News and events

Prince William visit 1
Census of Marine Life 2
Australia Day Achievement Award 2
UN Atlas of the Oceans 2
Impacts of ocean acidification 2
New Research vessel 2
Jacques Yves Cousteau -100 2
A national approach to monitoring 3
Hub researcher wins national award 3
Log your Longtail tuna catches 8
Invasive screwshell 12
Redmap and citizen scientists 15

International Year of Biodiversity

Prince William receives local view of global science

On a visit to Australia in January, His Royal Highness Prince William of Wales KG was given a tour of the research vessel Southern Surveyor and Dr Alan Williams provided a five-minute overview of marine biodiversity research in Australia. The Prince was also shown samples of coral, deep-sea fish, crustaceans and sea stars from the Australian Museum’s Fish Collection and CSIRO.

Prince William, second in line to the throne, had a good background for the tour – he received a 2.1 from St Andrews for his Master of Arts dissertation on the coral reefs of Rodrigues.


Top banner photo: Bramble corals, lace bryozoans and seapens are amongst the diverse invertebrate fauna found in Bathurst Channel, Port Davey, SW Tasmania, where strongly tannin-stained surface waters restrict light penetration, promoting “deep-water emergence” where such species can occupy shallower water environments without competition and fouling by algae. Photo: Neville Barrett, TAFI.
**Research vessel to sail in Flinders’ wake**

Marine Biodiversity hub researcher Kirrily Moore, together with Queensland primary school student Clare Cameron, have been announced joint winners of the competition to name Australia’s next marine research vessel. The Investigator was chosen from 1,458 entries received as the winning name for the Australian Government’s new $120 million deep water research vessel. Announcing the winners, the Hon Senator Kim Carr, Minister for Innovation, Industry, Science and Research, said “Australia has one of the largest marine territories in the world, yet much of this terrain remains a mystery to us….. It is time we followed in Matthew Flinders’ wake and embarked on a meaningful journey of discovery to unlock the secrets of our vast marine territory.”


---

**UN Atlas of the Oceans**

[http://www.oceansatlas.org](http://www.oceansatlas.org)

Make use of the UN Atlas of the Oceans internet portal which provides information relevant to the sustainable development of the oceans. It is designed for a number of audiences: for policy-makers who need to become familiar with ocean issues; for scientists, students and resource managers who need access to databases and approaches to sustainability; and for ocean industry and stakeholders.

Contribute to and participate in the growing Atlas community by becoming a member, and receive their newsletter. [View the April edition](http://www.oceansatlas.org/newsletter/en/newsletter_april_2010.html)

---

**CBD releases study on impacts of ocean acidification**

On 14 December 2009, the Secretariat of the Convention on Biological Diversity (CBD) released a major study “Scientific Synthesis of the Impacts of Ocean Acidification on Marine Biological Diversity”. The launch of the study was prepared in collaboration with the UNEP World Conservation Monitoring Centre (UNEP-WCMC) to mark Oceans Day during the climate change negotiations in Copenhagen. According to the study, seas and oceans absorb approximately one quarter of the carbon dioxide emitted to the atmosphere from the burning of fossil fuels, deforestation, and other human activities.


---

**Australia Day Achievement Award for knowledge brokering**

A fundamental aim of the Hub’s research is to produce high quality science which meaningfully informs decision-making on the marine environment. In this context, the Hub employed Paul Hedge as its knowledge broker in mid-2009.

In January this year, Paul was awarded an Australia Day Achievement Award 2010 by Robyn Kruk, Secretary of the Department of the Environment, Water, Heritage and the Arts (DEWHA). He received this award for his significant contribution to enhancing the level of engagement between the Department’s Marine Division and the marine research community through his secondment to the CERF Marine Biodiversity Hub.

Paul assisted hub researchers and DEWHA by identifying opportunities for short and long term challenges to better manage Australia’s marine biodiversity. Paul demonstrated a great capacity to work across organisational boundaries, managed often competing demands and delivered positive outcomes for the hub.

“The award is a good reflection on the willingness of the Hub’s scientists to understand the business needs of its key stakeholders and the success of the hub in targeting its research outputs to inform DEWHA’s decision making processes,” Paul said.

---

**Jacques Yves Cousteau - 100 Years Later**

2010 is the year that would have been Jacques Cousteau’s 100th birthday. Commemorative events are being planned to honour and pay tribute to the historical impact and pioneering legacy of this ocean icon who inspired so many around the world. [More info](http://www.cousteau.org/news/100th-anniversary)

---

**CBD releases study on impacts of ocean acidification**

On 14 December 2009, the Secretariat of the Convention on Biological Diversity (CBD) released a major study “Scientific Synthesis of the Impacts of Ocean Acidification on Marine Biological Diversity”. The launch of the study was prepared in collaboration with the UNEP World Conservation Monitoring Centre (UNEP-WCMC) to mark Oceans Day during the climate change negotiations in Copenhagen. According to the study, seas and oceans absorb approximately one quarter of the carbon dioxide emitted to the atmosphere from the burning of fossil fuels, deforestation, and other human activities.

A national approach to a monitoring, evaluation & reporting framework

This is the third article on the national advisory groups that the Marine Biodiversity Hub works with to improve the management of marine biodiversity. In our September 2009 newsletter, the Research and Development Working Group outlined their work on developing a national approach to marine indicators. In December, we reported on the work of the Marine Biodiversity Working Group and their role in addressing Australia’s marine biodiversity decline. In this issue, the Research and Development Working Group outlines recent progress in developing a national framework for marine monitoring and evaluation.

A common assessment and reporting framework (CARF figure below) is being developed and evaluated as a national framework for monitoring, evaluation and reporting (MER) in estuarine, coastal and marine environments. CARF is designed to work across all existing MER frameworks that have been operating in the estuarine, coastal and marine arenas, as well as across fisheries, conservation, marine bioregional planning for Commonwealth, regional, state and territory frameworks.

CARF is essentially a set of steps (components) laid out in a double loop formation based on the adaptive management paradigm. It begins with a focus on the objectives of the assessment, sets the context and scope, then introduces the emerging best practice of documenting the current understanding (e.g. as a diagrammatic conceptual model). The desired type of assessment is then conducted, drawing on the available information base including monitoring data. Finally, the ‘report against the objectives’ step is undertaken based on an explicit communication plan which delivers the required information to management. Further development of the information base, e.g. by monitoring and research, is a management response option within the ‘gather further information’ step. The process is repeated as often as needed.

