

## CoML PROJECT MILESTONES

### SECTION 10 – SYNTHESIS

#### **Projects were given the following guidance for completing this section.**

Questions to consider: What steps will your project take to integrate its data and findings into a global picture of marine life in your biogeographic *realm*? How will your project contribute to the overall CoML synthesis in 2010 and what needs to be done to prepare for that? Have you assigned a schedule for work with FMAP and a Liaison to FMAP to see the work through? Have you identified the limits to your knowledge (KUU)? Have you given thought to the Reporting Framework proposal? What other projects might you work with for even broader synthesis and understanding? Are you preparing visualization tools that will allow efficient communication of large amounts of information? **Please note in red potential obstacles to achieving milestones.**

#### **RESPONSES:**

##### **1. NaGISA**

We have a FMAP and a Framework liaison and have identified the KUU and reported to the various teams our goals and positions. Our data is biogeographic in nature and we expect it to directly relate to the CoML synthesis with out extensive translation with maps and visual representation.

*(Note: Milestones were not identified by year. This was also submitted as a draft, knowing much information needed to be completed)*

##### **2. CReefs**

###### **2006**

February - Database workshop held in Hawaii contributes to development of a system for CReefs Cruise data and ideas concerning CReefs Data Tools

June – begin engagement with Reporting Framework committee in preparation for SSC meeting

August – establishing contact with FMAP working group on effects of anthropogenic disturbances on reef diversity

August - International video conference to progress development of CReefs Data Tools.

November – 2-3 week programming workshop to be held in NZ. The aim will be to develop prototype CReefs Data Tools for interactive data visualization and analysis to allow the efficient communication of large amounts of information. Establish Tools to be developed, and plan a workflow defining the input/output requirements of each

module and integration between modules. Begin programming and testing. Seek continued feedback from scientists during the workshop

Publish first DNA-based assessment of coral reef biodiversity

### **2007**

Prototype of CReefs Data Tools with limited capabilities for testing online – early 2007. Feedback from user groups (including OBIS) on effectiveness

2 CReefs associated publications including coral reef ecosystem paper (will also form part of CoML interim report)

Plan to have 20 pages of website arterial – CReef Website established with general information about the fundamental aspects and activities proposed for the project with 20 coral reef associated links including summary of CReefs activities and findings from first two Cruises

Follow-up workshop to discuss limitations /additional requirements/new ideas for progressing the CReefs Data Tools in the scope of existing websites and visualization tools. Plan work-flow and programming requirements

### **2008**

Second installment of CReefs Data Tools to be launched. Seek feedback and integrate with OBIS and existing data tools

With the assistance of new tools, FMAP and Molecular post doc synthesis global coral reef data for research publications - Analyses of the effects of disturbance gradients on coral reef biodiversity

### **2009**

Vastly improved knowledge of the species associated with coral reefs (through CReef Cruise activity, data mining and synthesis, CReefs Data Tools, production of peer review papers (FMAP post doc and Molecular post doc).

### **2010**

Peer review papers and reports to contribute to overall CoML synthesis in 2010

Provide research and greater understanding of:

- 1) Patterns of species diversity for understudied reef-associated groups over gradients of human disturbance
- 2) Types/distribution of species obligately associated with healthy coral reefs
- 3) Prospects for maintenance of species diversity on reefs suffering various levels of human impacts
- 4) Amounts/types of taxonomic and ecological information required to manage reefs effectively

### **3. GoMA**

#### **2006**

*Toward an Ecosystem Approach to Management* Submission of article on GoMA program to Marine Policy

*Workshop on Biodiversity and Ecosystem Function*: Partner with U.S. National CoML Committee (Washington, D.C., September 2006)

*Initiate ecosystem program comparison* methods and achievements with other selected regional areas and programs: Gulf of Mexico, Baltic Sea, North Sea, Australia

#### **2007**

*Comparison of ecosystem approaches to management*: Follow through on ecosystem program comparisons and plan with other programs for joint symposium on methods and policies for ecosystem-based management.

#### **2008**

*Comparison of ecosystem approaches to management*: Follow through on ecosystem program comparisons and plan with other programs for joint symposium on methods and policies for ecosystem-based management.

