

## **CoML Australia**

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<http://www.coml.org.au>

### **1. 2006 ACCOMPLISHMENTS & SCIENTIFIC HIGHLIGHTS**

CoML Australia has continued to pursue the possibility of coordinating a voyage of discovery in the Australian region. The 'Voyage of Discovery' Workshop hosted by CoML in 2005 identified waters off the North West coast of Australia as a priority area for such a voyage. As a prelude to the proposed voyage, Australia's CSIRO Marine and Atmospheric Research has refocused an existing voyage scheduled for 2007 or 2008 in this region.

While no resources are available within CoML Australia for the voyage the Chair has approached Australian marine science organisations as well as international organisations seeking support for the proposal. Several members of the CoML Australia committee continue to actively work on the proposal. Unfortunately efforts to secure an appropriate level of support have not been successful to date.

The Oceans Policy Science Advisory Group (OPSAG), which is the Australian Government's marine science coordinating body, has discussed Australia's engagement in CoML. At their last meeting in June 2006, OPSAG set up a sub-committee consisting of CSIRO, the Australian Institute of Marine Science and the Australian Bureau of Rural Sciences to drive the broader CoML agenda, including the proposed voyage of discovery. This sub-committee will plan Australia's continued engagement in the CoML initiative.

The current CoML Australia Committee will shortly complete their term under the existing Terms of Reference. As Chair of CoML Australia I will be seeking input from the members on the current format of the committee, and in particular from the OPSAG sub-committee, on ways and means for Australian marine science agencies to continue to grow their participation in the global CoML initiative.

Progress on the CoML affiliated Great Barrier Reef Seabed Biodiversity Project in the year to July 2006 has included: sorting and identification of seabed fish and invertebrate samples at laboratories, processing of video, consultation and agreement among project participants regarding extra fieldwork and its funding, conduct of additional fieldwork, and preliminary data analyses for a technical workshop with the Task Associate/Steering Committee in mid-December 2005. The project has now completed significantly more vessel days than originally proposed, bringing the total number of sampling sites for seabed habitat and biota to 1340.

Data collected has been entered into databases, preliminary maps have been distributed and sorting and identification of samples at laboratories is almost complete. The preliminary data and substantial

visual material has been loaded onto the Project's website. The co-investigators made a presentation about the Seabed Project to the International Scientific Steering Committee of the CoML at its meeting in Cairns in 2005. The annual report for 2005-2006 for this project is at Attachment D.

## **2. SOCIETAL BENEFITS, IMPACT & APPLICATIONS**

The CoML Australia initiative supports the concept of making data and information more widely available and provides other opportunities for adding value in the marine research field. The information collected through this initiative will contribute to building a clearer picture of marine life within the Australian region.

CoML Australia is seeking to address information gaps in the oceans with particular projects focused on the relatively unexplored deeper waters. The North-west and North-east regions of Australia have been identified as priority areas for further exploration.

## **3. WORK PLANNED FOR 2007**

To inform CoML Australia planning for a "Voyage of Discovery", the Department of the Environment and Heritage (DEH) will collaborate with CSIRO Marine and Atmospheric Research in July 2007 to undertake a biodiversity survey of deep water habitats in the waters off North-western Australia. This project aims to collect information on the distribution of deep seabed habitats and benthic fauna in this relatively unexplored region. The information will contribute to a circum-Australia collection of deep shelf and slope benthic fauna that can be used to test hypotheses on the evolution and biogeography of Australia's biodiversity. It will also contribute to the validation and refinement of a marine bioregionalisation in this region.

## **4. EDUCATION & OUTREACH**

Due to resource constraints, CoML Australia has been limited in its ability to develop education and outreach material. However, it has had a role in circulating information relating to progress with the affiliated Great Barrier Reef Seabed Biodiversity Project and Census of Antarctic Marine Life, and information provided by the CoML International outreach officer. The main audience for this information has been the CoML Australia Committee itself; however information has been circulated to a wider Australian marine science audience where appropriate.

The affiliated project being led by the Australian Institute of Marine Science, the Great Barrier Reef Seabed Biodiversity Project, has been very successful in outreach to the community through regular press releases and an educational website:  
<http://www.reef.crc.org.au/resprogram/programC/seabed/index.htm>.

## **5. GEOGRAPHIC EXPANSION**

The 2007 collaborative biodiversity survey in the relatively unexplored deep water habitats in the waters off North-western Australia will expand knowledge of the marine environment. This region has been identified as a priority by CoML Australia.

The CoML affiliated Great Barrier Reef Seabed Biodiversity Project will provide a detailed picture of the reef system. This will contribute to our understanding of biodiversity in tropical reef systems.

## 6. PARTNERSHIPS & COLLABORATION

### a. Partnerships

Organization Name	Point-of-Contact (Name)	Nature of Relationship
CRC Reef Research Centre	Dr Roland Pitcher (CSIRO)	CoML affiliated project
Oceans Policy Science Advisory Group	Dr Ian Poiner (AIMS) Dr Tony Haymet (CSIRO) Stephen Bygrave (BRS)	Support and advice

### b. Links to CoML Ocean Realm Projects

Project Name	Liaison or Cross-over personnel	Nature of Relationship
Connectivity amongst seamounts in the South-east Marine Region (of Australia)	Dr Alan Williams, CSIRO Marine and Atmospheric Research	Possibility of developing linkages with CoML CenSeam Project
Census of Antarctic Marine Life	Prof Michael Stoddart and Dr Vicki Wadley, Australian Antarctic Division	Regular liaison and exploration of program linkages.