CARF was endorsed by the Marine and Coastal Committee in December 2009, along with four pilot studies (detailed below) to evaluate how the framework would be used and to demonstrate the efficacy of the national approach. Each jurisdiction is involved in one or more of the studies.

Pilot study 1 - South west bioregion

This study (led by the Department of the Environment, Water, Heritage and the Arts) will focus on a monitoring, evaluation and reporting framework of marine ecosystem health in the south-west Australian bioregion, covering state and Commonwealth waters from Shark Bay, Western Australia to Kangaroo Island, South Australia. The study is designed to examine broad-scale assets and threats in order to assess the value of ecosystem based management. It will identify those elements requiring consistent approaches between jurisdictions and conversely those elements where a national approach need not be considered.

Pilot study 2 - Iconic species - turtles

This project (led by the Northern Territory Department of Natural Resources, Environment, the Arts and Sport) will evaluate how a national CARF framework could be applied to species monitoring, using sea turtles as the target species. It is anticipated that the study will identify opportunities and challenges provided by the monitoring, evaluation and reporting framework and how this could be coordinated across different scales – local, regional, national.

Pilot study 3 - Estuaries – NSW and Queensland

This study (led jointly by the Queensland Department of Environment and Resource Management and NSW Department of Environment, Climate Change and Water) will compare existing estuarine monitoring and assessment approaches at regional and state scales in NSW and Queensland in the context of the proposed national CARF. The study will also evaluate possible future applications of the CARF to determine the additional value provided by the CARF for delivery of natural resource management outcomes in estuarine ecosystems. The study provides the opportunity to test how Australia’s jurisdictions can work together to support a national reporting of estuarine ecosystem condition and to define common information needs.

Pilot study 4 - South-eastern Australia MPA reporting

This study (led by CSIRO) will focus on the network of reserves within south-eastern Australia declared and managed by NSW, Victoria, Tasmania and the Commonwealth. The study will assess the benefits, costs, administrative and legislative constraints of a coordinated approach across jurisdictions to MPA reporting, together with the compatibility of existing approaches to the CARF framework.

Additional detail is included in the web version of this newsletter

Hub researcher wins national award

Marine Hub researcher Professor Corey Bradshaw has won the Life Sciences and Biological Sciences category of the inaugural Scopus Young Researcher of the Year Awards, presented by Senator Kim Carr, Federal Minister for Innovation, Industry, Science and Research. Professor Bradshaw is Director of Ecological Modelling at the University’s Environment Institute and holds a joint position with the South Australian Research and Development Institute (SARDI). He is a conservation biologist who uses mathematical modelling to understand the complex interactions between plant and animal species within an ecosystem.

His work with the Marine Biodiversity Hub is mainly in the supervision of the Prediction & Surrogacy Programs’ post-doctoral fellow, Dr Camille Mellin, who is leading cutting-edge modelling endeavours.

(Scopus Young Researcher of the Year Awards have been introduced this year by Universities Australia and Elsevier and sponsored by The Australian.)


A national approach to a monitoring, evaluation & reporting framework (CARF) diagram.
**Perspective**

**Prof. Nic Bax, Hub Director**

A major aim of the Marine Biodiversity Hub has been to promote collaboration among Australian marine researchers and thus improve the quality and extent of science available to support decision makers tasked with managing Australia’s oceans. A key achievement of the Marine Biodiversity Hub has been to access data and expertise from different partners and come up with products that have contributed directly to marine bioregional planning. But can we do more?

I was curious to find out what the Hub’s collaborations looked like when we included the networks that scientists are contributing to through their Hub research. This newsletter explores the collaborative networks that the partners have tapped into to advance the quality of our research and the advice we provide to Commonwealth, State and Territory governments. At the same time these national and international collaborations meet another aim of enhancing Australia’s contribution to regional and national initiatives and partners.

Hub researchers contributing to major international initiatives including the Global Ocean Biodiversity Initiative (GOBI) and GeoBON have the opportunity to access international expertise but also influence international management and monitoring of the world’s oceans through the Convention on Biological Diversity (CBD). Other collaborations including several through the Census of Marine Life, GeoFab, Tree of Life, and specialist taxonomic, threatened species and marine ecosystem groups are value adding to Australian research through large comparative studies that put our own species, systems and their management in the context of their world-wide diversity. One developing initiative is bringing Australian and Canadian researchers and students together to learn from each other’s biodiversity research and its translation to support evidence-based decision making.

At the national level, it is encouraging to read of the difference Hub research has made to MPA planning in NSW, the opportunities for a national volunteer-based monitoring program, and the degree to which collaboration between the Hub partners is improving the value that we get from marine surveys. And it is important to note that the collaboration is not only between the existing partners. Two workshops - one on sponge identification and other on predicting the distribution of threatened species - have brought in additional researchers to improve the advice available at the national level. This seems to be a major opportunity for the Hub – using the partners’ extensive research networks to bring together the top experts in the country and internationally to provide consensus advice to management agencies such as DEWHA.

---

**In focus – International collaborations**

**Global Ocean Biodiversity Initiative**

**Piers Dunstan, CSIRO - CERF Prediction program**

The Global Ocean Biodiversity Initiative (GOBI) is an initiative to identify ecologically and biologically significant areas (EBSA) on the high seas outside national jurisdiction. This will guide development of marine protected areas and other conservation management actions and reports directly through the Convention on Biological Diversity.

GOBI is a collaboration between the German Federal Agency for Nature Conservation (BfN), IUCN, UNEP World Conservation Monitoring Centre, Marine Conservation Biology Institute, Census of Marine Life, Ocean Biogeographic Information System and the Marine Geospatial Ecology Lab of Duke University, with other partners (including CSIRO and CENSEAM) joining later.

