SANCOR'S CURRENCY AND STRENGTH IS INFORMATION

Date: January 2014

ISSN 03700-9026 Issue #: 204

SANCOR NEWSLETTER

South African Network for Coastal and Oceanic Research

Inside this issue:

Out of the blue – acoustic monitoring of southern African blue whales

By Fannie Shabangu[1,2] and Ken Findlay[2]

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Growing to 30 m long and weighing up to 163 tonnes, Antarctic blue whales, *Balaenoptera musculus intermedia*, are the largest animal that ever lived on the planet; yet despite their enormous size, they feed on small Antarctic krill (*Euphausia superba*). They get their name from the blue-gray colour when underwater, but tend to be dull gray with blue-gray splotches when above water (Figure 1). Their abundance was estimated to be in the region of 240 000 animals prior to whaling, but after catches of some 360 000 animals last century, is estimated that about 1-3% of the pristine biomass remains. Despite protection in 1966, this species is still Critically Endangered and the population has only recently been shown to be recovering at a rate of 7% per annum. While blue whales generally have a cosmopolitan and pelagic distribution, occurring in the deep Indian, Pacific, Atlantic, and Antarctic, Antarctic blues (as one of three recognized sub-species) are thought to feed in high latitudes and migrate to lower latitudes for calving and over-wintering.

Recent dedicated research effort has been directed at Antarctic blue whales in the Southern Ocean by the International Whaling Commission's International Decade of Cetacean

Figure 1. An Antarctic blue whale showing the distinct colouration and splotches that allows researchers to recognise individual animals.

Research (IDCR) and Southern Ocean Whale and Ecosystem Research (SOWER) Programmes that ran from 1979 to 2010. These IWC research programmes included a blue whale component from the late 1990s, and used photo identification and genetic sampling to improve understanding of the species' abundance, behavior and distribution. They identified the ice-edge region between 0° and 20° E, south of South Africa, as a summer hotspot for Antarctic blue whales. This and the fact that over 12,000 blue whales were caught from southeastern Atlantic whaling stations in the early twentieth century suggest that this region is of high importance to the species. However, since the cessation of whaling in SA in 1975, only 3 blue whales have been in observed in South African waters, largely due to lack of search effort and monitoring in the offshore environment.

Despite being difficult to survey in local waters due to their low abundance, blue whales are great sound producers. It appears that nine different vocalization patterns have been recorded around the world's oceans and Antarctic blue whales have one of the loudest calls in nature (reaching source levels of 189 dB re 1 µPa at 1m). The low frequency sounds/calls categorized as moans can travel hundreds to thousand or more kilometers via the sound fixing and ranging (SOFAR) channel. Sonobuoys deployed during the IWC SOWER programme detected low frequency (60-100 Hz) D-calls from feeding blue whales; these calls are very variable and not well understood. Very low frequency calls (Z-calls - Figure 3) produced when the animals are not feeding modulate from 28 Hz downsweeping to 19 Hz, and are characteristic of Antarctic blue whales.

Blue whales are consequently a potential candidate species for acoustic monitoring of distribution, seasonality and relative abundance through indices of call rates. The main advantages of using acoustics compared to sightings are that surveys can be conducted even in bad weather conditions and animals can be detected from greater distances with less effort at a low cost. Acoustic monitoring is thus possible over a wider area and with greater efficiency than visual detection, particularly using autonomous acoustic recording (AAR) devices that can be deployed that can sample the water column for a) extended

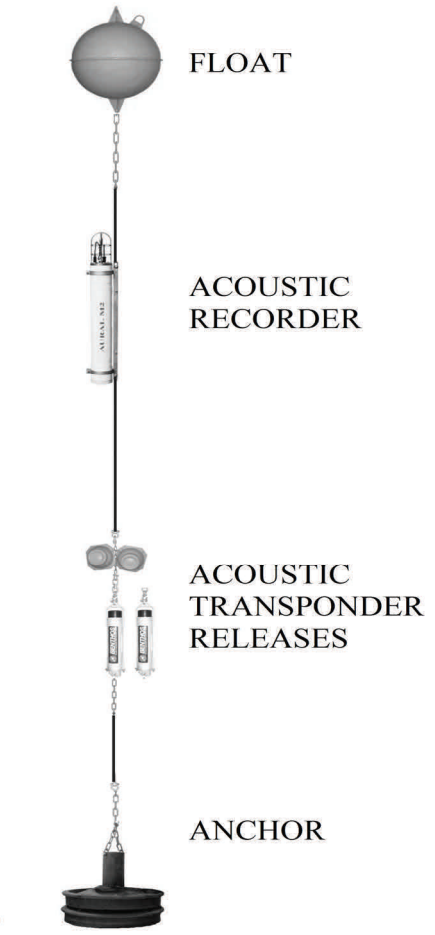


Figure 2. Autonomous Acoustic Recorder mooring system that the South African Blue Whale Project will be deploying in the Southern Ocean and off the west coast of South Africa to monitor migrations of Antarctic blue whales.

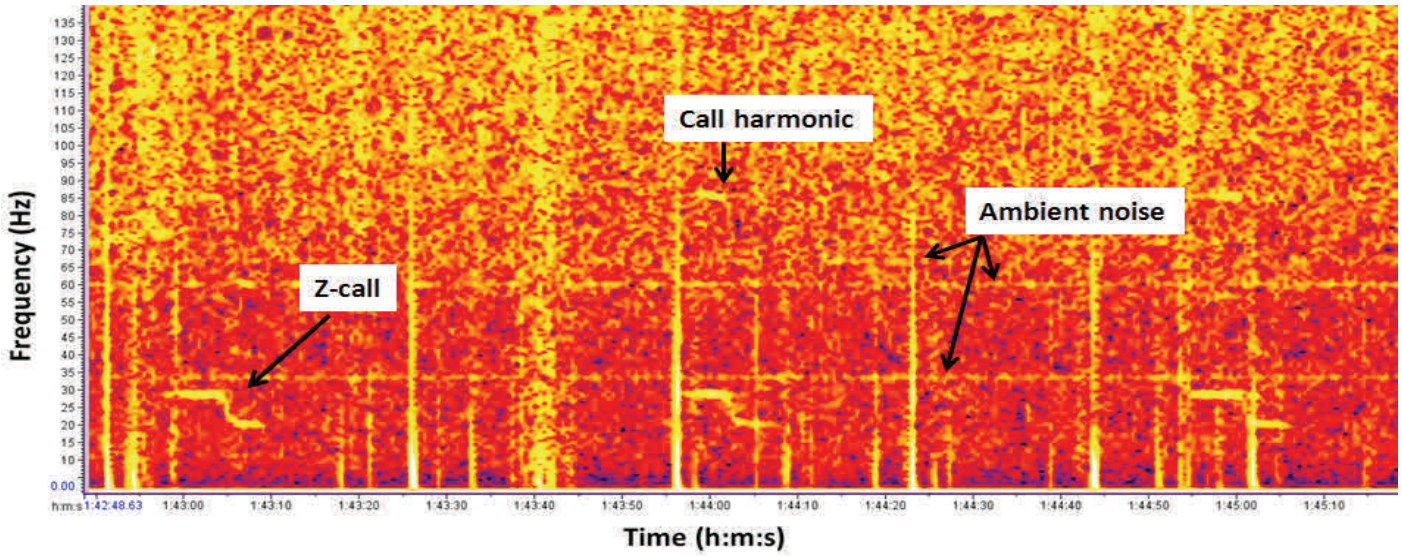


Figure 3. Spectrogram of three Z-calls of a blue whale observed from the IWC 1997/98 SOWER cruise. Data courtesy of the International Whaling Commission.

periods of time when sighting surveys are not feasible and b) in regions that are often inaccessible due to weather or ice cover or vessel availability. These AAR devices sub-sample the acoustic environment on a 24-hr basis and provide data on the presence of acoustically active individuals (as individual calls and the energy within the background noise spectra), while source levels detected by such instruments could possibly be used to derive estimates of the distance of incoming calls, and hence determine the radial location of callers. Unknown factors include variation in calling rates by season, sex, or behavioural state. Over longer spatial or temporal scales, studies of migrations, peak relative abundance, and seasonality may be particularly facilitated through the use of AAR devices.