### c. Links to other CoML National and Regional Implementation Committees (NRICs)

NRIC	Liaison or Cross-over personnel	Nature of Relationship
Canada		
Caribbean		
China		
Europe		
Indian Ocean		
Japan		
South America		
Sub-Saharan Africa		
USA	Mark Fornwall	Discussing linkages between OBIS nodes in the US, Australia, and New Zealand.

### d. Liaisons to CoML Cross-Cutting Groups

Project Name	Liaison Name & Institution	Nature of the Relationship
OBIS	Emma Campbell, DEH Tony Rees, CSIRO Marine and	OBIS AU Regional Node Manager OBIS International Steering Committee

	Atmospheric Research	
HMAP	Neil Klaer, CSIRO Marine and Atmospheric Research	CoML Australia member
FMAP		
SCOR Tech Panel	John Gunn, CSIRO Marine and Atmospheric Research	Member of Oceans Policy Science Advisory Group
E&O	Miranda Carver, DEH	CoML Australia Secretariat
Barcoding	Dr Robert Ward, Dr Ian Poiner, CSIRO Marine and Atmospheric Research	Chair FISH-BOL CoML SSC member

**e. Effectiveness of the Partnerships and collaborations**

Relationship building has largely been opportunistic and ad-hoc. In 2007 the OPSAG sub committee on CoML will look at mechanisms for future collaboration in CoML and related initiatives.



## ANNUAL TASK REPORT 2005-06

<b>TASK NO.</b>	Seabed biodiversity on the continental shelf of the GBRWHA (C1.1.2)
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### Progress Summary

*A 200 word plain English summary of research progress, including any successful applications of the research.*

In the year since July 2005, project work has included: sorting and identification of seabed fish and invertebrate samples at laboratories, processing of video, consultation and agreement among project participants regarding extra fieldwork and its funding, conduct of additional fieldwork, and preliminary data analyses for technical workshop with the Task Associate/Steering Committee in mid-December 2005. The project has now completed significantly more vessel days than originally proposed. The sixth and final field trip on the RV *Lady Basten* (LB) from 26/10 to 29/11 2005 successfully completed another 250 sites, bringing the total to 1340 sites for seabed habitat and biota. The fourth and final field trip on the FRV *Gwendoline May* (GM) from 9/11 to 14/12 2005 visited ~145 sites.

During the six LB benthic field trips, the seabed at 1212 sites was videoed with a towed drop-camera (yielding ~600 hrs of video); the epibenthos was sampled at 1191 sites (~11,945 benthic samples); the sediment was sampled at 1186 sites (~1184 grain size samples; 1165 infaunal samples); BRUVS were deployed at 401 sites (yielding ~1600 hrs of video); and digital acoustics was acquired ~continuously (yielding ~140 GB of echogram data).

During the four GM seabed fish sampling field trips, the seabed at 447 sites was successfully sampled with a small scientific trawl net yielding ~3870 samples including fish, prawns and other invertebrates.

The field work is now finished, with *Lady Basten* completing 180 days of the proposed 120 days — and the *Gwendoline May* completing 125 days of the proposed 90 days. The additional field days were needed for both vessels because the sampling rates had been slowed by bad weather, some gear problems and other logistics difficulties.

Data collected at sea has been entered into databases, preliminary maps have been distributed, and sorting and identification of samples at laboratories is almost complete. The preliminary data and substantial visual material has been loaded onto the Project's website at CRC-Reef.

The project's Steering Committee has been updated on the project's progress during meetings and out-of-session correspondence, and has provided advice on a number of issues requiring decision. Most importantly, all partners agreed to support the additional field work outlined above and the GBRMPA provided permits to sample a limited number of crucial sites that changed zoning to MNP on 1 July 2004. The Seabed Project has also been accepted an affiliated project under the international "Census of Marine Life", bringing particular benefits and obligations including international profile, support for making data/information more widely available and other opportunities for value adding. As part of this process, the co-investigators have made a presentation about the Seabed Project to the international Scientific Steering Committee of the CoML.

### Objectives

The overall objective is to address key issues identified by the GBRMPA, QDPI&F and QSIA in relation to biodiversity assessment and provision of information for future Marine Park planning needs, and environmental sustainability assessments of the Qld East Coast Trawl Fishery with respect to effects on bycatch, benthic assemblages and seabed habitat, to support ecologically-based management of the fishery. Specifically:

- Develop comprehensive inventories & maps of the distribution and abundance of seabed habitats & assemblages, as a benchmark of their current status, and provide these to GBR Marine Park managers for future planning, management and status reporting.
- Analyse bio-physical relationships and assess the utility of environmental correlates for spatial prediction of assemblages of biodiversity.
- Provide more detailed information for describing the non-reef bio-regions defined for the continental

shelf by the RAP process

- Develop attributes (eg. biomass, species richness, rarity, uniqueness, condition, potential vulnerability to impact etc.) for bio-assemblages defined by this project, and for RAP bio-regions, for future planning, management and WHA reporting.
- Provide recommendations for monitoring trends in the status of bio-assemblages and HPAs selected by the RAP process.
- Develop & provide maps of the distribution of vulnerable seabed habitats and assemblages to fishery managers and stakeholders, with the outcome of management strategies effective in minimising fishery effects, achievement of Management Plan targets and for future planning needs.
- For both bycatch & benthos, develop quantitative indicators of exposure to & effects of trawling, and sustainability risk indicators, as required for the environmental Strategic Assessment of the QECTF.
- Provide critical input to a dynamic model of indicators for the status of seabed assemblages and conduct ecological assessments of management strategies using an MSE approach.
- Contribute to quantifying the large-scale effects of trawling on bycatch species and benthos assemblages by analysing their abundance across the range of trawl intensities within and outside trawl grounds, while accounting for habitat variability.
- Develop transferable scientific methods and tools (including non-invasive video & acoustics) to facilitate regional marine management planning nationally.

## Milestones Progress

*Report progress towards milestones from the "Full Task Proposal".  
Milestones are reproduced here from CRC Reefbase.  
Against each milestone, report on progress in the full-year reporting period.*

Date	Milestone	Progress														
30 Decem ber 2005	#7 * Revise and finalize design of survey Yr 3 * Complete survey Yr 3 field-trips and entry of survey Yr 3 on-deck data - including acquisition of survey Yr 3 acoustic data	<p>The Project had already more than completed the field work originally scheduled for the third year of the Project by conducting longer Lady Basten (LB) trips than originally planned as well as the third Gwendoline May (GM) trip. The additional fieldwork agreed by partners has been conducted in the current reporting period, including a 6<sup>th</sup> LB trip and a 4<sup>th</sup> GM trip.</p> <p><b>Third GM sampling field trip:</b> The fish/bycatch sampling completed by the FRV Gwendoline May field team during Sept/Oct 2004 included: - night time operations at sea over a period of 5 weeks - visited and assessed ~140 sites for deployment of trawl sampling gear and successfully sampled ~100 sites, yielding ~811 fish/bycatch samples - preliminary sorting of prawns and bycatch, and preservation - entry of on-deck data into a database.</p> <p>A summary of the occurrence of the major classes of bycatch at sites sampled during GM#3 was:</p> <table> <thead> <tr> <th>CLASS</th> <th>Number of Sites</th> </tr> </thead> <tbody> <tr> <td>CRUSTACEA</td> <td>98</td> </tr> <tr> <td>    Crustacea: Penaeidae</td> <td>98</td> </tr> <tr> <td>FISHES:</td> <td>100</td> </tr> <tr> <td>MARINE PLANTS:</td> <td>34</td> </tr> <tr> <td>PORIFERA:</td> <td>36</td> </tr> <tr> <td>Other invertebrates</td> <td>98</td> </tr> </tbody> </table> <p>Most fish/bycatch samples were preserved by freezing. Post-field-trip, specimens were freighted to destination laboratories for detailed sorting, identification and curation.</p> <p><b>Fourth GM sampling field trip:</b> The Fish/bycatch sampling completed by the FRV Gwendoline May field team during the period November/December 2005 included: - night time operations at sea over a period of 5 weeks</p>	CLASS	Number of Sites	CRUSTACEA	98	Crustacea: Penaeidae	98	FISHES:	100	MARINE PLANTS:	34	PORIFERA:	36	Other invertebrates	98
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- visited and assessed ~145 sites for deployment of trawl sampling gear and successfully sampled ~114 sites, yielding ~1170 fish/bycatch samples
- preliminary sorting of prawns and bycatch, and preservation
- entry of on-deck data into a database.

A summary of the occurrence of the major classes of bycatch at sites sampled during GM#4 was:

CLASS	Number of Sites
CRUSTACEA	114
Crustacea: Penaeidae	110
FISHES:	114
MARINE PLANTS:	54
PORIFERA:	50
Other invertebrates	114

Most fish/bycatch samples were preserved by freezing. Post-field-trip, specimens were freighted to destination laboratories for detailed sorting, identification and curation.

#### **Fifth LB sampling field trip:**

The benthic sampling completed by the RV Lady Basten 5<sup>th</sup> trip field team during Jan/Feb 2005 included:

- 24 hour operations at sea during one trip of 33 scheduled days
- deployment of drop-video at 209 sites, yielding ~105 hrs of video
- deployment of epibenthic sled at 182 sites, yielding ~2,040 samples
- deployment of sediment scoop at 182 sites, yielding 180 grain size and 177 infaunal samples
- deployment of BRUVS at 54 sites, yielding ~215 hrs of video
- ~continuous deployment of acoustics, acquiring ~20 GB of echogram data.
- sorting and preservation of benthic invertebrate and sediment samples
- entry of on-deck data into a database.

A summary of the occurrence of the major groups of epibenthos at sites sampled during LB#5 is:

CLASS	Number of Sites
ANNELIDA: WORMS	77
ASCIDIACEA: TUNICATA:	140
BRYOZOA:	112
CNIDARIA:	54
Cnidaria: Anthozoan: Octocorallia	106
CRUSTACEA:	174
ECHINODERMATA:	167
Echinodermata: Crinoidea	65
FISHES:	135
MARINE PLANTS:	97
MOLLUSCA:	177
PORIFERA:	112

Preserved biota included a total of 14 bags frozen, 4 drums of sediment samples for infauna, 6 drums in formalin, 11 drums in 70% alcohol, 5 drums in 100% alcohol.