The EBSA criteria are: uniqueness or rarity, special importance for life-history stages of species, importance for threatened, endangered or declining species and/or habitats, vulnerability, fragility, sensitivity, or slow recovery, biological productivity, biological diversity, naturalness. Examples of each of these criteria can be found at the GOBI website. The analyses will be informed by much of the work done by the Global Open Oceans and Deep Seas Biogeographic classification (GOODS) – a bioregionalisation of the pelagic and benthic open oceans. Five working groups are forming:

- Dynamic and pelagic
- Benthic
- Data and products
- Multi-criteria decisions, and
- Pacific regional analysis

The benthic working group is tasked with identifying methods and data relevant to benthic habitats for consideration under the EBSA criteria. The methods developed in the Hub to predict biodiversity patterns around Australia will form an important part of the deliverables of this group. There are 3 primary tasks:

- discuss and consider how EBSA criteria can be applied to benthic communities and ecosystems;
- develop design principles to inform the selection of benthic EBSAs;
- explore and locate benthic data relevant to GOBI in collaboration with the Data working group.

Further information:

Benthic working group - contact the chairperson piers.dunstan@csiro.au
Other working groups of GOBI - contact nic.bax@csiro.au or visit www.gobi.org

---

**GEO BON - making earth observation data more accessible**

**Roland Pitcher, CSIRO - Program Manager, CERF Prediction Program**

Hub researchers in the Prediction program are collaborating with the Group on Earth Observations Biodiversity Observation Network (GEO BON). GEO BON, a global Biodiversity Observation Network, is part of a larger entity, the Group on Earth Observations (GEO) that is coordinating efforts to build a Global Earth Observation System of Systems (GEOSS). GEO BON is a Community of Practice fostering collaboration to make biodiversity data, information and forecasts more readily accessible to scientists, policymakers, and managers and is a key deliverable for the Convention on Biological Diversity (CBD).

GEO BON has 8 working groups, of which two have relevance to the Marine Biodiversity Hub: marine ecosystem change (group 5) and integration of observations and data in a modelling framework (group 7).

Working Group 5 on marine ecosystem change, aims to link existing marine biodiversity observation datasets, particularly those with a temporal component, for direct observation of change (eg. SAHFOS CPR is seen as an “Early Product”). The Marine Hub is an important link as it now holds significant Australian biological survey datasets. Monitoring datasets such as coral reef Long Term Monitoring Program (from hub partner Australian Institute of Marine Science) and temperate reefs monitoring program (from partner Tasmanian Aquaculture and Fisheries Institute) are also key resources. WG5 also aims to produce an updated classification of marine realms and ecosystems, collate relevant historical and archaeological
data, standardise sampling protocols, stimulate new observation and monitoring (including of invasive species) and report periodically on biodiversity change.

Working Group 7 is about integrating direct biodiversity observations with remotely-sensed (and other large-scale/continuous coverage) data in a modelling framework to produce measures of biodiversity changes at a range of scales aiming for global coverage of terrestrial, freshwater and marine realms. These goals are relevant to the Marine Hub’s Prediction Program and identified future priorities.

The working groups are currently finalising their goals, activities and deliverables, to be incorporated in the GEO BON Implementation Plan due for release on World Biodiversity Day on 22 May 2010. Further information:
WG5 - Carlo Heip c.heip@nioo-knaw.nl
WG7 - simon.ferrier@csiro.au
http://www.earthobservations.org/geobon.shtml

GeoHab (Marine Geological and Biological Habitat Mapping)

GeoHab was established in 2001 to bring together scientists from around the world working on the development of new thematic maps linking acoustic mapping and geological sampling to marine biology in a Geographical Information System environment that would support sustainable ocean management.

GeoHab is an international forum which meets annually and is designed to:
- maintain awareness of technological developments and survey standards
- identify existing metadata sources relevant to marine habitat mapping
- develop new thematic maps useful for fisheries management, biodiversity management, and the assessment of future Marine Protected Areas (MPAs)
- encourage standardization of maps through the creation of a habitat mapping glossary and building links to marine mapping agencies worldwide
- apply and evaluate habitat classification systems using real-world examples

The 2010 meeting was held in Wellington, New Zealand, and the Marine Biodiversity Hub was a gold sponsor. Hub researchers presented 11 talks.

For further information see:
www.geohab.org

Biodiversity and seamounts – the CenSeam program

Alan Williams, CSIRO - CERF Biodiversity Program

Hub researchers have contributed to making 2009 a very productive year for the Census of Marine Life’s (CoML) seamounts program, CenSeam. Input to committees, working groups and publications have supported some of CenSeam’s many international activities and outputs, while knowledge contributed from survey work off temperate Australia and the Lord Howe area has continued to feed into CenSeam’s global information system for seamount biology – Seamounts Online.

The topics and forms of outputs reflect CenSeam’s two primary aims:
1. Identifying the factors that drive community composition and diversity on seamounts, including any differences between seamounts and other habitat types
2. Evaluating the impacts of human activities on seamount community structure and function

The CenSeam program is in its final year now and, appropriately, many of its outputs build on synthesis of knowledge over the last few years aiming to shape paradigms about seamount biodiversity. Publications in the primary literature include a review of the ecology of seamounts in relation to structure, function and human impact (see listing in this newsletter), while a set of seamount papers that will comprise a Special Issue of Marine Ecology has been coordinated by CenSeam and will be published in mid-2010.

Reporting to international agencies has included advice to the IUCN on the management of deep-sea fisheries on the high seas; recommendations to the International Seabed Authority (ISA) on the formulation of environmental guidelines; and advice to the Convention on Biological Diversity (CBD) on issues including “Scientific criteria for identifying ecologically or biologically significant marine areas in need of protection in open-ocean waters and deep-sea habitats”.

A workshop on the identification of deep-sea organisms from images and video held at the MBARI marine labs has contributed to standardizing international best practices in the use of imagery for biodiversity assessment.

For more information:
CenSeam: http://censeam.niwa.co.nz/
Seamounts Online: http://seamounts.sdsc.edu/

Biodiversity and continental margins – the COMARGE program

Gary Poore, Museum Victoria - CERF Biodiversity Program

Hub researchers have promoted the importance of taxonomy and biogeography in the study of continental margins in the Census of Marine Life, Continental Margin Ecosystems (COMARGE) program, and have promoted Australia’s margin studies as part of international research effort. Since 2007, COMARGE has supported international collaboration into research on the taxonomy and biology of squat lobsters. These crustaceans belong to three families of decapods that are important components of continental margin faunas in Australia as well as world-wide. One of the first tasks from the squat lobster working group meeting in New Zealand in 2007 was to compile a hierarchical list of the world’s 900 species that was published in Zootaxa in 2008. Another was to compile a bibliography of more than 1,000 citations. Currently COMARGE is supporting a post-doc at Museum Victoria, Dr Joanne Taylor, who is preparing interactive electronic keys to the world’s squat lobster fauna.