The Southern Ocean Research Partnership (SORP, an Australian-lead initiative of the IWC) is continuing to monitor blue whales and other cetaceans in the Southern Ocean through international collaborations. In line with this programme, the South African Blue Whale project of the University of Pretoria's Mammal Research Institute Whale Unit has initiated a long term monitoring programme on Antarctic blue whales, funded through the Department of Science and Technology. The acoustic component of this programme is based on deploying Autonomous Acoustic Recorders on moorings (Figure 2) in local waters and in the Southern Ocean, while a visual survey, photographic-identification and biopsy component will include survey transects within the Southern Ocean hotspot to obtain information on local abundance and population relationships. Although Antarctic blue whales are the primary target species of this study, the AAR devices will provide considerable opportunities for the monitoring of other baleen whale species which vocalize in similar low frequency bands, such as fin whales (*B. physalus*) which are an important component of the ecosystem. As an initial trial, the project is currently analyzing data from over 700 acoustic stations in the Southern Ocean circumpolar region carried out during the IWC SOWER cruises.

Acknowledgements

The International Whaling Commission is thanked for the opportunity to analyze their SOWER acoustic data under this project.

The Department of Science and Technology are acknowledged for the funding of this project through the South African National Antarctic Programme.

Further reading

Branch, T.A., Stafford, K.M., Palacios, D.M., Allison, C., et al. 2007. Past and present distribution, densities and movements of blue whales Balaenoptera musculus in the Southern Hemisphere and northern Indian Ocean. *Mammal Review* 37(2): 116-175.

SORP website:
www.marinemammals.gov.au/sorp

Oceanographic data from foreign vessels: please help

Marten Gründlingh

Southern African Data Centre for Oceanography

In terms of the stipulations of the Exclusive Economic Zone (EEZ), foreign research vessels operating in South African waters need to obtain permission from the Department of International Relations and Cooperation (DIRC). In the case of South Africa, with a limited number of research vessels, data collected by other research vessels is very useful. In the past, DIRC used to inform or consult with various other entities upon receiving such a request, e.g. the SA Navy and the Department of Environmental Affairs. These organisations relayed the information to the Southern African Data Centre for Oceanography (SADCO), and they alerted SADCO about the cruise as well as about the expected data that would be repatriated (also part of the EEZ stipulations). The data would obviously take a few years to process.

Over the past years attempts by the Steering Committee of SADCO to obtain copies of the data (in spite of evidence that such data had been lodged with DIRC), have been fruitless. In at least one case the data was kindly re-supplied to SADCO by the USA Cruise Leader, an embarrassing experience since SADCO had to admit that no trace could be found of the data previously submitted via the official route.

In the light of the apparent failure of the "official" route, SADCO is now trying to establish another way to find out about impending or recent cruises. We believe that South African scientists are far better suited to know of a planned survey in our waters, and would have a greater interest in the data reaching SADCO. They probably know the PI, some of them may even participate in the cruise or collaborate in papers that emanate from the survey.

A call is therefore made on South African scientists to inform SADCO about imminent cruises that they know about but also about cruises that may have taken place in the last, say, 5-10 years. The information can be captured in a simple e-mail, copied to Roy van Ballegooyen (rvballeg@csir.co.za), Marten Gründlingh

(marten.grundlingh@gmail.com) and Ursula von St Ange (uvstange@csir.co.za).

The information that will be useful is the following:

- Vessel name (e.g. *Poseidon*)
- Project name (if available)
- Principal scientist and e-mail, and affiliation (institute)
- Rough date/period of the cruise
- Broad area of cruise (e.g. Benguela, SW Indian Ocean, Southern Ocean, etc)
- Data type (CTDs, ADCP, floats, etc).

SADCO can then follow up with the PI and arrange to obtain a copy of the data.

New SANCOR Steering Committee Chair & Vice Chair

The SANCOR Steering Committee is pleased to announce the appointments of Dr Anusha Rajkaran as its Chair and Dr Louis Celliers as Vice Chair.

Anusha is a lecturer at Rhodes University's Department of Botany. Her research interests include Mangrove and Estuarine Ecology. Louis is Research Group Leader of Coastal Systems at the CSIR Natural Resources and the Environment. He is particularly interested in the manner in which science and scientific information can be used to improve the state of the coastal and marine environment in order to provide real benefit to society. We wish them both success in their new positions and thank them for their contribution on the committee. Outgoing Chairperson Prof Michael Schleyer is thanked for his commitment and leadership that he provided during his term.

Call for 2014 SANCOR International Travel Student Award

The South African Network for Coastal and Oceanic (SANCOR) is a non-statutory body that generates and communicates knowledge and advice in order to promote the wise and informed use and management of the marine and coastal environments. Its vision is: healthy marine and coastal environments, rich in opportunities for human advancement and managed on the basis of excellent information, generated through well-coordinated research and development of scientific capacity. It aims to promote, facilitate and co-ordinate excellence in marine and coastal research and education for the benefit of South Africa.

SANCOR offers the SANCOR International Travel Student Award (managed by the NRF) which is valued at R20 000.

Objectives of the activity

The SANCOR International Travel Student Award has been instituted to promote and develop capacity building in science in the marine and coastal environment. It is presented annually to a Ph.D. student in recognition of their work accomplished thus far. The SANCOR Travel Grant offers up and coming young marine scientists the opportunity to attend an international conference and to showcase their research as well as gain experience in presenting a paper to an international audience. Furthermore it provides the ideal platform for the student to interact and network with national and international experts in the same research field.

Eligibility criteria for students:

- younger than 35 years of age
- South African citizens/permanent residence permit holders
- registered for a full-time Ph.D. degree at a South African university at the time of the application are invited to submit applications electronically via the NRF Submission system at https://nrfsubmission.nrf.ac.za in accordance with the strategy and eligibility criteria, as set out in the Strategic Framework Document for funding in 2014.

CALL OPENS: December 2013

CALL CLOSES: 22 January 2014

Please note

The NRF closing date for validated applications is 22 January 2014. Institutions must set their own internal closing dates, so as to enable internal validation by institutional Designated Authorities prior to submission to the NRF.

Managed by the Knowledge Fields Development Directorate of the NRF

Contact person:

Carmen Visser Tel: (021) 402 3536

Email: Sancor@daff.gov.za

Of trawl nets, historical baselines and Gilchrist's hidden legacy

By Jock Currie

South African Environmental Observation Network and Marine Research Institute, Biological Sciences, UCT

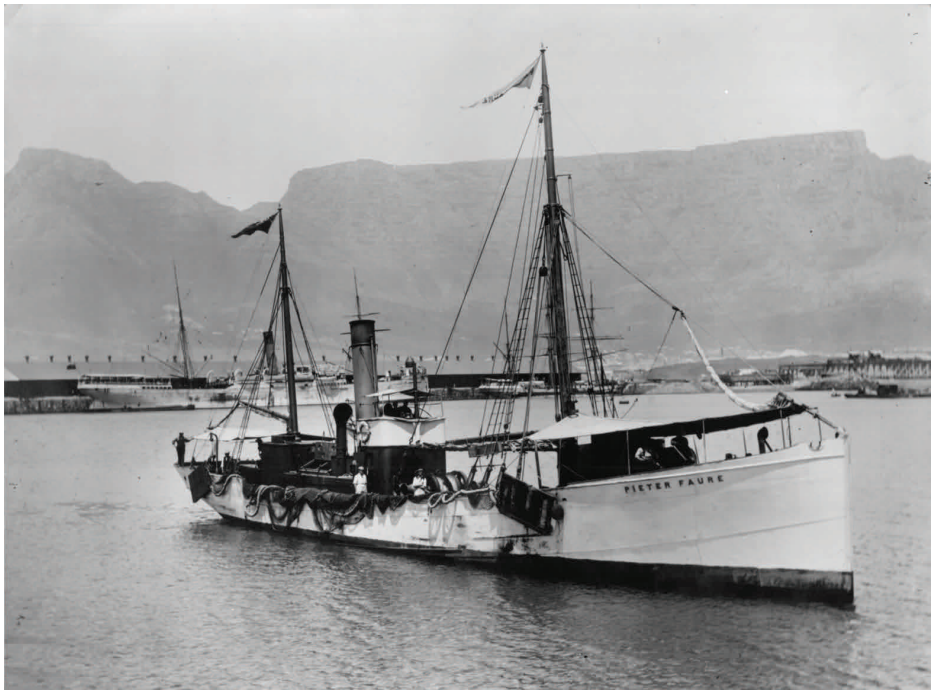


Figure 1. The steam ship Pieter Faure *heading out of Table Bay (DAFF Communications Archive Photo Library)*