#### **Sixth LB sampling field trip:**

The benthic sampling completed by the RV Lady Basten 6<sup>th</sup> trip field team during Oct/Nov 2005 included:

- 24 hour operations at sea during one trip of 35 scheduled days
- deployment of drop-video at 233 sites, yielding ~115 hrs of video
- deployment of epibenthic sled at 213 sites, yielding ~2,015 samples
- deployment of sediment scoop at 213 sites, yielding 209 grain size and 209 infaunal samples
- deployment of BRUVS at 74 sites, yielding ~295 hrs of video
- ~continuous deployment of acoustics, acquiring ~20 GB of echogram data.
- sorting and preservation of benthic invertebrate and sediment samples

		<p>- entry of on-deck data into a database.</p> <p>A summary of the occurrence of the major groups of epibenthos at sites sampled during LB#6 is:</p> <table border="0"> <thead> <tr> <th>CLASS</th> <th>Number of Sites</th> </tr> </thead> <tbody> <tr> <td>ANNELIDA: WORMS</td> <td>39</td> </tr> <tr> <td>ASCIDIACEA: TUNICATA:</td> <td>150</td> </tr> <tr> <td>BRYOZOA:</td> <td>184</td> </tr> <tr> <td>CNIDARIA:</td> <td>14</td> </tr> <tr> <td>    Cnidaria: Anthozoan: Octocorallia</td> <td>111</td> </tr> <tr> <td>CRUSTACEA:</td> <td>205</td> </tr> <tr> <td>ECHINODERMATA:</td> <td>201</td> </tr> <tr> <td>    Echinodermata: Crinoidea</td> <td>118</td> </tr> <tr> <td>FISHES:</td> <td>182</td> </tr> <tr> <td>MARINE PLANTS:</td> <td>130</td> </tr> <tr> <td>MOLLUSCA:</td> <td>201</td> </tr> <tr> <td>PORIFERA:</td> <td>143</td> </tr> </tbody> </table> <p>Preserved biota included 19 bags frozen, 4 drums of infauna samples, 11 drums in formalin, 19 drums in 70% alcohol, 5 drums in 100% alcohol.</p>	CLASS	Number of Sites	ANNELIDA: WORMS	39	ASCIDIACEA: TUNICATA:	150	BRYOZOA:	184	CNIDARIA:	14	Cnidaria: Anthozoan: Octocorallia	111	CRUSTACEA:	205	ECHINODERMATA:	201	Echinodermata: Crinoidea	118	FISHES:	182	MARINE PLANTS:	130	MOLLUSCA:	201	PORIFERA:	143																																																		
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30 June 2006	<p>#8</p> <ul style="list-style-type: none"> <li>* Complete sorting and data entry of samples from last surveys</li> <li>* Finalise all sorting and entry of survey data, finalise cross-check/verification all databases</li> <li>* Complete classification and biophysical analyses</li> <li>* Complete spatial-prediction based mapping of assemblages and habitats</li> <li>* Complete analyses of the large-scale effects of trawling</li> <li>* Complete estimates of exposure to trawling</li> <li>* Complete evaluations of QECTF management interventions</li> <li>* Finalise cross-check/verification all acoustic survey data, complete identification of acoustic features to discriminate seabed habitat and analyses of relationships between acoustics</li> </ul>	<p>Post field-trips, specimens were freighted to several destination laboratories where detailed sorting, identification and curation is now almost complete.</p> <p>During lab sorting of samples, data on OTUs and site details are entered into a computer database. A wide range of invertebrate taxa are being sorted at MTQ by MTQ and AIMS staff, crustaceans and bycatch fishes are being sorted at CSIRO by CSIRO staff, prawns are being sorted at QDPIF in Cairns, and sponges gorgonians sled-fishes and other invertebrates are being sorted at QM by QM staff. Approximately 12,335 site-samples of a wide variety of biota have been sorted and identified as at early-May 2006, and comprehensive reference collections of voucher specimens have been established and recorded into the data base.</p> <p>Lady Basten Benthos samples as at early-May 2006:</p> <table border="1"> <thead> <tr> <th>PHYLUM</th> <th>COLLECTED</th> <th>SORTED</th> <th>PERCENT</th> </tr> </thead> <tbody> <tr> <td>ANNELIDA</td> <td>522</td> <td>25</td> <td>5</td> </tr> <tr> <td>ASCIDIA</td> <td>1097</td> <td>267</td> <td>24</td> </tr> <tr> <td>BRACHIOPODA</td> <td>5</td> <td>5</td> <td>100</td> </tr> <tr> <td>BRYOZOA</td> <td>14729</td> <td>14386</td> <td>98</td> </tr> <tr> <td>CNIDARIA</td> <td>4021</td> <td>3644</td> <td>91</td> </tr> <tr> <td>CRUSTACEA</td> <td>9917</td> <td>9900</td> <td>100</td> </tr> <tr> <td>ECHINODERMATA</td> <td>8866</td> <td>8204</td> <td>93</td> </tr> <tr> <td>FISHES</td> <td>3249</td> <td>3082</td> <td>95</td> </tr> <tr> <td>MARINE PLANTS</td> <td>7057</td> <td>6958</td> <td>99</td> </tr> <tr> <td>MOLLUSCA</td> <td>9417</td> <td>9399</td> <td>100</td> </tr> <tr> <td>PORIFERA</td> <td>9227</td> <td>9020</td> <td>98</td> </tr> </tbody> </table> <p>Since early-May, most of these groups have been completed. The anticipated completion of bryozoans, cnidarians and poriferans is mid-late July 06. By decision of the Steering Committee, annelids and ascidians will not be completed in the scope of the project. In addition, Geoscience Australia has completed composition analysis of 1195 sediment samples.</p> <p>Gwendoline May fish &amp; bycatch samples as at early-May 2006:</p> <table border="1"> <thead> <tr> <th>PHYLUM</th> <th>COLLECTED</th> <th>SORTED</th> <th>PERCENT</th> </tr> </thead> <tbody> <tr> <td>ELASMOBRANCHS</td> <td>77</td> <td>77</td> <td>100</td> </tr> <tr> <td>FISH</td> <td>8112</td> <td>8053</td> <td>99</td> </tr> <tr> <td>INVERTEBRATES</td> <td>22344</td> <td>22166</td> <td>99</td> </tr> <tr> <td>MARINE PLANTS</td> <td>229</td> <td>2</td> <td>1</td> </tr> <tr> <td>PRAWNS</td> <td>1818</td> <td>1619</td> <td>89</td> </tr> <tr> <td>SEASNAKE</td> <td>40</td> <td>40</td> <td>100</td> </tr> </tbody> </table>	PHYLUM	COLLECTED	SORTED	PERCENT	ANNELIDA	522	25	5	ASCIDIA	1097	267	24	BRACHIOPODA	5	5	100	BRYOZOA	14729	14386	98	CNIDARIA	4021	3644	91	CRUSTACEA	9917	9900	100	ECHINODERMATA	8866	8204	93	FISHES	3249	3082	95	MARINE PLANTS	7057	6958	99	MOLLUSCA	9417	9399	100	PORIFERA	9227	9020	98	PHYLUM	COLLECTED	SORTED	PERCENT	ELASMOBRANCHS	77	77	100	FISH	8112	8053	99	INVERTEBRATES	22344	22166	99	MARINE PLANTS	229	2	1	PRAWNS	1818	1619	89	SEASNAKE	40	40	100
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and habitat, complete maps of seabed acoustic attributes, complete evaluations of the performance of single-beam acoustics  
 \* Annual collaborators progress review, and steering committee update, feedback and consultation meeting.  
 \* Complete & submit draft Final Report