This connection and the international interest in squat lobster phylogeny and biogeography has enabled the CERF Marine Biodiversity Hub to use them
How many species in the oceans – the NRIC program

Nic Bax, TAFI/CSIRO

The Census of Marine Life, National and Regional Implementation Committees were set the task of estimating the number of marine organisms in their waters. The results of these studies and a synthesis study are the foundation of the new Public Library of Science (PLoS) Hub for Biodiversity. The Australian synthesis, led by Alan Butler who leads the Biodiversity Program, involved Hub scientists from CSIRO and Museum Victoria with additional assistance from the Australian Biological Resources Study (ABRS). No single database exists that summarises Australia’s marine flora and fauna – the researchers amalgamated data from 4 major databases, supplemented with additional records from a mixture of specialist databases and expert knowledge. They concluded that there are about 33,000 marine species (mainly animals) in the major databases, of which 130 are introduced, 58 listed as threatened and an unknown percentage endemic. An estimated 17,000 more named species are either known from the Australian EEZ but not in the present databases, or potentially occur there. It is crudely estimated that there may be as many as 250,000 species (known and yet to be discovered) in the Australian EEZ. This estimate does not include the hugely diverse microbial world. Sadly the authors also note that taxonomic expertise in Australia is unevenly distributed across taxa, and declining.

Mid-trophic biodiversity in ocean basins

Rudy Kloser, CSIRO - CERF Surrogates program

The open oceans cover more than two-thirds of the planet and contain more than 95% of the earth’s living space. Their deep water component is probably the largest and least-known major faunal group on earth despite its obvious importance to understand and manage at a global scale.

Our research (Figure at right) is part of a major international effort to develop a global ocean Mid-trophic Automatic Acoustic Sampler (MAAS) as part of the CLimate Impacts on Oceanic TOp Predators (CLIOTOP) program. CLIOTOP is a ten year programme implemented under the international research programmes GLOBEC (2005 to 2009) and IMBER (2010 to 2014), two components of the International Geosphere-Biosphere Programme. CLIOTOP focuses on oceanic top predators within their ecosystems and is based on a worldwide comparative approach among regions, oceans and species. It requires a substantive international collaborative effort to identify, characterise, monitor and model the key processes involved in the dynamics of oceanic pelagic ecosystems in the context of climate variability and intensive fishing of top predators. The goal is to develop a reliable predictive capacity combining observation and modelling for size-based single species and ecosystem dynamics at short, medium and long term scales. This will require observational platforms equipped with multi-frequency acoustics on a global scale and will be achieved through a combination of existing components and expertise – ARGOS.

buoys, vessels of opportunity, moorings, etc.. Read the full report in the web version of this newsletter http://www.marinehub.org/index.php/site/newsletter.
International collaborations in taxonomy
Gary Poore and Robin Wilson, Museum Victoria; Dan Geldhill, CSIRO - CERF Biodiversity Program

Assembling the Tree of Life
Gary Poore is part of the Assembling the Tree of Life - Decapoda group, funded by the National Science Foundation in the USA. The aim of ATOL is to construct an evolutionary history for all major lineages of life. Material collected during cruises in Western Australia, analysed as part of the Marine Biodiversity Hub’s biogeographic studies, form important parts of the Tree, and are also being integrated into phylogenetic/systematic studies of decapod crustaceans.

An evolutionary tree of the world’s scale-worm fauna
Robin Wilson and Dr Kristian Fauchald of the National Museum of Natural History, Smithsonian Institution, in Washington DC, are generating an evolutionary tree of the world’s scale-worm fauna (Polychaeta: Polynoidae). This will provide an historical framework for understanding the biogeography of a taxonomic group that forms part of the Western Australian Voyage of Discovery dataset being analysed by the Hub, and its extension to a national database than can be used to inform the implementation of marine regional plans and heritage listing. (See Robin’s article on Polychaete worms in our July 2009 newsletter).

Sharks and Rays of Borneo
Hub scientists are collaborating on an Australian Centre for International Agricultural Research (ACIAR) project with researchers from the USA, Malaysia and Australia to survey the sharks and rays of Borneo, and their associated metazoan parasites. Many of the 100 species of sharks and rays estimated to occur in the region are poorly known, and a number are new to science. The survey will provide baseline taxonomic data essential for the development of a resource management plan in East Malaysia. New discoveries of sharks and rays will be described in collaboration with international colleagues. The project is also publishing a book of the sharks and rays of Borneo, providing images and identification characters to assist with future surveys and management. ■

Uniting marine scientists in Canada and Australia -
The Canadian Healthy Oceans Network (CHONe) and the Marine Biodiversity Hub

From the glass sponge reefs of the Pacific deep sea, to the depths of the arctic seafloor, to the intertidal landscape of Halifax Harbour, researchers in the Canadian Healthy Oceans Network (CHONe) have gathered together to discover how marine biodiversity knowledge can advise conservation-based policy development in Canada.

CHONe is an ongoing strategic partnership between Canadian university researchers and government scientists – predominantly Fisheries and Oceans Canada (DFO) – formed to develop research tools to aid decision-making for the sustainable use of Canada’s three oceans, the Atlantic, Pacific, and Arctic. The Network is funded primarily by the Natural Sciences & Engineering Research Council of Canada (NSERC), with Memorial University and the province of Newfoundland as other major funding partners. Network Director, Dr Paul Snelgrove, and the CHONe administrative team are housed at Memorial University in St. John’s, Newfoundland.

CHONe’s research focuses on three central themes: marine biodiversity, ecosystem function and population connectivity. Researchers working in the marine biodiversity theme are testing hypotheses that link functional and species biodiversity to habitat diversity in frontier areas such as the Arctic and deep water; they are also exploring diversity at multiple taxonomic levels (including cryptic diversity) and as a function of time as revealed by genetic barcode and morphological data.