South Africa's first officially-appointed marine biologist, Dr John D.F. Gilchrist, left behind a scientific legacy that is far greater than may at first be obvious from his numerous publications and reports. These contributions have lain dormant on the shelves of libraries and archives, remaining unexplored and all but forgotten, until recently. I am referring to vast lists and tables of data, which record the exploration of our offshore marine environment and describe its initial exploitation during the first half of the 20th century. The collection of these data were initiated by Gilchrist and continued after his death in 1926, by his successor, Cecil von Bonde. As a result, we have detailed research survey data collected from early steam-driven research vessels like the *Pieter Faure*, *Pickle* and the *Africana*, which provide unprecedented snapshots of relatively pristine marine ecosystems of the early 20th century. In addition, these early researchers ensured that a remarkably complete account of commercial fish landings from harbours and trawl companies was collated between 1897 and the 1950s, which document the development of industrial fisheries during those decades. The re-discovery of these information and digitization of historical datasets is poised to provide researchers and fishery managers with a far better understanding of what marine ecosystems looked like in the past and how they might have changed during the last century.

Piecing together the historical backdrop of our marine environments and the fisheries resources they supported in the past, is a vital component to effective management of our current and future marine ecosystems. For how can we understand changes in our marine environment, let alone disentangle their causes, if we do not understand where the population or system has come from? The study of these historical reference points, frequently referred to as 'baselines', are extremely important and feed into a range of research disciplines: they are critical in many fishery stock assessments; they are used to initialize ecological models; and perhaps most importantly, they provide essential reference points to resource managers, conservationists and policy makers, in order to counter 'shifting baselines' – the propensity for successive generations to accept an increasingly impoverished natural environment as the norm.

For my PhD research, I am using the historical datasets mentioned above, to explore how parts of the ecosystem might have changed between the early 20th century and the present, and to estimate some historical reference points for certain fish resources. As a result, I had the privilege to attend the ICES (International Council for the Exploration of the Sea) working group on the history of fish and fisheries (WGHIST) in the scenic Italian village of Panicale from the 7th to 11th of October. This working group aims to bring together fisheries scientists, marine biologists and historians in order to promote multi-disciplinary investigations into the long-term dynamics of fish populations, fishing fleets and catching technologies. The meeting provided a great platform to interact with a diverse set of researchers from across the world, who are investigating similar questions, but approaching these using a variety of techniques and data.

Having presented my PhD plans and gained valuable input in Italy, the next stop was to spend four weeks visiting CEFAS (Centre for Environment, Fisheries & Aquaculture Science) on the east coast of England. This government research centre overlooks the North Sea in the coastal town of Lowestoft and houses roughly 300 staff working in marine and freshwater environments. Tracing its roots to a small fisheries laboratory

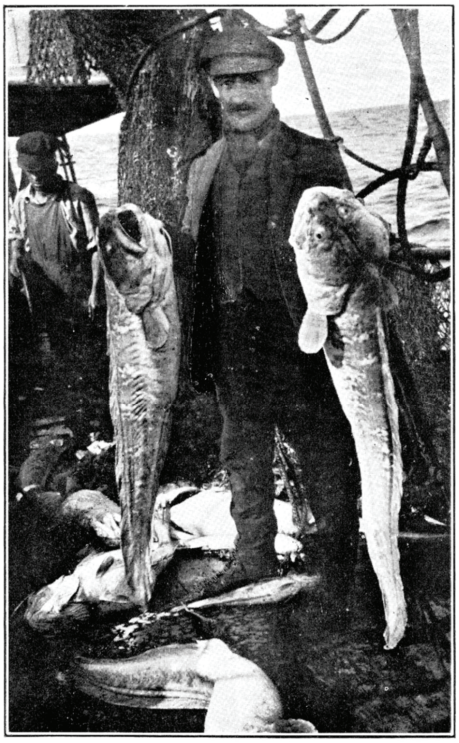
that was established in 1902, CEFAS has accumulated a rich historical legacy, including an outstanding library collection of old, irreplaceable books, journal volumes and reports. If you are searching for information on the history of fisheries or fishing gear, this is a great place to visit! Thankfully I had the kind assistance of Dr Georg Engelhard to act as my host and guide at CEFAS. Having researched these topics for a number of years, Georg has amassed valuable knowledge of historical fishery and fleet dynamics that will no doubt be called upon in future collaborations.

Much of the four weeks in Lowestoft, I spent searching through the library and archive shelves at CEFAS. My effort was focussed on piecing together information on historical trawl gear from the late 1890s and early 1900s, the period when the *Pieter Faure* was active as a research vessel in South Africa. The early period of Gilchrist's investigations are of special interest to us as they offer a globally unique situation: detailed research surveys of an environment that until then, would have experienced minimal human impacts in the form of climate change, fisheries pressure, pollution or the introduction of alien invasives. The great majority of marine ecosystems were exposed to decades, if not centuries, of exploitation before being investigated by scientific survey.

My search for historical net details is driven by a plan to revisit sites surveyed by Gilchrist and the *Pieter Faure*, and to examine these sites by re-enacting the trawl gear and methods used by them approximately 115 years ago. Such experiments will allow us to describe what the fish community looked like back then and assess how it might have changed during the intervening century. Whilst Gilchrist pronounced that his newly commissioned research vessel, launched in Glasgow in 1897, was fitted with an “otter trawl of latest pattern with all accessories”, he frustratingly did not provide a detailed description of this net (at least not one we have managed to find so far). So after having canvassed the local archives and libraries, it was time to move my search to the UK, where much of the history of trawling evolved.

The findings of this research will be detailed in one of my thesis chapters. Together with information gleaned from photos and drawings of the *Pieter Faure*, we now have a good idea of the various parts that made up the “large otter trawl” used during her surveys. Until a few months ago, I had little appreciation for the intricacies involved in the build of an otter trawl, where many specifics combine to affect the 'selectivity' of the net, i.e. the relative proportion in which different fish species will be caught by the net (due to their differing behaviour that affects their escape or capture rate). Factors such as the trawling speed, the size of the mesh, the shape of the mouth of the net while it is being towed through the water, are subtle factors that can drastically alter the selectivity of the net. Obviously we want to confidently replicate the fishing methodology, in order to ascribe any differences we might find between the catches of a century ago and those from our re-survey to changes in the fish community (as opposed to differences in the gear used). As such, we are paying close attention to these details and are gathering input and collaboration from a wide range of experts from the fishing industry, research institutes, net manufacturers and technical advisors.

If anyone is interested in this project, or in the broader field of historical marine ecology, I encourage them to contact me (jock@saeon.ac.za). Over the next three years, I shall be coordinating a 'historical working group' under the auspices of a new national marine biodiversity project called *SeaKeys: Unlocking foundational marine biodiversity knowledge*. This working group is focussed around data rescue, digitisation



King-Klip-fish from Deep Water off Cape Town (Station 89, 214 fathoms).

