journal of Marine Science – Total	50
South African Journal of Marine Science	23
Special edition – Benguela and Comparable Ecosystems	7
Special edition – Benguela Trophic Functioning	5
Special edition – Benguela Dynamics	10
African Journal of Marine Science	5
Journal of Plankton Research	17
South African Journal of Science	15
Marine Ecology Progress Series	12
ICES Journal of Marine Science	7
Progress in Oceanography	7
Journal of Experimental Marine Biology and Ecology	6
Marine Geology	6
Marine Micropalaeontology	6
Deep-Sea Research	5
Limnology and Oceanography	5
Journal of Marine Systems	4
Ecological Modelling	3
Estuarine, Coastal and Shelf Science	3
Palaeogeography, Palaeoclimatology, Palaeoecology	3
Continental Shelf Research	2
Hydrobiologia	2
Marine and Freshwater Research	2
Advances in Marine Biology	1
Ambio	1

Archive for Fishery and Marine Research	1
Aspects of Hydrozoan Biology	1
Bulletin of Marine Science	1
Earth and Planetary Science Letters	1
Fisheries Oceanography	1
Geobios	1
Geochimica et Cosmochimica Acta	1
Journal of Natural History	1
Journal of the Marine Biological Association of the UK	1
Marine Biology	1
Micropalaeontology	1
Mitteilungen der Naturforschenden Gesellschaften beider Basel	1
Natural Resource Modeling	1
Netherlands Journal of Sea Research	1
Oceanography	1
Oceanography and Marine Biology Annual Review	1
Oceanologica Acta	1
Palaeobiology	1
Proceedings of the Ocean Drilling Programme	1
Scientia Marina	1
Transactions of the Royal Society of South Africa	1
<b>Total number of publications</b>	<b>178</b>
<b>Number of journals</b>	<b>42</b>



Appendix A. The full metadata record for the metadata database “MCM\_20060227\_14474: Pelagic pre-recruit survey”, copied directly from the SADC Marine Fisheries/ Environmental Metadata Directory.

## 1. SUMMARY INFORMATION

<b>Entry ID</b>	MCM_20060227_14474
<b>Entry Title</b>	Pelagic Pre-recruit Survey
<b>Summary</b>	The pre-recruit survey is generally undertaken in March. It combines acoustic measurements and biological sampling (Methot net) to map the distribution of anchovy and sardine post-larvae and juveniles and provide an index of their relative abundance in the nursery areas of the West Coast. This survey provides an early indication of recruit strength prior to the recruitment survey in June-July. This survey has been completed every year since 1991 except for 1993. Note that these surveys are undertaken as part of research surveys of Marine and Coastal Management, during which environmental, chlorophyll and plankton data are collected. These data are described in other metadata.
<b>Data Set Language</b>	English,
<a href="#">Top of Page</a>	

## 2. DATA SET CITATION

<b>Originator</b>	Marine and Coastal Management
<b>Title</b>	Pelagic Pre-recruit Survey
<b>Publication Date</b>	1999
<b>Publication Place</b>	Cape Town, South Africa
<b>Publisher</b>	George Warman Publications
<b>Edition</b>	1999
<b>Issue Identification</b>	Vol 53, No. 2: 24-27
<b>Data Presentation Form</b>	Graph/Plot

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### 3. REFERENCES

#### Reference(s)

Van der Lingen, C. and D. Merkle 1999 -  
Predicting anchovy and sardine recruitment from  
pelagic pre-recruit surveys.  
In South African Shipping News and Fishing  
Industry Review.  
Vol: 53 No. 2: 24-27

O'Toole, M. and I. Hampton 1989 -  
New prospects for surveying and sampling anchovy  
pre-recruits.  
In South African Shipping News and Fishing  
Industry Review.  
Vol: 44 No. 5: 32-33

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### 4. PERSONNEL

<b>Role</b>	Investigator
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<b>Last Name</b>	Van der Lingen
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<b>Role</b>	Technical Contact
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## 5. DATA STORAGE AND DISTRIBUTION

<b>Distribution Media</b>	Not Known
<b>Distribution Format</b>	EXCEL > Microsoft Excel
<b>Stored Data Media</b>	Not Known
<b>Stored Data Format</b>	Not Known
<b>Software Requirements</b>	Microsoft Office

## 6. DATA QUALITY AND CONSTRAINTS

<b>Access Constraints</b>	Release with permission of the appropriate parties
<b>Use Constraints</b>	Permission to use data must be obtained from Dr Carl van der Lingen
<b>Quality</b>	The data has been used successfully to give early indications of recruitment as measured by the recruit survey later in the year.