In the ecosystem function theme, CHONe researchers are seeking to understand and predict the role of biodiversity in marine ecosystem services by quantifying links between biodiversity and ecosystem function measures, and to provide predictive models to help minimize anthropogenic impacts on ecosystem services and health. Research will provide survey tools to collect data more efficiently and new tools for ecosystem modeling and design of conservation strategies.

CHONe projects in the population connectivity theme are evaluating the role of larval dispersal in regional source-sink species dynamics using existing management areas as model systems, and comparing estimates of metapopulation connectivity of marine populations using different metrics of larval dispersal potential.

Collaborations with the Marine Biodiversity Hub will enhance CHONe’s ability to achieve its objectives through the sharing of new research methods on predictive analysis and in decision support. Together, the Hub and CHONe can facilitate the translation of their respective findings into policy and provide students with the opportunity to participate in research exchanges with the Hub.

For more information on CHONe, contact: Kate Wilke, kmwilke@mun.ca or visit www.chone.ca ■

Dalhousie University/CHONe researchers Jon Grant, Mike Dowd, and Jeff Barrell use a helium-inflated blimp as an aerial photography platform for studying the spatial patterning of intertidal landscapes. Pangnirtung, Baffin Island, Nunavut.
Alternatives to closed areas
Natalie Dowling and Chris Wilcox
CSIRO – CERF Off Reserve Management Program

A main aim of the Hub’s Off-Reserve Management Program is to develop and test approaches to influence the spatial distribution of fishing effort without complete closures. These approaches will be necessary if we are to achieve the often conflicting aims of sustainable commercial fisheries and the conservation of high-risk or threatened species. Alternative (or additional) management approaches to marine closures (ie MPAs) were tested for their likelihood of minimising capture of threatened species with minimal loss of access to target species.

A major part of the project was to develop methods for predicting the costs of marine spatial management, through an understanding of the spatial redistribution of fishing effort in response to incentives such as decrementing the effort quota by more than one hook per actual hook set in certain areas. The notion is that fishers are discouraged, but not prohibited, from entering an area where there is a high probability of encountering high-risk species. To achieve this, an understanding of fisher decision making is critically important. Hub researchers are working with Marc Mangel, (Distinguished Professor at the University of California, Santa Cruz and a world leader in quantitative ecological modelling), to describe the fleet dynamics of the Eastern Tuna and Billfish Fishery, the case study fishery for the project. This model has been successfully used to predict the economic costs and biodiversity benefits of incentives to reduce the number of hooks fished versus entirely closing areas to the fishery.

Novel management options for seabirds and turtles
Jennifer Lavers, CSIRO - CERF Off Reserve Management Program

Seabirds and turtles have the unfortunate habit of paying no attention to national borders. Effective conservation of these species within Australian waters typically requires a regional or broader effort. Marine Biodiversity Hub scientists are working in several international partnerships to increase research relevance and uptake. A research program with the National Center for Ecological Analysis and Synthesis (NCEAS) in California, and CSIRO, is investigating “equivalency ratios” so that proposed biodiversity offsets for the bycatch of seabirds and sea turtles in fisheries are on a like-for-like basis. This work addresses a significant challenge in our ability to mitigate bycatch, by taking into consideration life-history parameters such as delayed recruitment (up to 38 years in sea turtles) and reproductive value. We have also developed a novel tool to estimate equivalency ratios for poorly known species with little or no demographic data.

Hub scientists are also collaborating with the Memorial University of Newfoundland (Canada), the National Institute of Water and Atmospheric Research (NIWA) in New Zealand, and countless museums (including the Paris and American Museums of Natural History) to develop a geographic assignment model where seabirds taken as bycatch on fishing vessels of unknown provenance are assigned to their colony of origin using biochemical markers, including genetics, stable isotopes, and trace elements. This enables wildlife managers to identify colonies that are at the greatest risk from fisheries bycatch, and to understand the connection between observed population trends (usually declining) and known bycatch events.

Working with Cornell University, Hub scientists have conducted a review of the demographic benefits of removing predators for birds. The role of predator type (rat vs fox), nest location (burrow vs. surface), bird size, and other factors were considered. These results are used to develop a predictive model that estimates the benefits of predator removal programs for birds that are still at risk (eg the critically endangered Tristan Albatross which suffers extensive mouse predation on Gough Island).

Log your Longtail tuna catches on website

A website developed to collect information about Longtail tuna from recreational fishers was launched in February, Shane Griffiths from CSIRO Marine and Atmospheric Research led a consortium of recreational fishing groups and scientists to gather the information for a Wealth from Oceans Flagship project on the species. The information gathered will contribute to scientific assessments of the condition of the Longtail tuna population.

The [website](http://www.longtailtuna.com.au/) features an online logbook that allows recreational anglers to submit fishing trips anonymously. They can also register for free, to use the site as a personal fishing diary to store and view details of their fishing trips. Registered users submitting catch data are entered in a monthly draw for longtail tuna t-shirts. [Listen to the podcast](http://www.marinehub.org)
National Collaborations and Surveys

Marine Biodiversity Hub data improves NSW Marine Protected Area planning

Alan Jordan, NSW Department of Environment, Climate Change and Water*

There are six Marine Parks in New South Wales that cover 345,000 hectares, or around 34 percent of NSW coastal waters. Their primary aims are to conserve marine biodiversity, maintain valuable ecosystems and support sustainable uses of the marine environment. The zoning plan outlines what activities can be undertaken in different areas of the Marine Park, primarily through the application of four types of zones: sanctuary, habitat protection, general use and special purpose zones.

Under Australian State and Commonwealth planning policies, a key objective of marine park planning is to achieve comprehensive, adequate and representative (CAR) protection of ecosystems and habitats, and in doing so protect the full range of biological diversity. In order to maximise the likelihood that zoning arrangements fulfil CAR objectives, a seabed mapping program has been underway for several years detailing the distribution, extent and structure of seabed habitats on the inner and mid-continental shelf of New South Wales.