Figure 2. Kingklip caught by trawl on the Pickle *in 1920 (taken from the Fisheries and Marine Biological Survey Report No. 1)*

and analysis of historical marine biodiversity data and we welcome any involvement by persons interested in these topics. The *SeaKeys* project is led by Kerry Sink (SANBI) and is funded through the Foundational Biodiversity Information Program (see related article in this edition).

Acknowledgements

The Marine Research Institute at UCT and the South African Environmental Observation Network (SAEON) kindly provided travel funding for my overseas visit. The Marine Conservation Institute, National Research Foundation, SAEON and the University of Cape Town are acknowledged for their support of the project and my bursary. Thanks are due to Georg Engelhard for hosting me at CEFAS and inviting me to the ICES WGHIST meeting, as well as Mandy Roberts for kindly helping me navigate the CEFAS library and tracking down missing references.

Recent loading of data in SADCO

Roy van Ballegooyen, Ursula von St Ange, Louise Watt and Marten Gründlingh

Southern African Data Centre for Oceanography

The professional management of quality scientific data is often the most important legacy that a project can have. In the process of publishing scientific findings large amounts of the collected data need to be aggregated before they can be converted to information, then to knowledge and understanding (see Figure 1). Such data represent an enormous investment in time and money, and need to be collated and stored professionally. Often, the same data can be reused to answer different questions, leading to other understanding and actions.

The need to look after marine environmental data is receiving growing support from the awareness of environmental degradation and depletion of marine living resources. Coupled with the impact of climate and global changes these issues often require extended time series of data to provide sufficient robustness to numerical models and other forecasting techniques. Such models also play a role in suitable and efficient design of maritime structures and even forensic hindcasting of events in cases of marine incidents.

Although many organisations have in-house data management facilities, these are often inadequate when trying to address the growing temporal and spatial issues that require multi-organisational data. This can be achieved more cost efficiently if a collective approach is considered by countries (i.e. a national oceanographic data centre), regions, or even internationally (like the World Data Centre). The Southern African Data Centre for Oceanography (SADCO, sadco.csir.co.za) is such a regional facility.

Figure. 1 Data pyramid, showing the progress from raw data to action.

Data loaded 2013

Scouting for and loading data is a prime component of a data centre's activities, and serves a bimodal goal: On the one hand, it stores and maintains (backs up) valuable data collected by local organisations, while on the other hand it finds data from foreign sources and thus provides the best data available to support local researchers. The following are two of the data sets loaded recently:

VOS data

Voluntary Observing Ships' data consists of weather reports submitted by merchant and other vessels as they ply the oceans. SADCO downloads monthly updates of this data kindly supplied by the South African Weather Service. This data is reformatted and loaded into SADCO's marine climate database, and is now up to date to 31 August 2013.

All the data from 1750 onwards is universally and freely extractable on-line, per area and period.

ARGO float data

ARGO floats are cylindrical, free-drifting instruments that weigh about 25 kg (Figure 2) and have the ability to sink from the surface to a level of neutral buoyancy (see: http://www.argo.ucsd.edu/FrHow_Argo_floats.html). At that depth (nominally 1000m or 2000m) the float drifts with the currents, providing valuable and unique insight into the flow patterns at that level. This is referred to as the "simple mission operation".

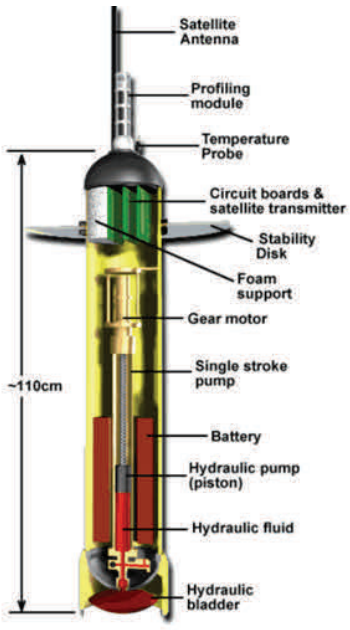


Figure. 2 Diagram of an ARGO float

After nine days the float adjusts its buoyancy by increasing the size of an external "bladder", and this causes it to rise all the way to the surface. During its vertical traverse, CTD profiles of temperature and salinity are recorded.

Upon reaching the surface, the float transmits the data to a satellite, while the position of the buoy is also fixed. After a day at the surface, the buoy returns to its pre-set depth and repeats the cycle.

In the "park and profile mission operation" the float initially sinks to about 1000m and drifts with the currents. After 9 days the float sinks to 2000m before rising all the way to the surface, recording temperature and salinity en route. The data referred to below is downloaded from an international site.

The float is supplied with battery power that allows about 50-150 of these cycles. There are nominally about 3000 floats operating globally.

Data loaded

The distribution of the data recently loaded within SADCO's target area, is indicated in Figure 3. The number of stations added to SADCO's database amounted to 15 687, collected by 349 floats.

SADCO loads only the "delayed mode" (verified) data and not the raw data. The total number of ARGO stations in SADCO's target area now stands at 109 219, thereby representing about 29% of the total number of hydrographic stations (373 041). ARGO has become the single largest contributor to SADCO's hydrographic data holdings.

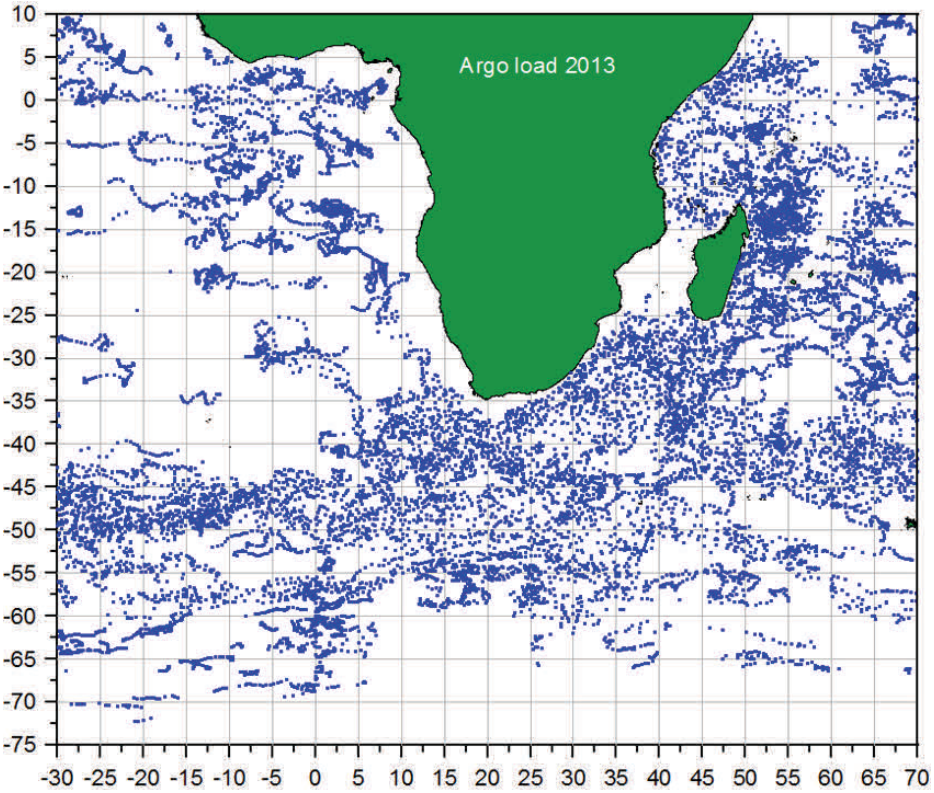


Figure 3. ARGO float stations loaded in SADCO over the past year (15 687). While individual float tracks provide insight into the speed and direction of water mass movement at 1000m, each dot represents a CTD station to 1000m or 2000m (depth permitting).