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## 7. SPATIO-TEMPORAL COVERAGE

### Area: 1

	<b>Northernmost Latitude : -29</b>	
<b>Westernmost Longitude : -15</b>		<b>Easternmost Longitude : -19</b>
	<b>Southernmost Latitude : -35</b>	

**Minimum Depth** SURFACE

**Maximum Depth** 35m

### Location

<b>Sea Area</b>	<b>Detailed Sea Area</b>
South Atlantic Ocean	Benguela, Southern Benguela

**Data Set Progress** Complete

**Data Set Maintenance** Annually

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## 8. PARAMETERS AND KEYWORDS

<b>Category</b>	<b>Topic</b>	<b>Term</b>	<b>Variable</b>	<b>Detailed Variable</b>
Earth Science	Biosphere	Ecological Dynamics	Life History	Small Pelagic Fish Life History
Earth Science	Biosphere	Ecological Dynamics	Primary Production	
Earth Science	Biosphere	Zoology	Biomass	
Earth Science	Oceans	Marine Biology	Fish	Small Pelagic fish
Earth Science	Oceans	Marine Biology	Marine Microbiota	Plankton
Earth Science	Oceans	Ocean Chemistry	Chlorophyll	Chlorophyll a
Earth Science	Oceans	Ocean Chemistry	Dissolved Gases	
Earth Science	Oceans	Ocean Chemistry	Nutrients	
Earth Science	Oceans	Ocean Chemistry	Oxygen	Dissolved Oxygen
Earth Science	Oceans	Bathymetry	Water Depth	
Earth Science	Oceans	Ocean Circulation	Ocean Currents	
Earth Science	Oceans	Ocean Temperature	Thermocline	
Earth Science	Oceans	Ocean Temperature	Water Temperature	
Earth Science	Oceans	Salinity/Density	Salinity	
Earth Science	Oceans	Ocean Acoustics	Acoustic Scattering	Back Scattering
Earth Science	Biosphere	Aquatic Habitat	Pelagic Habitat	Shelf Waters
Earth Science	Biosphere	Zoology	Fish	

Earth Science	Biosphere	Zoology	Invertebrates
Earth Science	Biosphere	Zoology	Zooplankton

**Keyword** Biosphere > Microbiota > Chlorophyll, Biosphere > Microbiota > Phytoplankton, Biosphere > Microbiota > Plankton, Recruit, Pre-recruit,

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## 9. EQUIPMENT AND PROJECT

### Source Name

Short	Long
SHIPS	

### Sensor Name

Short	Long
ACOUSTIC SOUNDERS	
ADCP	Acoustic Doppler Current Profiler
CTD	Conductivity, Temperature, Depth
DROGUES	
FLUOROMETERS	
PROFILERS	
TEMPERATURE PROBES	

**Originating Center** Marine and Coastal Management

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## 10. DATA RESOLUTION

<b>Latitude Resolution</b>	10 nautical miles
<b>Longitude Resolution</b>	not less than 5 nautical miles

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## 11. DATA CENTER

**Data Center Name** MCM Marine and Coastal Management, South Africa

<b>Role</b>	Data Center Contact
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<b>First Name</b>	Ashley
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## 12. METADATA INFORMATION

**Creation Date  
(YYYY-MM-DD)** 2001-08-21

**Revision Date  
(YYYY-MM-DD)** 2001-08-21

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## 13. RELATED URL

<b>URL Content Type</b>	PROJECT HOME PAGE
<b>URL</b>	http://www.benefit.org.na
<b>Description</b>	The home page of BENEFIT, a regional fisheries and training programme.