Multibeam sonar mapping conducted by the CERF Marine Biodiversity Hub within Jervis Bay Marine Park (JBMP) and Lord Howe Island Marine Park (LHIMP) has provided a considerable amount of seabed coverage within these areas. In JBMP these data have been combined with extensive swath acoustic data collected using the NSW Department of Environment, Climate Change and Water’s interferometric side scan sonar bathymetry system allowing the development of high resolution maps of seabed bathymetry, backscatter and habitats. The Marine Hub mapping identified significant additional areas of complex inner-shelf reef within JBMP reflecting the bedrock geomorphology of the area. In LHIMP, the Marine Hub bathymetry data have been combined with our maps of shallow reefs digitised from aerial photos to provide new insights into the structure and extent of seabed habitats on the Lord Howe Island shelf. In particular, large areas of limestone hardground on the outer shelf were identified as a ‘relic’ coral reef and mapped at high resolution, significantly improving the knowledge of this unique temperate reef system.

Both of these marine parks are undergoing a 5 year review of their zoning plans, and these datasets have significantly contributed to the information on seabed habitats, enhancing our capacity to assess the CAR planning criteria. The zoning plans in NSW marine parks were developed using a benthic habitat classification system as a surrogate for biodiversity, and habitat classification is likely to remain a key marine park planning tool in NSW. However, the effectiveness of habitats as a planning and management tool will depend, to some extent, on how well they represent patterns of biodiversity. We have been combining maps of seabed habitats from a number of sources with site-specific information on species composition to increase the range of biodiversity surrogates being employed. This in turn has improved our ability to inform park planning and the assessment of the effectiveness of marine park locations and specific zoning arrangements for representing biological diversity in NSW.

The NSW habitat maps have also led to specific projects that aim to document and monitor the community composition of specific habitats. In particular, the sonar bathymetry coverage has significantly improved the capacity to examine the relationship between fish community structure and sessile benthic assemblages, and spatial parameters such as reef complexity, patchiness and rugosity. Given the need to predict biodiversity from the most useful surrogates for effective MPA planning, the Marine Biodiversity Hub program is an important contributor to the information required by the NSW Marine Parks Authority.

Contact: Dr Alan Jordan, Head, Marine Conservation Science Unit, Waters and Coastal Science, NSW Department of Environment, Climate Change and Water alan.jordan@environment.nsw.gov.au

Relic reef on Lord Howe Island shelf that often contains a diverse benthic community including solitary hard corals, soft corals, sponges, ascidians, encrusting bryozoans, hydroids, starfish, sea urchins, molluscs, crustaceans and a dense cover of algae including foliose and nodular coralline species. Galapagos sharks are also very common on the shelf habitats.
Marine Biodiversity Hub researchers collaborate on marine survey in Northern Australia

Andrew Heap, Rachel Przeslawski, Ralph Haese, and Justy Siwabessy, Geoscience Australia

Geoscience Australia scientists recently teamed up with researchers from the Australian Institute of Marine Science (AIMS) to carry out a seabed mapping survey on the Van Diemen Rise in the eastern Joseph Bonaparte Gulf off the coast of Australia’s Northern Territory. The survey was part of a three-year collaboration between the two organisations involving marine surveys to northern Australia using Geoscience Australia’s shallow water multibeam sonar system and AIMS’ research vessel RV Solander.

The eastern Joseph Bonaparte Gulf was selected because its seabed environments are representative of the shallow banks and shoals and intervening channels common across the whole Gulf and, more broadly, the northern Australian shelf.

Environments spanning the outer to inner shelf in the Gulf were mapped using the multibeam sonar system. This revealed a complex seabed characterised by shallow carbonate banks dominated by sponge gardens, deep channels, including one channel more than 200 metres deep, and sediment plains.

There was also evidence of significant sediment transport across the banks.

The survey collected geological and biological samples as well as wave and tide current data and underwater video footage of seabed habitats. Epifaunal species richness was associated with geomorphology, with 141 sponge morphospecies identified on the banks, including reef-forming types such as lithistids, halichondrids and xestosponges (Fig. 1). Stony corals (Acropora sp.) were only observed in two places. A very high diversity of infauna occurred on the sediment plains, with >80 crustacea species from just seven sites. From the 45 mollusc species collected were three new species, a new Australian record, and a new distributional record.

Interestingly, water column and surface sediment measurements indicate that the marine mineral high-magnesium calcite which comprises coralline algae is very close to its saturation state. It is possible that this mineral could be lost over a time scale of decades if ocean acidification predictions prove correct, with attendant major changes in sediment composition. Other measurements showed that the water residence time in the Gulf increased onshore.

These data will help improve our understanding of seabed environments and habitats in the Joseph Bonaparte Gulf. A follow-up survey is planned for August 2010.

Figure 1: Most common sponges recovered on the carbonate banks: a) Xestospongia sp. 1 (26 m), b) Ianthella sp. 2 (60 m depth), and c) Echinodictyum mesenterinum from (27 m depth). Scale bar = 10 cm.

The Reef Life Survey

- A program to ‘remotely-sense’ patterns of inshore marine biodiversity at continental scales through support from recreational divers.

Graham Edgar and Rick Stuart-Smith, Tasmanian Aquaculture and Fisheries Institute/UTAS

A fundamental problem faced by managers dealing with increasing threats to the inshore marine environment is that they occur out of sight. Little reliable information exists on the distribution and true scale of threats, causing great difficulty when allocating resources to where conservation intervention is most useful. The Reef Life Survey (RLS) program seeks to remedy these problems by providing high-quality information needed for marine research and management.

A small network of skilled recreational divers has been trained in the technical knowledge needed to scientifically and cost-effectively survey abundances and sizes of fish and invertebrate species, and marine flora, along transects on temperate and tropical reefs.

RLS places particular emphasis on data quality, which is achieved by limiting the program to the most capable divers, by providing immediate feedback when divers complete surveys or have queries, and by organising collaborative surveys with researchers. The program is directed by a steering committee that, in addition to scientists and recreational divers, includes representatives from Australian national and state coastal management agencies, thereby ensuring that the data collected from priority regions contributes to coastal planning. Ecological data are managed within a central database and made freely available to the public.
Satellite bathymetry for Lord Howe Rise

Brendan Brooke, Geoscience Australia - CERF Surrogates Program

Satellite-derived bathymetry data was produced for the shallow inner shelf around Lord Howe Island, one of the Marine Hub’s field sites. These data will enable the Hub’s surrogacy research to extend into the shallow sections of the shelf by providing high-resolution bathymetry coverage of areas that cannot otherwise be mapped.