CALL FOR APPLICATIONS FOR THE

YOUNG SCIENTISTS SUMMER PROGRAM (YSSP)

1 JUNE – 31 AUGUST 2014

The International Institute for Applied Systems Analysis (IIASA), located in Schloss Laxenburg, Austria, is an international institution, supported by twenty member nations, engaged in scientific research aimed at providing policy insight on issues of importance in the following global problem areas and programs: Energy; Transitions to New Technologies; Advanced Systems Analysis; Ecosystem Services and Management; Mitigation of Air Pollution and Greenhouse Gases; Evolution and Ecology; World Population; Risk Policy and Vulnerability; Food and Water; Climate Change; and Poverty and Equity.

IIASA hosts, on an annual basis, a selected group of graduate students from around the world in its Young Scientists Summer Program (YSSP). The Program offers research opportunities to talented young researchers whose interests correspond with IIASA's on-going research on issues of global environmental, economic and social change, mentioned above. Selected students work with an IIASA senior scientist (mentor), on a project proposed by the student, related to his/her graduate research, with a goal of publishing a paper.

DEADLINE FOR THE SUBMISSION OF APPLICATIONS: 13 JANUARY 2014

For more details on this opportunity visit http://www.nrf.ac.za/funding_overview.php?fid=232

SeaKeys Project: New collaboration to unlock marine biodiversity knowledge and benefits for South Africa

Kerry Sink and

Mari-Lise Franken

South African National Biodiversity Institute

Researchers, post-graduate students, citizen scientists, marine managers and decision makers will work together in an ambitious new project that will collate, co-ordinate and apply marine biodiversity knowledge. The SeaKeys Project is a new three year collaboration funded by the National Research Foundation of South Africa through the Foundational Biodiversity Information Programme. This new program aims to support integrated projects that not only generate and disseminate foundational biodiversity information, but ensure uptake of data to improve decision-making, service delivery and create new economic opportunities. Funded projects need to deliver species inventories, records, Encyclopaedia of Life pages, DNA barcodes, new species descriptions and ensure that all this information flows up the biodiversity knowledge chain to make a difference!

The SeaKeys project team includes 30 team members and includes representatives from more than 17 different organisations including multiple government departments, research institutes, universities and even industry. The project is co-ordinated by SANBI's Marine Programme. The project will collate and increase marine and coastal biodiversity information and translate this information into products to support application and development of new benefits for South African society. There is a strong focus on capacity building with numerous student projects and associated bursaries and other initiatives to raise capacity in maritime sectors.

Key elements in the project motivation included the lack of comprehensive marine biodiversity databases in South Africa and a need for improved co-ordination and collaboration between departments and institutes. The description, assessment and understanding of marine biodiversity lags behind that of other environments and these shortfalls hamper monitoring of marine biodiversity, global change understanding, provision of evidence-based policy and management advice, marine spatial planning and the ability of South Africans to derive sustainable benefits from our rich marine biological diversity.

The diverse project team will address these challenges by working in 7 different key activity areas (see Table 1) that cover the genetic, species and ecosystem levels of marine biodiversity. The project will digitise and serve historical marine biodiversity

SeaKeys Inception Workshop Team

information, unlocking thousands of undigitised species records. Taxonomic work focuses on habitat forming, key resource, indicator and biosecurity species and ecosystem research centres on habitats that deliver key services or are sensitive to impact. Molecular research includes barcoding work to collate existing barcodes for South African marine species and advance this research area for priority species. Population genetics will also be conducted to address priory research questions identified by fisheries and biodiversity managers. Data will be disseminated through online databases, species pages, guides and maps along with publications and sector-specific guidance to ensure products support sustainable use and development. Working group submissions and contributions, GIS layers and other forms of scientific advice will support the flow of marine biodiversity knowledge. The project will explore links with the bio-economy and includes a new scuba diving training initiative, "Dive South Africa" that aims to promote South Africa's marine biodiversity and raise capacity of underwater guides. Case studies and policy briefs will also support application of foundational marine biodiversity information in the fisheries, mining, energy, trade, aquaculture, integrated coastal management and global change sectors.

This project will unlock and build new capacity in terms of post graduate students, citizen scientists, EIA practitioners and decision makers. There are several training workshops which will be advertised over the next 2 years. Five major citizen science projects will be launched or strengthened by the SeaKeys team in March next year; the National Fish Atlas, EchinoMap, a Coral Atlas, Nudibranch Atlas and the SA Jelly Watch.

The project will be managed through 10 working groups that are integrated through a multi-institutional co-ordination group. This project provides a great opportunity to demonstrate the value of foundational biodiversity knowledge and welcomes collaboration. The project will officially launch in March 2014 and team members will be active at the upcoming South African Marine Science Symposium in July.

Table 1: Overview of key activities and deliverables in SeaKeys Project.

Activity area	Key deliverables
Digitisation of historical and contemporary specimen and biodiversity data (links to Biodiversity Heritage Library)	• Digitisation of UCT ecological survey • Historical fisheries data & maps • Digitisation of cartilaginous fish collection • Collation of benthic invertebrate macrofauna records
Citizen science Initiatives: National Fish Atlas, Coral Atlas, Echinoderm Atlas and SA Jelly Watch	• Virtual museums • 10 000 records • Workshops, marine biodiversity blitzes
Taxonomic research, species inventories, species pages and guides	• Inventories: selected marine invertebrate groups, fish • Taxonomic workshops • Encyclopaedia of Life species pages
Molecular work to support barcoding, species description, understanding of population genetics and connectivity	• List of barcoded SA marine species • 200 new barcodes (corals, crinoids, nudibranchs, parasites, seaweeds, fish) • Population genetics for key resource or indicator species
Application of collated and new information in research and monitoring	• Redlist assessments • Ecosystem classification, description & assessment • Fisheries monitoring & management • Climate change monitoring & adaptation • Training in these fields
Application of knowledge to support science-based management and policy advice	• Critical Biodiversity Areas, Ecological Support Areas & Strategic Fisheries Resource Areas identified • EIA training, BGIS training, Sector guidelines (fishing, mining, ICM) • Products used in marine spatial planning • Support for policy advice
Exploration of opportunities for marine biodiversity to contribute more to the bio-economy	• Dive South Africa project • Other eco-tourism links • Bio-prospecting and marine natural products case studies

White sharks in Algoa Bay

Matt Dicken

KwaZulu-Natal Sharks Board

The white shark *Carcharodon carcharias* is a wide-ranging species that occurs in both temperate and tropical waters worldwide. In South Africa, its regional centre of abundance extends along the East Coast from False Bay in the Western Cape to KwaZulu-Natal (KZN) in the north-east. Existing white-shark research both in South Africa and internationally has focused primarily on adult sharks (>3.5 m) at island based pinniped colonies. Although these studies have begun to elucidate the biology of adult and sub-adult white sharks, little is known about the movements and habitat preferences of juvenile (<2.5 m) sharks, particularly in South Africa.

In South Africa, very little research has been conducted on white sharks outside of the Western and Southern Capes. Anecdotal reports from fishermen, however, have suggested that Algoa Bay, in the Eastern Cape, may be a white-shark nursery ground. To explore this theory in more detail we conducted a series of helicopter and shore angling surveys along the beaches of Port Elizabeth in an attempt to quantify the number and size of white sharks encountered. We also made monthly trips to the Bird Island Group (South Africa's most easterly Cape fur seal breeding colony), which is thought to be an aggregation site for white sharks (Figure 1).