#### **2009**

*Comparison and synthesis*: Conduct international symposium on methods and the cultivation of policies that enable ecosystem based management.

#### **2010**

*Delivery of synthesis of knowledge* between biodiversity processes and ecosystem based approaches to ocean area management and outline of work needed in the future

### **4. POST**

#### **2006**

Continue to work towards strengthening the relationship between POST and TOPP and demonstrate synthesis of results through data integration from joint projects based on double tagging.

Continue to liaise with Vancouver Aquarium experts on outreach and visualization tools for communication of results to diverse audiences

#### **2007**

**September**: Integration of POST data to FMAP modeling efforts

Through establishment of dedicated working groups, facilitate information exchange, data sharing and regular interaction

Continue to liaise with related projects such as Neptune as well as emerging projects in proposal stage

Complete module of visualization tools for education and communication of complex and large amounts of data; begin to market POST through presentation of data visualization at events and camps for example

### **2008**

Work with researchers at academic, government and not-for-profit institutions and emphasize the value of POST as component of broader, interdisciplinary, ecosystem-based research efforts

Integrate data from related CoML (and other) projects into visualization module

A technical assessment and comparison of the relative merits of available and competing technology as it is quickly evolving, with particular emphasis on the relative appropriateness for various marine life involved in partner projects.

### **2009**

Continue to add layers of information to visualization module as technology evolves and datasets become available

Provide data on marine species as a contribution to GOOS and US IOOS

### **2010**

*No information provided*

## **5. COMARGE**

### **2006**

- Regional workshop I The Atlantic - Plan for analyses [concurrent with SC meeting]. Within the COMARGE network, scientists actively involved in the study of Atlantic margins will set up the plan for a comprehensive synthesis and analysis of data at the community and species levels.
- Steering Committee meeting [concurrent with Regional Workshop I]
  - Synthesis of the workshop: what have to be done and what resources/skills are needed within the next year to implement the plans for a comprehensive synthesis and analysis of data from Atlantic margins?
  - 2010 Synthesis: A representative of the Framework working group will be invited in order to help planning the 2010 synthesis.

### **2007**

- Habitat workshop [concurrent with SC meeting] – Summary: Habitat classifications based upon simple parameters such as sediments, hydrology, water chemistry, and

dominant biota are universally used for the management of natural resources and for the design of scientific sampling in heterogeneous landscapes and coastal oceans. Such classifications have not been produced for the deep-sea due to a previous lack of need. The development of habitat classifications for the deep ocean is now badly needed. The habitat is complex, and exploitation is advancing faster than ecological knowledge. In developing a classification many ecologically-relevant parameters can be identified, but initial emphasis must be placed on pragmatic parameters to be able to produce maps from existing data of potential margin habitats as wide in space and detailed in resolution as possible. Priority will be given to the relatively data-rich North Atlantic in order to validate models of potential habitats with what is known about species distributions in this well-studied area

- Steering Committee meeting [concurrent with Habitat Workshop]
  - Synthesis of the workshop: what have to be done and what resources/skills are needed within the next year to draw a first map of continental margin habitats in the Atlantic?
  - 2010 synthesis: Plans to develop a GIS in order to visualize data gathered and generated by COMARGE.
  - Offshore Industry cooperation.
- Regional workshop II The Atlantic – Species distribution, initial synthesis [concurrent with SC meeting].
- Steering Committee meeting [concurrent with Regional workshop II]
  - Synthesis of the workshop: species distribution maps for the Atlantic
  - 2010 synthesis: Progress on the GIS
  - Review of the results of the small grant program 2007