The new satellite-derived data complement and extend the multibeam sonar data collected during the Hub’s survey on the RV Southern Surveyor in 2008 (with University of Wollongong), as well as the Navy’s LADS bathymetry coverage of a section of the shelf. A QuickBird satellite image of the island and shelf was used in this work. The image was acquired on the 3rd August 2002, has a 2.4m horizontal pixel resolution and comprises 4 spectral bands (Blue 450 - 520 nm; Green: 520 - 600 nm; Red: 630 - 690 nanometers; Near-IR: 760 - 900 nm).

To derive bathymetry data from the QuickBird image, a physics-based bathymetry mapping approach was employed that was recently developed by CSIRO’s Land & Water Group in Canberra. Called SAMBUCA (Semi-Analytical Model for Bathymetry, Un-mixing, and Concentration Assessment), this approach uses an objective and repeatable algorithm and optimisation routine to extract depth, water column constituents and substrate variables on a pixel-by-pixel basis from the spectral bands. The basis of this approach is the expression of the subsurface reflectance as a set of variables, and a parameterisation of this model to define it as a function of a set of environmental variables. An optimisation routine is used to minimise the difference/error between the measured subsurface reflectance and the modelled reflectance by adjusting the variables and retrieving the environmental parameters, including water depth, that correspond to the lowest error between measured and modelled reflectance values. The output for the Lord Howe work is a 2.4 m bathymetry grid that covers the lagoon and fringing reef, the inshore zone around the island and extensive shallow areas that extend from Lord Howe Island to the Admiralty Islands.

References are available in the online version of this newsletter http://www.marinehub.org/index.php/site/newsletters/

More info www.reeflifesurvey.com
Recent publications


- Huang, Z., Brooke, B., Harris, P. (in press). A new approach to mapping marine benthic habitats using physical environmental data. Continental Shelf Research


- Taylor, J. (2010). The sand shrimp genus Philocheras (Caridea: Crangonidae) from the continental margin of Western Australia including the description of a new species and a key to Australian species. Zootaxa 2372:1570168


See other publications, abstracts, posters and fact sheets on our website: http://www.marinehub.org/index.php/site/publications/

Invasive screwshell - making new habitat

Australian marine scientists have discovered that the impact of an introduced species of shellfish – the New Zealand invasive screwshell - has grown dramatically. The New Zealand screwshell (*Macricolpus roseus*) entered the Tasmanian marine environment some 70 years ago – and now covers large areas of the marine environment, from D’Entrecasteaux Channel to Sydney Harbour.

Marine Biodiversity Research Hub Director, Professor Nic Bax, said the various impacts of the screwshell were a clear demonstration of how human intervention can alter the marine environment irrevocably. “There is only finite space in the marine environment; in this instance what was there originally has gone,” Prof. Bax said.

Using an AUV (autonomous underwater vehicle) from IMOS (International Marine Observing System), the Hub has extensively mapped the seabed in eastern Tasmanian waters. “We now have a much better understanding of the deeper shelf habitats,” Dr Neville Barrett said. “We knew that this screw shell species had formed extensive cover in parts of the D’Entrecasteaux Channel, but were not aware of similar densities in other areas of the east coast. “The invasive screwshell has displaced indigenous shellfish and surrounding ecosystems.”

Rebecca Leaper,
Tasmanian Aquaculture and Fisheries Institute

Hub Scientist - CERF Prediction Program

The famous scientist I share my birthday with struck a chord with me when he said, “in the long history of humankind (and animal kind, too) those who learned to collaborate and improvise most effectively have prevailed”. A position with the CERF Marine Biodiversity Hub Prediction Program, which I began in March 2009, is my opportunity to collaborate and improvise effective ways to describe patterns of known biodiversity, to develop frameworks for accurately predicting ecological patterns and most importantly, to link biodiversity research to marine planners and managers.

Hub researcher retires
Dr Gary Poore, Museum Victoria

A special issue of Memoirs of Museum Victoria has been dedicated to Dr Gary C B Poore on his retirement as Principal Curator of Marine Biology.

The Memoir is a tribute to Gary’s contributions to the field of crustacean systematics, with more than 100 taxonomic and ecological papers, over 350 new species described, and the building of Museum Victoria’s crustacean collection and systematics library. “The variety of crustacean taxa included —isopods, amphipods, cumaceans, carideans, stomatopods and thalassinideans, and the genera and species in the issue named in his honour — is a permanent reminder of Gary’s interests across diverse crustacean taxa,” said Memoir editors and colleagues Drs Joanne Taylor and Robin Wilson.

Exhibitions/Conference/Workshops

Questacon Exhibition
21 May, Canberra, ACT

Come and see the Hub’s exhibition of marine biodiversity images at Questacon in Canberra from May to July to celebrate the International Year of Biodiversity. The exhibition contains images from Hub partners (and a few more) and is being curated by Mark Norman, Head of Science at Museum Victoria. Our aim is to reach out to the general public (especially school students) and raise their awareness of the beauty and fragility of Australia’s marine biodiversity. We also raise the need for cutting edge science and management to protect this environment. The exhibition of photographs is scheduled to open on May 21, the day before International Biodiversity Day.

AMSA 2010 Conference
4 - 8 July, Wollongong, NSW

The Marine Biodiversity Hub is sponsoring the poster session and cocktail hour at this year’s AMSA Conference. Hub scientists will also be convening two symposia:

Abiotic surrogates for marine biodiversity
Convenor: Rachel Przeslawski

Improved technology and protocols have greatly facilitated biological sampling in Australian waters, but it is unfeasible to catalogue all marine life using direct sampling techniques. To that end, surrogacy research provides a promising avenue in which suitable environmental variables are identified to predict patterns of marine biodiversity.

Marine Biodiversity Symposium: 2010 International Year of Biodiversity (proposed)
Convenor: Piers Dunstan

2010 is the International Year of Biodiversity, endorsed by the United Nations. In 2002, the Convention on Biological Diversity committed themselves to achieve by 2010 a significant reduction in the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth. This symposium may include topics such as biogeography, genetics, taxonomy, analytical techniques, planning and management, microbial diversity, Antarctic, temperate and tropical biodiversity.