Forty-three flights were conducted between October 2010 and March 2012 and a total of 50 white sharks were observed (Figure 2). Apart from a single shark observed in May 2011, all of them were sighted in the spring

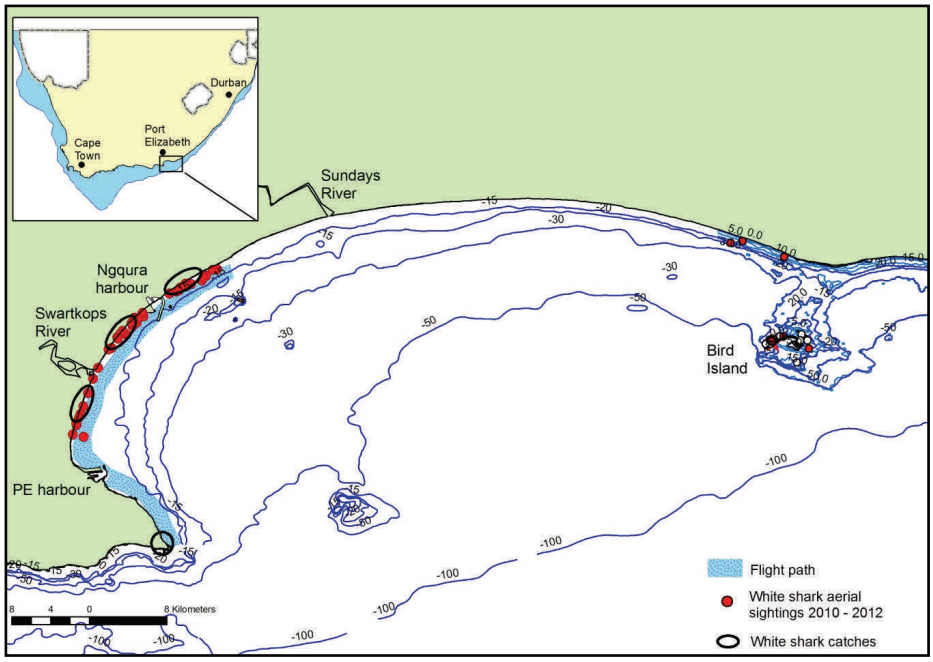


Figure 1. Map showing the location of the study site within Algoa Bay

and summer months between October and March. The highest sighting rate on a single survey was 7 sharks per hour. All of the sharks observed were located more than 4 km north of the Port Elizabeth harbour, with 82.0% being within 6 km north and south of the Port of Ngqura. Almost all of the sharks were seen within 100 m of the shoreline, with some as close as 30 m. The majority of sharks observed were less than 2.5 m in length.

A total of 58 white shark catches were recorded from the shore-angling survey (Figure 3). As with the aerial survey the sharks were caught almost exclusively in the spring and summer with 69% less than 1.75 m long. They were invariably caught by the anglers while fishing for other species such as raggedtooth and bronze whaler sharks. All of the white sharks recorded in the survey were released alive. Interestingly, the interviewed anglers, some of whom had been fishing for over 40 years, stated that prior to 2009, white sharks were rarely caught from the

Figure 2. Aerial photo of juvenile white shark, 2 m in total length, swimming 100 m from the shoreline in Algoa Bay

shore. Anglers have always targeted large sharks, there has been no major shift in the type of tackle used and fishing effort for sharks has, if anything, declined since the vehicle beach ban in 2002. Whether increased catches reflect a greater number of sharks pupped, as a result of a redistribution

or recovery of the white shark population, or is simply a product of favourable environmental conditions such as prey availability, remains unclear.

The presence of small sharks in Algoa Bay suggests that parts of the bay are important spring and summer habitat and core activity zones for young of the year and juvenile white sharks. At this time of year a variety of elasmobranch species such as blue rays (*Dasyatis chrysonota*), sand sharks (*Rhinobatos annulatus*) and dusky sharks (*Carcharhinus obscurus*) pup close inshore in Algoa Bay. It's possible that juvenile white sharks may time their movement inshore to feed on these seasonally abundant species, all of which are commonly recorded from the stomach contents of juvenile great white sharks. Predictable seasonal events such as prey availability have also been suggested to influence the occupancy of white shark nursery areas in Australia and America.

White sharks have been implicated as one of the main species involved in shark attacks both in South African and international waters. The abundance of juvenile white sharks close to beaches in Algoa Bay may increase the risk of encounter with water users and, hence, the chance of an attack. Despite numerous reported encounters, however, there have been no confirmed attacks leading to injury at any of the inshore sites surveyed in our present study. High abundance of juvenile sharks and an absence of shark attacks have also been observed at popular bathing beaches in Australia. These findings suggest that the presence of sharks alone is a poor indicator of attack risk.

In contrast to inshore observations, white sharks were only observed around Bird Island in the winter and spring months between April and November. The sharks were also larger reaching up to 4.5 m. This seasonal pattern is consistent with observations at other seal colonies in South Africa and coincides with the time when seal pups are beginning to enter the water after weaning. Being inexperienced, with limited swimming and diving abilities, pups are probably targeted by white sharks as they are easier prey in comparison to the adult seals. The bite inflicted wound on the seal in Figure (4) is testament to the fact that white sharks are actively predating seals around Bird Island.

The peak number of sharks sighted per hour at Bird Island (1.2 sharks per hour) was less than half of that recorded at either Mossel Bay or Gansbaai and less than one-third of that recorded in False Bay. This is possibly due to the fact that the number of seals at Bird Island is much lower than at these other sites and hence supports a smaller population of white sharks. Interestingly, we only observed one natural predation in 22 trips to Bird Island over a two year period. This is in stark contrast to other white shark aggregation sites in South Africa, such as Seal Island in False Bay where up to 40 predatory attacks are observed in a day!

In conclusion, this study identified Bird Island as an important off shore white shark aggregation site on the east coast of South Africa. It provides new information that fills a current gap in the existing knowledge of the distribution of white sharks between the Western Cape and KwaZulu-Natal. Our study also provided information on the existence of a possible inshore nursery area for white sharks in Algoa Bay. Defining key habitats for young of the year and juvenile white sharks is critical to their conservation in South Africa and improves our understanding of white-shark distribution and biology. This information is crucial for the long-term management and conservation of white sharks in South Africa. It also provides critical information necessary to minimise the risk of encounter between sharks and people as well as for managing human impacts on white sharks close inshore.

Figure 3. Young of the year white shark caught and landed by angler on beach

Figure 4. White shark bite inflicted wound on seal at Bird Island

This work would not have been possible without the assistance of project team members Dr. Malcolm Smale and Michelle Bradshaw. Financial support was provided by the Nelson Mandela Metropolitan Municipality, the Rufford Foundation and a National Research Foundation Professional Development Programme Post-doctoral Fellowship award. Logistical support was provided by the South African Environmental Observation Network (Elwandle Node). Thank you to South African National Parks and the Department of Environmental Affairs, branch Oceans and Coast for research permits.

Building on the South African Coelacanth Legacy

By Penny Haworth

South African Institute for Aquatic Biodiversity

Seventy-five years after the discovery of the living coelacanth off East London by Marjorie Courtenay-Latimer on 21 December 1938, marine researchers, managers and policy makers from around the country gathered to celebrate the impact of this discovery on marine science in South Africa in Port Elizabeth on 26 November 2013. In his opening address, Dr Thomas Auf der Heyde, Deputy Director General (DDG) of the Department of Science and Technology (DST), compared the significance of the discovery to the first human heart transplant and other seminal events in the way that it has shaped the science landscape in its field in South Africa.

(From left) Dr Albert van Jaarsveld, CEO of the National Research Foundation, Dr Thomas Auf der Heyde, DDG of the DST, Dr Johann Augustyn of the Department of Environmental Affairs, Dr Michael Knight of SANParks and Dr Angus Paterson, MD of SAIAB gathered on the jetty for the official handover of the R/V Kadouw.

Rik Nulens (left) and Peter Timm (right) were presented Citizen Science Awards for their contributions to coelacanth research over the past 20 years.

The original discovery in 1938 put South Africa on the map in terms of Ichthyology. The re-discovery in South Africa in 2000 off Sodwana Bay then led to the formation of the African Coelacanth Ecosystem Programme (ACEP) which over the past 12 years has taken a multi-disciplinary, multi-institutional approach to ecosystem research and has expanded that legacy to other fields of marine science, encouraging collaboration and sharing of resources, knowledge and experience, proving that a whole is greater than the sum of its parts.