## **2008**

- Global workshop I Beyond the Atlantic – Biogeographical perspectives at a global scale [concurrent with SC meeting], selection of taxa and datasets suitable for biogeographical synthesis at a global scale
- Steering Committee meeting [concurrent with Global workshop I]
  - Synthesis of the workshop: what have to be done and what resources/skills are needed within the next year to get a global picture of species distribution for selected taxa
  - 2010 synthesis: How can we surf on the media wave that the Galathee film will generate.
  - 2010 synthesis: In association with FMAP, what can be modeled to predict the future of biodiversity and functioning of continental margin ecosystems.
- Regional workshop IV The Atlantic – Benthic ecology, synthesis at the community level [concurrent with SC meeting].
  - Invitation of a representative of FMAP, potential for a FMAP post-doc
- Steering Committee meeting [concurrent with Regional workshop IV]
  - Synthesis of the workshop: what have we learned on the ecology of benthic ecosystems from the Atlantic synthesis, how does it fit in theoretical context.
  - 2010 synthesis: Planning of COMARGE Phase III

- Review of the results of the small grant program 2008

## **2009**

- Global workshop II Ecological perspectives [concurrent with SC meeting]
- Steering Committee meeting [concurrent with Global workshop II]
  - Synthesis of the workshop: what have to be done and what resources/skills are needed within the next year to get a global picture of some biodiversity patterns?
  - 2010 synthesis: Planning for the Census synthesis, invitation of a representative of the Framework working group
- Global workshop III Worldwide biogeography of key benthic taxa, lesson learned [concurrent with SC meeting].
- Steering Committee meeting [concurrent with Global workshop III]
  - Synthesis of the workshop:
  - 2010 Synthesis: What are the most intriguing patterns in the biogeography of margin species and how to turn them into appealing stories
  - Review of the results of the small grant program 2009
  - Beyond 2010

## **2010**

- Global workshop IV Ecology of the deep-sea benthos, global patterns and emergent processes, in association with FMAP.
- Steering Committee meeting – Finalize contributions and visualization for the 2010 synthesis
  - 2010 Synthesis for researcher: End-products = databases, GIS; Forum; Knowledge: empirical and theoretical advances.
  - 2010 Synthesis for stakeholders: End-products = Habitat/sensitivity maps; Knowledge: scientific advances to answer conservation issues
  - 2010 Synthesis for the offshore industry: End-products = database, taxonomic clearing house, protocols; Knowledge: baseline description of benthic community patterns, scientific advances for sound ecological risk assessments.
  - 2010 Synthesis for the public: End-products = website, Google Earth layers or Google Earth-like marine GIS, exhibitions; Knowledge = we expect to generate a strong interest all along the life of the project through the website, exhibitions, media events from cruises, popularization papers, educational poster and network of schools. We look forward the results of the 2010 Framework working group to integrate this knowledge into a global picture for the Census of Marine Life.
- Community meeting – Beyond 2010

## **6. CeDAMar**

### **2006**

Contacts with CAML and HERMES for future exchange of data, establishing close contact with FMAP to explore possibilities to use CeDAMar data for modelling

### **2007**

Cooperation with CAML, HERMES and other international projects formalised in a mutually agreed way (liaison to go to respective meetings and workshops, exchange of minutes of relevant meetings, mutual links to websites, alerts in case of new developments such as upcoming cruises, etc)

### **2008**

*No information provided*

### **2009**

Workshop on deep-sea biology, see above

### **2010**

*No information provided*

## **7. CMarZ**

### **2006**

Planning for synthesis will be a topic of discussion during the CMarZ Steering Group meeting (November 2006 in Tokyo). An essential goal for CMarZ will be integration and synthesis of data and information toward a global view of zooplankton biodiversity, including a prospective view of the completeness of the information and the remaining holes (unknown or unknowable) by 2010. Coordination with ArcOD, CAML, MAR-ECO, ICOMM, CeDAMAR, and FMAP will be explicitly discussed; the Reporting Framework will be used as a guide for our planning.

### **2007**

Data management and synthesis workshop for CMarZ Steering Group members who are major data contributors (Woods Hole, MA USA; May 2007)

### **2008**

CMarZ Steering Group meeting (TBA)

### **2009**

Synthesis planning workshop with other some CMarZ Steering Group members and selected CoML field project representatives (TBA)

## **2010**

CMarZ Steering Group meeting and CoML meetings.

CoML All-Program meetings are useful events to build a sense of identity and common purpose, and should be a primary vehicle to move projects toward and through synthesis activities. Annual All-Program meetings would be useful, but CoML would need provide funding to projects for participant travel.