Sponges and biodiversity

Marine Biodiversity Hub partners Australian Institute of Marine Science and Geoscience Australia held an international sponge workshop in Perth early in February 2010 to identify a treasure trove of marine sponges collected in deep waters off Ningaloo Reef, Western Australia.

Sponge taxonomists from Australia and overseas were on-hand to identify over 1,000 samples collected during a Marine Biodiversity Hub survey designed to develop new physical predictors for marine biodiversity. Many of the sponges are either new discoveries for Western Australia or new to science. (Ningaloo Reef is one of the largest and least studied coral reef ecosystems in the world.)

“The project has shown that the deepwater habitats are even richer than previously thought and suggests that there are still many discoveries to be made with more fieldwork,” said Hub researcher Dr Heyward.


Dr Belinda Glasby with sponge.
Photo: Christine Schoenberg, AIMS.
CERF/ERIN Species prediction workshop

Convenor - Paul Hedge, Knowledge Broker, Marine Biodiversity Hub

On 9 March 2010, the Marine Biodiversity Hub convened a one day workshop between marine scientists and the Environmental Resources Information Network (ERIN) from the Department of the Environment, Water, Heritage and the Arts (DEWHA). The objectives of the workshop were to identify:

1. Current DEWHA practices, challenges and objectives for predicting species distributions;

2. Methods, techniques and environmental surfaces developed or investigated by the CERF Marine Hub that address some of the problems of predicting marine species distributions.

3. The advantages and limitations of available data, surfaces and techniques to predict species distributions; and

4. Opportunities to improve ERIN’s capacity to predict and maintain species distributions through use or adoption of new surfaces, methods and techniques.

The workshop also provided a good opportunity to explore the usefulness of the Marine Biodiversity Hub as a conduit to specific elements of the marine science community (i.e. for times when DEWHA is seeking advice on marine biodiversity topics). At this meeting we were able to bring in key national experts representing the AEDA Hub, Melbourne University, CSIRO and AIMS and thus provide a consensus view of the available scientific options.

Redmap and citizen scientists

Each year over 120,000 Tasmanians go fishing at least once. Imagine ....120,000 potential ‘citizen scientists’ collecting valuable data about the marine environment! Redmap invites the Tasmanian community to spot, log and map marine species that are uncommon in Tasmania, or along particular parts of our coast. The information collected is mapped and displayed on the site, demonstrating, in time, how species distributions may be changing in response to changing environmental conditions.

Sightings are divided into two categories – those with a photo that can be ‘verified’ by a marine biologist, and sightings without photos that are called community sightings (anecdotal). All the information collected, with and without photos, is mapped and will be used to map the ‘story’ of what changes are occurring in the Tasmanian marine environment. Public response has been high and several other States are wondering how Redmap can be extended to their jurisdictions.

Hub scientists involved in the program include Graham Edgar and Neville Barrett from the Tasmanian Aquaculture and Fisheries Institute and Peter Last, William White and Daniel Gledhill from CSIRO’s Fish Taxonomy and Biogeography team.

Download teacher resources, visit the photo gallery, get the latest news or log a sighting http://www.redmap.org.au/
Australian Government

Department of the Environment, Water, Heritage and the Arts

www.marinehub.org

This newsletter is produced by the CERF Marine Biodiversity Hub – a collaboration between the University of Tasmania/TAFI, CSIRO Wealth from Oceans Flagship, Geoscience Australia, the Australian Institute of Marine Science and Museum Victoria. The Marine Biodiversity Hub is funded through the Commonwealth Environment Research Facilities Program (CERF), administered through the Australian Government’s Department of the Environment, Water, Heritage and the Arts. The key aim of CERF is to provide sound advice to inform environmental public policy objectives and to better the management of Australia’s unique environment.

This newsletter is available as a PDF and online version at http://www.marinehub.org/index.php/site/newsletters/ with links to sources.

National Research

FLAGSHIPS

Wealth from Oceans

CSIRO

www.marinehub.org

This newsletter is produced by the CERF Marine Biodiversity Hub – a collaboration between the University of Tasmania/TAFI, CSIRO Wealth from Oceans Flagship, Geoscience Australia, the Australian Institute of Marine Science and Museum Victoria. The Marine Biodiversity Hub is funded through the Commonwealth Environment Research Facilities Program (CERF), administered through the Australian Government’s Department of the Environment, Water, Heritage and the Arts. The key aim of CERF is to provide sound advice to inform environmental public policy objectives and to better the management of Australia’s unique environment.

This newsletter is available as a PDF and online version at http://www.marinehub.org/index.php/site/newsletters/ with links to sources.

National Research

FLAGSHIPS

Wealth from Oceans

CSIRO

www.marinehub.org

This newsletter is produced by the CERF Marine Biodiversity Hub – a collaboration between the University of Tasmania/TAFI, CSIRO Wealth from Oceans Flagship, Geoscience Australia, the Australian Institute of Marine Science and Museum Victoria. The Marine Biodiversity Hub is funded through the Commonwealth Environment Research Facilities Program (CERF), administered through the Australian Government’s Department of the Environment, Water, Heritage and the Arts. The key aim of CERF is to provide sound advice to inform environmental public policy objectives and to better the management of Australia’s unique environment.

This newsletter is available as a PDF and online version at http://www.marinehub.org/index.php/site/newsletters/ with links to sources.

National Research

FLAGSHIPS

Wealth from Oceans

CSIRO

www.marinehub.org

This newsletter is produced by the CERF Marine Biodiversity Hub – a collaboration between the University of Tasmania/TAFI, CSIRO Wealth from Oceans Flagship, Geoscience Australia, the Australian Institute of Marine Science and Museum Victoria. The Marine Biodiversity Hub is funded through the Commonwealth Environment Research Facilities Program (CERF), administered through the Australian Government’s Department of the Environment, Water, Heritage and the Arts. The key aim of CERF is to provide sound advice to inform environmental public policy objectives and to better the management of Australia’s unique environment.

This newsletter is available as a PDF and online version at http://www.marinehub.org/index.php/site/newsletters/ with links to sources.