Since early-May, most of these groups have been completed. The anticipated completion for non-commercial prawns is mid July 06. By decision of the Steering Committee, GM marine plants will not be completed in the scope of the project.

To date, about 7,500 OTUs (nominal species equivalents) have been recognized (excluding unidentifiable fragments) across the four laboratories, including several new species and new records for Australia. This number may reduce slightly after OTU reconciliation between labs is completed. The distribution of specimens of recognized OTUs across the major phyla is summarized in the following table.

PHYLUM	CMR	MTQ	QDPI	QMSE
Annelida		16		195
Arthropoda	18593	8	1587	51
Brachiopoda		163		1
Bryozoa		13068		630
Byrozoa		241		
Chordata	21366	87		5482
Cnidaria		715		6880
Crustacea		147		
Echinodermata		8098		6138
Ectoprocta		392		536
Mollusca		9071		6618
Porifera		26		15512
Tunicata				479
Chlorophycota			2814	710
Cyanophyta			55	
Magnoliophyta			677	164
Phaeophycophyta			886	226
Rhodophycota			2542	298

Preliminary maps of broad seabed habitat types observed during towed-video transects have been produced (see Appendix) as have maps of the biomass of biota sampled by LB and GM, based on data entered at sea following primary sorting into major groups. Detailed maps of fish and benthos distribution & abundance await completion of sorting and analyses. Seabed habitat is currently being quantified in more detail from the towed-camera transects following earlier development of digital-video analysis software & database by CSIRO staff. These preliminary maps and selected example seabed video and still photos have been loaded onto the Project's CRC website.

Fish on video tapes from BRUVS sets have been quantified by AIMS staff using custom developed BRUVS tape-reading software and database. Quantification of BRUVS tapes has been completed – a final tally of 1150 tapes (45-60 minutes each) from all single-camera BRUVS sets have been read from 381 sampling stations to produce an initial dataset comprising information on 40,228 individual fishes, sharks, rays and seasnakes from 367 OTUs, which are referenced in an image library. Staff from AIMS, CSIRO and QM have checked every record in the BRUVS reference image library to standardize the species recognized on the BRUVS with those names in use by the other labs identifying fish from trawl and sled samples. The BRUVS dataset is now being thoroughly checked for outliers and preliminary analyses are underway to develop appropriate method scripts. Some BRUVS video and reference images have been included on the Project's CRC website. As a preliminary to the final analyses, an initial cluster analysis and mapping of preliminary fish-presence data demonstrates cross-shelf & along-shelf variability.

The acoustics data from the Simrad EY500 digital echosounder acquired during towed video camera transect have been extracted and synchronized and matched habitat ground-truth data – for all six LB voyages; this is the

training dataset and comprises some 2 million records. A similar process has been conducted for the QTC-View signal processor data. The EY500 data from a contrasting set of GBR sites have been investigated in detail to provide information on the best range of features for seabed discrimination purposes. Similar analysis of the full training dataset is currently underway. Once the final feature set is determined, the discrimination algorithms will be run on the entire acoustics dataset (>30 million records) and mapped.