As ACEP grows and extends its reach we were able to use the event to welcome the South African National Parks Board (SANParks) on board with the handover of the research vessel *Kadouw*. This will certainly strengthen the ACEP platform, provide scope for growth and allow service to more partners from further afield.

Two citizen science awards were presented on the evening to recognise the contributions of members of the public who have both played tremendous roles in coelacanth research nationally and internationally. Peter Timm, of Triton Dive Lodge, was on the team that discovered the South African coelacanth population off Sodwana in 2000 and has been diving with coelacanths regularly ever since. He has shared his knowledge with every coelacanth expedition to have taken place in the area. Rik Nulens from Belgium has, over the past 19 years, compiled a database of coelacanth literature and a catalogue of all known specimens, assisting over 120 researches world-wide and established the Dinofish website. ACEP thanks them both for the work that they have done.

ACEP's two research vessels uKwabelana *and* Kadouw, *moored at the Algoa Bay Yacht Club for the event.*

ACEP and its partners used the opportunity to showcase the work that they have done and exhibited some of the highlights from the past 12 years including SAEON's Sentinel Sight, the ACEP Open Call and Phuhlisa programmes, the impact of the ASCLME, SAIAB's Acoustic Telemetry Array Platform (ATAP), ACEP and SAEON's outreach programmes and South African coelacanth research.

SAIAB published a special publication, *Building on the South African Coelacanth Legacy*, to mark this seminal event. Download a pdf of this publication here.

SANCOR hosts KZN Student Workshop

SANCOR hosted a Student Workshop for the KwaZulu-Natal region on 19 November 2013 at the University of KwaZulu-Natal (UKZN). The objectives of the workshop, themed "The Future of Marine Science", were to give an overview of the marine and coastal research landscape, provide valuable career advice from the experts and promote interaction with other marine postgraduates and scientists.

The event attracted 39 postgraduate students. The speakers were senior scientists from classic research institutions/academia, consulting and regional management organisations and represented a range of potential career paths in marine and coastal science.

The keynote presentation was delivered by Prof Ticky Forbes (SANCOR Forum Chair) who gave an overview of estuarine research in the region. He reflected on his career trajectory in academia and described the nature of and efforts involved in marine research consulting. Dr Larry Oellermann, Director of the Oceanographic Research Institute, gave a brief introduction to the institute and its research activities. As his career path was aimed at science management, he was able to give a unique insight. Mr Geremy Cliff, Chief Scientist at KZN Sharks Board, gave an overview of shark research and activities at the Sharks Board. He recommended that students develop a 'toolbox of skills for marine scientists' such as angling, boating, diving, statistics and numerical modelling.

Dr Brent Newman presented on chemical pollution in Durban Bay. Although he had a background in marine research, this was not his original field of study. He advised students not to be afraid of targeting new areas of research. Dr David Glassom, senior lecturer at UKZN, showed students how the research landscape has changed: data is now freely available, changing the role of field biology. He encouraged students to keep learning, to be critical, write for others to read or to generate a reaction. He advised them not to be afraid of failure or change direction.

Mrs Jennifer Olbers from EKZN Wildlife presented on the marine research opportunities at the organization and described the activities and challenges involved in conservation and management. Dr Camilla Floros gave a young scientist's view on transitioning to the workplace. She said that postgraduate study certainly helped her with aspects of being a scientist, such as: participating in research; developing independent research initiatives; writing project/funding proposals and reports; conduct reef monitoring; maintaining reef databases; publishing results; planning and supervising fieldtrips. She encouraged students to understand the needs of the organization.

Dr Louis Celliers (SANCOR National Forum Representative) challenged students to:

- Connect with a society that needs a solution and develop a solution for a problem or users. Researchers need to change their behavior or risk conducting research which has no impact. Science has limited value until you make your research valuable for someone else. In the past, scientists could operate autonomously. This is no longer the case.
- A career in science requires the development of other skills, such as business development and finance. At most institutions, scientists need to be able to find funding for their research and in some cases raise a multiple quantity of their salary. He added that future marine science opportunities may involve:
  - ♦ Adaptation and mitigation of environmental change
  - ♦ How is the system changing?
  - ♦ Understanding a changing planet

- Managing our behavior in the system
- Ecosystem service delivery
- Environmental solutions for a blue/ green economy. Enhancing resource use without degradation.

- It is not your level of intelligence that will make you successful, but your skill set and how you manage opportunities.
- Tips for interviews: Show that you are not just looking for a job, but pursuing an opportunity. Show that you understand our societal context and landscape, e.g. National Development Plan, terminology of inter/multi/ transdisciplinary research.

Dr Ursula Scharler (SANCOR KZN Representative) facilitated the open discussion between the students and speakers. The following issues were raised:

- Gap years should be carefully planned: A gap year or break from science after the MSc or PhD may impact publication throughput, so gap years should involve activities to gain relevant experience, develop a complementary skillset, get international exposure and focus on research goals. Doing a PhD is a commitment where you establish yourself as an expert and should not step away from it. Make use of the multitude of postdoc opportunities available. South Africans have a good reputation abroad.
- Consider different supervisors, volunteer or collaborate.
- Try to get own funding.
- Acknowledge and be aware of the skills you have developed (in comparison to 3rd year), such as problem recognition and articulation.
- Confidence comes with age. Don't expect to feel confident about moving from the sheltered part of postgraduate life.

Based on the feedback received, students benefited from the diverse range of topics covered at the workshop and the advice shared by professional marine scientists.

Nominations invited for SANCOR Awards

Every three years SANCOR awards excellent performers in science in the marine and coastal environment. Nominations are hereby invited for these prestigious awards. Please make use of this opportunity to acknowledge the sterling efforts of our deserving colleagues by submitting a nomination.

SANCOR invites nominations for the following awards:

1) The **Marine and Coastal Communicator Awards** are made to individuals or groups of individuals in recognition of their outstanding contributions towards communication of information about the marine and coastal environment to the public via various media at various levels.
2) The **Gilchrist Medal** is awarded to distinguished marine scientists. The Medal serves as recognition of the recipients' contributions to marine science, to further stimulate excellence in South African marine science, and to focus attention on South Africa's marine and coastal environments.
3) The **Derek Krige Medal** is awarded in recognition of outstanding achievements in the field of technical support to marine science in South Africa. The award of this medal serves to emphasize the valuable contribution to marine science made by those who provide the technical and logistical support services that make research possible.
4) ***NEW!*** The **SANCOR Emerging Scientist Award** has been established to acknowledge a new generation of scientists and to encourage research excellence in science in the marine and coastal environment (SMCE).

The awards are hosted under the auspices of SANCOR and will be presented at the banquet evening of the 15th Southern African

Marine Science Symposium (SAMSS) which will be held in Stellenbosch during 15-18 July 2014.

Please click on the table below for the criteria and forms for each award as well as the new open process of nominating a candidate.

We welcome your nominations by 28 February 2014.

Please submit your nominations to sancor@daff.gov.za, with the subject heading "SANCOR Award Nomination". Receipt of nominations will be acknowledged within three days. Please enquire telephonically on 021 402 3536 if you have not received an acknowledgement.

Award	Click on the links below for the relevant documents	
Gilchrist Medal	Criteria	Nomination Form
Derek Krige Medal	Criteria	Nomination Form
Marine and Coastal Communicator	Criteria	Nomination Form
SANCOR Emerging Scientist	Criteria	Nomination Form

Regional educator conferences in the Northern and Southern Cape

The Marine and Coastal Educators Network (MCEN) is a SANCOR co-ordinating body for marine education in South Africa, it is an informal network which aims to assist marine educators in their activities, facilitate collaboration between educators, to help co-ordinate national marine education initiatives and to identify future opportunities for marine education in South Africa.

One of its activities is to host a mini-conference for local educators in each coastal region . Regional MCEN Representatives Ms Erna Groeners and Mr Arno Munro report on their events.