## **8. TOPP**

### **Major Objective- To Develop interoperability between TOPP-NASA JPL- Duke OBIS SeaMap**

TOPP and OBIS

1. We expect that we will be able in 2007 to put the surface data sets into OBIS via interoperability with Duke SeaMAP
2. 2000 tracked animals data sets will be delivered by 2008, 4000 by 2010
3. Not sure how to answer this
4. Our plan is to liaison with OBIS via Duke SeaMap, Pat Halpin is involved with our data management plan at TOPP
5. Pat Halpin has attended most workshops and has been aware of our developing data management record. Our motto is first TOPP has to manage the data successfully prior to transferring it to OBIS
6. Time Table

November 2006-November 2007: Build infrastructure for data delivery to Duke OBIS SeaMap, so that surface records are transferred to Duke automatically from TOPP Servers, Develop interactive servers with NASA JPL for vertical water column data

## **2006**

-Ongoing analyses that describe/characterize the habitats and distribution of individual TOPP organisms.

-Low level comparisons between similar TOPP species (e.g. Laysan and black-footed albatrosses).

Building TOPP Data base with completion expected in late 2006 so that automatic ingestion occurs and automatic display to LAS and interlinking servers occurs for all data sets.

## **2007**

-Development of tools for comparing oceanographic features with animal habitats

-Initiate multi-species level analyses

-Deliver first half of data to Duke OBIS SeaMap

-Develop quantification methods for statistically analyzing animal tracking observations

- Automate software packages for generating geo-referenced, track specific multivariate habitat maps
- Develop visualization, and 4-D animations
- Verify quality of ocean observation Data and build interoperability with NASA JPL
- TOPP interface with NASA and Google, Duke OBIS SeaMap

### **2008**

- Develop forecasting tools
- Improve state space modeling approaches with Bayesian meta-analytic framework
- Apply models to real world data sets
- Continue developing visualization
- Deliver second half of tracking data sets to Duke OBIS Seemap
- Deliver ocean observation data to CenCOOS, PaCoos, NASA, GOOS, Duke OBIS SeaMap

### **2009**

Continue as above

Generate more flexible analytical tools useful for marine biogeographic investigations at global scales

### **2010**

Complete delivery of all data and synthesis

## **9. MAR-ECO**

### **2006**

Discussion of Reporting Framework proposal scheduled for SG meeting in July. Draft 1 submitted. No liaison with FMAP, but the MAR-ECO network has competence to synthesise.

### **2007**

Synthesis papers in Deep-Sea Res II and Marine Biological Research

### **2008**

*No information provided*

### **2009**

Synthesis papers from ECOMAR and US 2007 cruises.

### **2010**

Overall synthesis papers published.

## 10. CenSeam

### 2006

- Publication of “Seamounts: ecology, fisheries and conservation” (eds. T. Pitcher, P.J.B. Hart, T. Morato, M. Clark and R.S. Santos to be published by the Blackwell Science *Fish and Aquatic Resources Series*).
- Links with FMAP (Ram Myers and Derek Tittensor) in the Data Analysis Working Group (DAWG) work on the biodiversity and vulnerability of deep-sea corals on seamounts beyond areas of national jurisdiction (report to be published by CBD, UNESCO/IOC and UNEP which will be presented to the Dutch Ministry of Agriculture, Nature and Food Quality - who funded the original Data Analysis workshop)
- Establish links with CAML to plan for International Polar Year
- Links established with EuroCoML, CheSS and CeDAMar to facilitate a greater understanding and enhanced communication where necessary/possible
- Ongoing population of SeamountsOnline website (>OBIS)
- Submission of CenSeam document to the Reporting Framework

### 2007

- Establish links with CAML for International Polar Year
- Publication of CenSeam protocols document to facilitate effective communication of findings from the Standardization Working Group (SWG) and more efficient data collection/analysis to enhance the global picture of marine life on seamounts. The assimilation of a protocols document will also identify the depths to which we cannot go/ cannot yet become knowns
- Ongoing population of SeamountsOnline website (>OBIS)
- Links established with EuroCoML, CheSS and CeDAMar to facilitate a greater understanding and enhanced communication where necessary/possible
- Maintain links with FMAP for data analysis support
- Maintain links/feed into Reporting Framework as required