Several preliminary analyses of the trawl effort covariate have been conducted for broad substratum & biological habitat types observed during towed video transects and for ~phylum level biomass from LB sled and GM bycatch samples (as listed below for trawl exposure), using simple log-linear regression that included 28 other environmental covariates. Several common or specially selected species were also examined as part of the Technical Workshop held in Dec 05. Trawl effort typically accounted for <<1% of the variance in the regression models and usually ranked low compared with other covariates in 'explaining' distribution of the data among sites (median rank = 18). Out of 178 models, trawl effort was significant in 21 cases – and of those 21, it was negative in 14 cases. For example:

For GM Prawns biomass, trawl effort explained 0.77% of the variation ( $p = 0.061$ ; rank 5) and the coefficient indicated that Prawns were 1.9% more abundant per hr of trawling (annual per 0.01°) -- +2.6% in the specific case of Endeavour Prawns.

For LB Cnidaria biomass, trawl effort explained 0.69% of the variation ( $p = 0.0031$ ; rank 6) and the coefficient indicated that Cnidaria were 3.6% less abundant per hr of trawling (annual per 0.01°).

For LB Echinoderm biomass, trawl effort explained 0.31% of the variation ( $p = 0.044$ ; rank 14) and the coefficient indicated that Echinoderms were 1.9% less abundant per hr of trawling (annual per 0.01°).

For LB Marine Plants biomass, trawl effort explained 0.36% of the variation ( $p = 0.033$ ; rank 13) and the coefficient indicated that Marine Plants were 2.9% less abundant per hr of trawling (annual per 0.01°).

For LB Porifera biomass, trawl effort explained 0.53% of the variation ( $p = 0.010$ ; rank 6) and the coefficient indicated that Porifera were 3.8% less abundant per hr of trawling (annual per 0.01°).

The six individual species that showed negative effects (2 molluscs, 1 bryozoan, 3 small fishes), the effects sizes were similar.

Given the distribution of biomass and effort in the region, these effects sizes lead to estimates of total population change in the order of 1-4%. Caution is required in interpreting these results from relatively simplistic analyses of broad groupings of preliminary data — the results may reflect simple correlation rather than causality, despite the inclusion of other covariates to account for habitat variability. Detailed assessment of the trawl effort effect will be conducted following completion of all sorting.

Preliminary estimates of exposure to trawling have been estimated for the same broad habitat categories and phylum/group sample-biomasses as analyzed above (see tabulated list below). These preliminary estimates have been calculated from site point data, and may be biased by the distribution of sites sampled to date. The estimates are summarized below, showing the percentage of observed habitat or sampled biomass at sites located in areas open to trawling and with recorded trawl effort, both before and after re-zoning by the RAP program. Spatial estimates at the species level will become available during the final analysis phase of the project.

<u>Observed substratum type:</u>	<u>%PreRAP</u>	<u>%PostRAP</u>
%Sites	38	33
Muddy	56	54
Silty	41	37
Sandy	43	32
CoarseSand	25	21
Dunes	43	38
Rubbly	27	24

		Stony	3	2
		Rocky	2	1
		Reefy	1	1
		<u>Observed biological habitat type:</u>		
		%Sites	38	33
		Bioturbated	43	38
		Algae	26	22
		Seagrass	65	51
		SparseEpibenthos	14	12
		MediumEpibenthos	5	4
		DenseEpibenthos	7	6
		LiveCoral	0	0
		No biological habitat	40	34
		<u>Sled sample biomass by Phyla:</u>		
		%Sites	42	35
		Annelida	17	12
		Ascidia	33	28
		Bryozoa	34	30
		Cnidaria	26	20
		Crustacea	47	42
		Echinodermata	43	28
		Fishes	54	43
		Marine Plants	26	19
		Mollusca	50	43
		Porifera	23	19
		<u>Bycatch sample biomass by Group:</u>		
		%Sites	49	45
		Elasmobranchs	64	70
		Fish	52	48
		Invertebrates	55	48
		Marine Plants	65	39
		Prawns	52	49
		Seasnakes	88	65
		<p>The project team, Steering Committee and several key representatives from management and industry met for an in-depth technical workshop on 16-17 Dec 2006 to examine data &amp; analysis details, with particular emphasis on risk assessment methods – in addition to the broader information presented above, details were provided for about 200 individual seabed species, assemblages and communities. The Steering Committee also reviewed progress and provided advice – particularly on priorities for sorting - and assistance to the Project, with out-of-session correspondence to follow-up a number of issues requiring decision/action.</p>		

## Problems/difficulties

*Highlight reasons why milestones might not have been achieved, or other difficulties*

The seabed at about 150 sites has been too rough to sample with devices other than towed-video. Conversely, the water has been too turbid to obtain seabed video at about another ~60 sites. Further, there were also a number of sites, particularly in the vicinity of Broadwater Sound/Shoalwater Bay that were both too rough and too dirty to sample with any device, although digital acoustics data was acquired.