Northern Cape MCEN Conference

The 4th Northern Cape Mini-Conference was held in Kleinzee during 18-20 October 2013. This mini-conference aimed at providing information and activities linked to the requirements of the national curriculum (CAPS - Curriculum and Assessment Policy Statement, including CAPS+), and to complement existing knowledge. This mini-conference was attended by 29 participants representing: ten schools in the region; the Northern Cape Department of Environment and Nature Conservation (DENC); SANParks; Department of Basic Education in Springbok; South African National Biodiversity Institute (SANBI); Namakwa District Municipality; Department of Environmental Affairs (DEA).

Mr. Anton Meyer, Environmental Officer from de Beers Mines presented on coastal management along the Namaqualand coastline from a mining perspective. Ms Adeleen Cloete and Ms Wilna Oppel from the Northern Cape Department of Environment and Nature Conservation presented the topic from a government perspective. Presentations and hands-on activities were given on i) plankton, ii) impacts of overfishing and the iii) Southern African Sustainable Seafood Initiative (SASSI). Site visits were arranged to local abalone and oyster farms. The different processes on both the abalone farm and the oyster nursery were explained. A discussion was facilitated to highlight environmental issues in the region.

Southern Cape MCEN Conference

The Southern Cape Regional Conference (MCEN) was hosted by the Southern Cape Representative, Mr Craig Viljoen from the Aquatic Protection Group and the National DAFF Representative Mr Arno Munro. The Confrence was held at the Marine and Fisheries Educational Centre at the Dias Museum Complex on 31 October 2013.

The theme for the day was the "Better understanding of our Oceans – for the protection of life, jobs, food security". The event, held at the Marine and Fisheries Educational Centre at the Dias Museum Complex in Mossel Bay, attracted 37 environmental educators in the region. Amongst others, presentations were given on: Fishing sectors and methods of fishing (recommended for a Grade 11 class); How to rescue and handle oiled marine birds when disaster strikes; History of whaling along the Southern Cape and celebrating 100 years of freedom; Whale research in Mossel Bay from 1913 till 2013; Oceanographic Projects of the Department of Biodiversity and Conservation.

The conference was concluded to encourage the delegates and organisations to participate in World Fisheries Day 2013 and the upcoming National MCEN Conference 2014 to be held in Port Elizabeth.

Source: Reports from Erna Groeners and Arno Munro.

Treasure Hunters - diving gear, maps and cameras, the tools of marine scientists

Jone Porter

uShaka Sea World Education Centre

Annually during the first week of August South Africa celebrates National Science Week. The uShaka Sea World and Oceanographic Research Institute are in a unique geographic position to share a huge range of exciting marine science activities with school learners and the public.

During this week learners from selected schools participated in an action-packed work experience involving activities that included working out fish biology and sustainable harvesting, working with a aquarist to find out about fish nutrition and what it takes to create a healthy environment for marine animals, and discussing with scientists how to plan for sea level rise in Durban or the national fish tagging project.

Some schools were visited by marine educators and a commercial diver and learnt about the science behind diving and looking after the Sea World animals – all in their own language, isiZulu.

The public fortunate to visit uShaka Marine World on the weekend got to chat to scientists about coral reef research, using GIS maps to plan sustainable development along our coast and see footage of baited remote underwater video being used to work out fish communities and abundance within and outside a Marine Protected Areas. A microscope linked to a big screen highlighted the tiny animals living on and close to the shore. The most popular of all were the squid dissections, even with the staff of a nearby seafood restaurant!

This diverse programme, reaching over 7 000 people, was our best in the last 10 years. This was organised and run by the staff of the uShaka Sea World Education Centre, which runs curriculum- based programmes for about 90 000 learners each year.

SANCCOB Education centre celebrates Penguin Month

Francois Louw

Southern African Foundation for the Conservation of Coastal Birds

October saw SANCCOB celebrate Penguin month. SANCCOB's Wild About Exploration… Environmental Education Centre hosted a number of exciting educational programmes during this time to teach learners more about penguins and our marine environment. SANCCOB welcomed the Grade 1 learners of Kenridge Primary School for the duration of the month. Learners had the opportunity to learn more about penguins (in the programme Wild About…Penguins) and also about the Treasure oil spill (Wild About…The Big Spill). They also learned how to walk, swim, catch fish and even dance like penguins.

During National Marine Week (7-11 October), SANCCOB held a two-day joint programme with the City of Cape Town's Blaauwberg Nature Reserve. Learners from Belhar Islamic Primary visited Blaauwberg Nature Reserve in the morning and after lunch they came to SANCCOB where they did a lesson on empathy towards seabirds. This lesson involved a story about 'Beakie the Penguin' and her recovery after being involved in a hit -and-run accident. Learners had to explain how they thought Beakie felt at different sections of the story and also how the story made them feel. They then had to use their

feeling about the story to make a special emotion mask. At the end of the lesson, learners got to meet one of SANCCOB's ambassador penguins.

Another programme that ran at SANCCOB during Penguin month was EduXperience. SANCCOB hosted learners from Eindhoven Primary School for a week to learn about identifying birds using bird guides. Learners first had to identify a bird along with the SANCCOB educator and then, while working in groups, they had to identify four different kinds of seabirds.

SANCCOB also partnered with the West Coast Fossil Park in Langebaan on a collaborative lesson about penguins of the past and present. Learners were shown what penguins looked like in the past and SANCCOB demonstrated what they currently look like with the help of one of their ambassador penguins. Learners also enjoyed doing a mock dig where they could dig up some bones of their own.

On the 12th of October SANCCOB along with SANParks hosted African Penguin Awareness Day, a day dedicated to raising awareness about the plight of the endangered African penguin. The day started with a beach release of 47 rehabilitated African penguins at Seaforth beach (Simon's Town) and was followed by the Penguin festival at Boulders Beach Lodge and Restaurant. One of the highlights of the festival was the SASSI Celebrity Chef challenge by the Ultimate Braai Master sponsored by Pick 'n Pay. The fun-filled day also included environmental exhibition stalls, snake and raptor shows, games for the family, raffles, food stalls, and a penguin encounter with one of SANCCOB's ambassador penguins. *Photo by SANCCOB*

Take part in Ocean Sampling Day 2014

Frank Oliver Glöckner, Maria Ina Arnone and Chris Bowler

Marine Genomics

The Editors of *Marine Genomics* are proud to support Ocean Sampling Day on 21 June 2014. The purpose of this ambitious project is to collect ocean samples from across the world that will be related in time, space and environmental parameters.

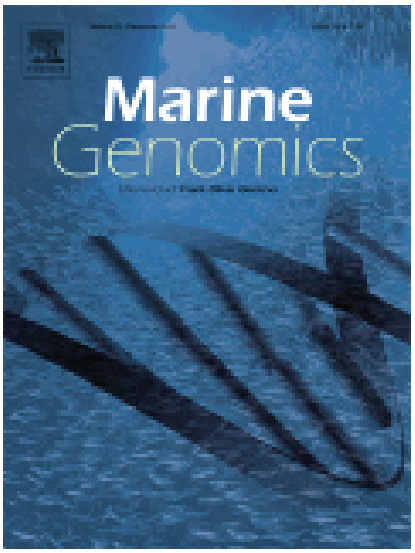
The aim is to provide insights into fundamental rules describing microbial diversity and function, and it is expected that the data collected will provide a reference data set for generations of experiments to follow in the coming decade.

Call for Participants:

There is an open call to participate in Ocean Sampling Day. If you are associated with a marine research site or research cruise and would like to participate in OSD 2014, you can express your interest here.

If you would like to find out more about Ocean Sampling Day, you can watch a short YouTube video in which project leads Dr Dennis Fink and Dr Wolfgang Hankeln explain the motivation behind the project. You can also find more information, including blog and social media links, on the Ocean Sampling Day Facebook page.

We hope you can participate!



Issued by the South African Network for Coastal and Oceanic Research (SANCOR)
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SANCOR's activities are made possible through financial contributions from the Department of Agriculture, Forestry and Fisheries (DAFF), the Department of Environmental Affairs (DEA) and the National Research Foundation (NRF).

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