### 2008

- Establish links with CAML for International Polar Year
- Links established with EuroCoML, CheSS and CeDAMar to facilitate a greater understanding and enhanced communication where necessary/possible
- Maintain links with FMAP for data analysis support
- Maintain links/feed into Reporting Framework as required
- Ongoing population of SeamountsOnline website (>OBIS)
- Plans to develop/release a CenSeam seamounts DVD

### 2009

- Ongoing population of SeamountsOnline website (>OBIS)
- Links established with EuroCoML, CheSS and CeDAMar to facilitate a greater understanding and enhanced communication where necessary/possible
- Maintain links with FMAP for data analysis support

- Maintain links/feed into Reporting Framework as required

## **2010**

- Ongoing population of SeamountsOnline website (>OBIS)
- Links established with EuroCoML, CheSS to facilitate a greater understanding and enhanced communication where necessary/possible
- Maintain links with FMAP for data analysis support
- Liaise strongly with Reporting Framework as required

## **11. ChEss**

### **2006**

Good communication between the PIs, coordinators and scientists of the different CoML deep-sea projects will ensure a sound coordination for the integration of data and findings, not only in the chemosynthetic realm but in the deep-sea as whole.

- First document for Reporting Framework proposal (June 06)
- ChEss Annual Report
- Start development of O&E activities within the DESEO group with aims of major achievements for 2010 (Deeper than Light expanded exhibition, Comic book)

### **2007**

- Creation of web-based image bank
- ChEss Annual Report

### **2008**

- Continue populating web-based image bank
- Interactive DVD for Handbook of Vent Fauna
- ChEss Annual Report

### **2009**

- Continue populating web-based image bank
- ChEss Annual Report

### **2010**

- Deeper than Light Exhibition inaugurated in major museum
- Comic book published
- ChEss Final Report

## **12. ArcOD**

### **2006**

- first discussions with HMAP and FMAP for collaborative projects

- compile Arctic Synthesis report within NPRB funding (will hopefully be implemented in scope of funding)
- established contact with reporting framework group (need liaison)
- begin modeling work of ArcOD data

## **2007**

- build ArcOD portal with visualization tools (manpower)
- work toward expanding Arctic species pages (need CoML template)

## **2008**

- Expand spatial modeling applications of ArcOD data (overcome data gaps and opportunistic character)
- work toward expanding Arctic species pages

## **2009**

- improve visualization applications for ArcOD data (needs AOOS collaboration)
- work toward expanding Arctic species pages
- update Arctic species inventory for 2010 synthesis
- develop online GIS layers for selected Arctic species
- Work on bipolar comparisons with CAML
- Work on Pan-Arctic perspective based on IPY data

## **2010**

- modeling applications of ArcOD data on pan-Arctic scale
- Updated protocols online
- IPY / ArcOD synthesis publications
- Final Arctic keys published and available on-line
- Work on bipolar comparisons with CAML
- GAP analysis type of approach for Arctic marine biodiversity data (for reporting framework)
- Contribution to Finale press release
- ArcOD/AOOS to become recognized source for data and images of Arctic organisms (need broad buy-in, also from agencies)

## **13. CAML**

### **2006**

CAML, by its very nature, is global in its approach. Its close interrelationship with ArcOD will highlight similarities and differences between the Earth's two ice-oceans.

### **2007**

SSC meets with invited experts to examine progress of taxonomic studies and publication of outputs

See Section 9 re SCAR MarBIN's activities

## **2008**

Sub-program workshops, following main field work phase  
See Section 9 re SCAR MarBIN's activities

## **2009**

Sub-program workshops in mid 2009.  
All-CAML workshop in late 2009

## **2010**

*No information provided*

## **14. ICoMM**

**2006-2010** ICoMM is a global project so seeks to cover as many biogeographic provinces as feasible. We have not yet assigned a schedule for work with FMAP but hope to by 2008.