As noted previously, fieldwork was front-loaded into the first year because of restrictions on sampling that applied after 1 July 2004 arising from rezoning of the Marine Park and because sample acquisition was the most high-risk component of the Project. The decision to front-load the sampling, in-turn, reduced the effort available early for sample sorting and data analysis. The decision to give priority to sites affected by the rezoning resulted in less efficient cruise tracks, and meant that these additional field trips had to be conducted

at times when the weather risk was less favourable. As a result of strong winds and high seas, the second GM trip in April 2004 was able to sample on only 16 nights out of 30 days available and was not able to sample areas further offshore, and the third LB trip in May lost up to 6 days of sampling and was largely confined to sheltered inshore waters whereas most of the sites that needed to be sampled were located in offshore, open and exposed waters. Similarly, the fourth LB and third GM trips lost several days each in September 2004, as did the fifth LB trip in Jan/Feb 2005 with two cyclones passing close to the study area. The additional & final LB & GM trips were specifically scheduled for the lowest weather risk season and lost some, but minimal, time to weather. There were also a number of technical problems with essential equipment, and attrition of gear, requiring down-time for maintenance and repairs. A combination of these gear problems and un-workable weather meant that it was not possible to sample all of the areas that were given higher protection by the 1 July 04 rezoning, and that the sampling rate was not as high as planned. Further, the cost of conducting fieldwork has also been higher than budgeted. In response, the Project's partner agencies committed to additional field-work (a 35 day field trip each for both vessels) in an attempt to minimize the gaps in the coverage of the sampling – this additional field-work was completed successfully.

The magnitude of samples collected for sorting and identification was challenging throughout the project. In response, additional staff resources were and continue to be applied to the Project by the QM, CMR, QDPI & AIMS. The rate of sorting, identifying, and accessioning samples into the collections and databases was increased, and has been reviewed regularly, with priorities for the various biotic groups discussed with the Steering Committee — the high priority groups are now complete or almost so; some others will require alternative arrangements. The unexpected passing away of Peter Arnold was a sad shock to the team and to others, as well as having an impact on progress with identifications (especially bryozoans). The team members at MTQ are to be commended for their continued efforts under the circumstances.

## **Milestones Variation**

*Requested modification to milestones: If milestones have not been achieved, or you anticipate problems with forthcoming milestones, outline your requested amended milestones here. Continued payments of research funds will be contingent on achieving set milestones. Where a failure to meet milestones has altered budget requirements, these should be addressed in the section on Budget Variations.*

No change requested, other than the already agreed slippage of the June 2006 milestone to December 2006 as discussed in several past Steering Committee meetings, approved by the CRC Board and confirmed in separate correspondence with CRC Reef.

## **Budget Variation**

*Where there is a request to change the agreed budget, please outline reasons for the request here.*

No change requested, other than that presented in May 2005, in a letter to partner agencies and then discussed at the 27 May 2005 CRC Reef Board Meeting, which led to agreement by all partners to commit support for additional fieldwork in spring 2005.

## **Outcomes/achievements**

*Outline how your research has been used in an applied or management situation, eg. has your research been used to modify a management practice, used by industry, affected a government policy decision?*

Preliminary trawl exposure indicators were presented at a QDPIF ecological trawl risk workshop 5-6 May 2005 and are likely to be adopted into the interim ERA for the fishery required by DEH. Further preliminary trawl indicators were examined at the Dec 2005 technical workshop and provided to QDPIF.

## Contact with Task Associates

*How frequently did you communicate with your Task Associate/s and what form did the communication take? Were there any difficulties encountered?*

In 2005/2006, the co-investigators have had contact with a number of Task Associates and other key stakeholders to brief on Project progress and ongoing field results, and to resolve issues affecting the project such as additional field work and the Technical Workshop in mid-December 2005.

## Publications

*List publications for the reporting period which have resulted in full or in part from your work with CRC Reef. Enter publications according to the following categories*

- a) Books and book chapters
- b) Refereed journal articles

Cappo, M., Speare, P., and D'eath, G. (2004). Comparison of Baited Remote Underwater Video Stations (BRUVS) and prawn (shrimp) trawls for assessments of fish biodiversity in inter-reefal areas of the Great Barrier Reef Marine Park. *Journal of Experimental Marine Biology and Ecology* 302(2),123-152

- c) Refereed conference proceedings
- d) Other conference proceedings
- e) Technical reports

Phase 1 Report:

Pitcher, R., Venables, W., Ellis, N., McLeod, I., Pantus, F., Austin, M., Cappo, M., Doherty, P., Gribble, N. (2002) GBR Seabed Biodiversity Mapping Project: Phase 1 Report to CRC-Reef. CSIRO/AIMS/QDPI Report, pp. 192.

- f) Popular articles
- g) Others (videos, CDs etc, brochures)

5000 copies of a brochure about the project were prepared and circulated widely in mid-September 2003.

Much of the currently available information, including preliminary maps and selected visual material such as example seabed video and still photos and some BRUVS video and reference images have been loaded and updated on the Project's CRC website and are publicly accessible.

## Presentation/Workshops

*Please provide a list of the following for 2003/2004:*

*In Addition, provide a count of the number of public presentations, eg seminars and conference presentations and a list of your media activities*

- a) Keynote/ Plenary addresses in 2005/06.

2005 AMSA Conference, Darwin, Census of Marine Life Australia plenary session:  
Marine Biodiversity - Dr Peter Doherty, AIMS

- b) Workshops, industry information sessions organised in 2005/06 for communication of research findings

Presentations about Project progress and preliminary results were made to GBRMPA, TrawlMAC, CSIRO, Q.EPA, QDPI, AMSA during the reporting period. Project staff contributed to a QDPI Fisheries Management Workshop on Ecological Risk Indicators for the Trawl Fishery in May 2005.

Task Associate Steering Committee technical workshop & progress meeting, 16-17 Dec 2005

- c) Public meetings, industry/interest group meetings (relevant to CRC Reef) attended in 2005/06:

- d) Number of other public presentations, eg seminars and conference presentations in 2005/06 (excluding those listed above).

Presentations about Project progress and preliminary results have been made at CSIRO and QM in the past year, as well as a public session of the 2006 Queensland Museum Talk Series, Pioneering a Sustainable Queensland. Brisbane, June 2006; and at the 2005 Queensland Conservation Conference, Townsville.

- e) List of media activities in 2005/06

PRESS RELEASES.....

CSIRO: Snapshot of life deep in the Great Barrier Reef, 23 February 2006

<http://www.csiro.au/csiro/content/standard/ps19x,..html>

this release lead to an enormous number of enquiries and the following activities at least:

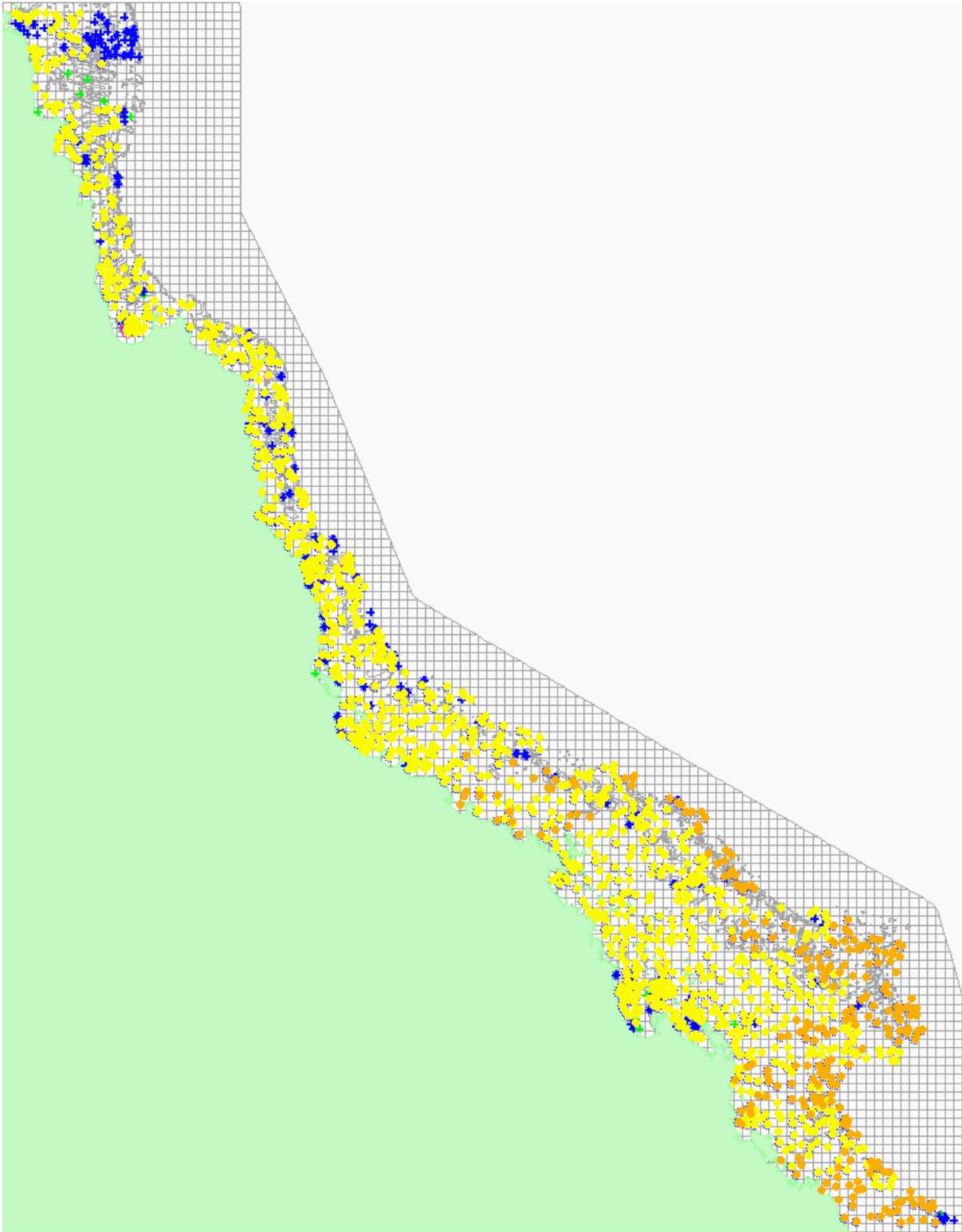
- several newspaper stories in regional Queensland and interstate capitals
- several radio interviews in regional Queensland and nationally (eg ABC Bush Telegraph, Country Hour)
- television, including evening news on ABC, 7, 9; ABC Asia Pacific's Nexus program; ABC Catalyst.

## Signatories

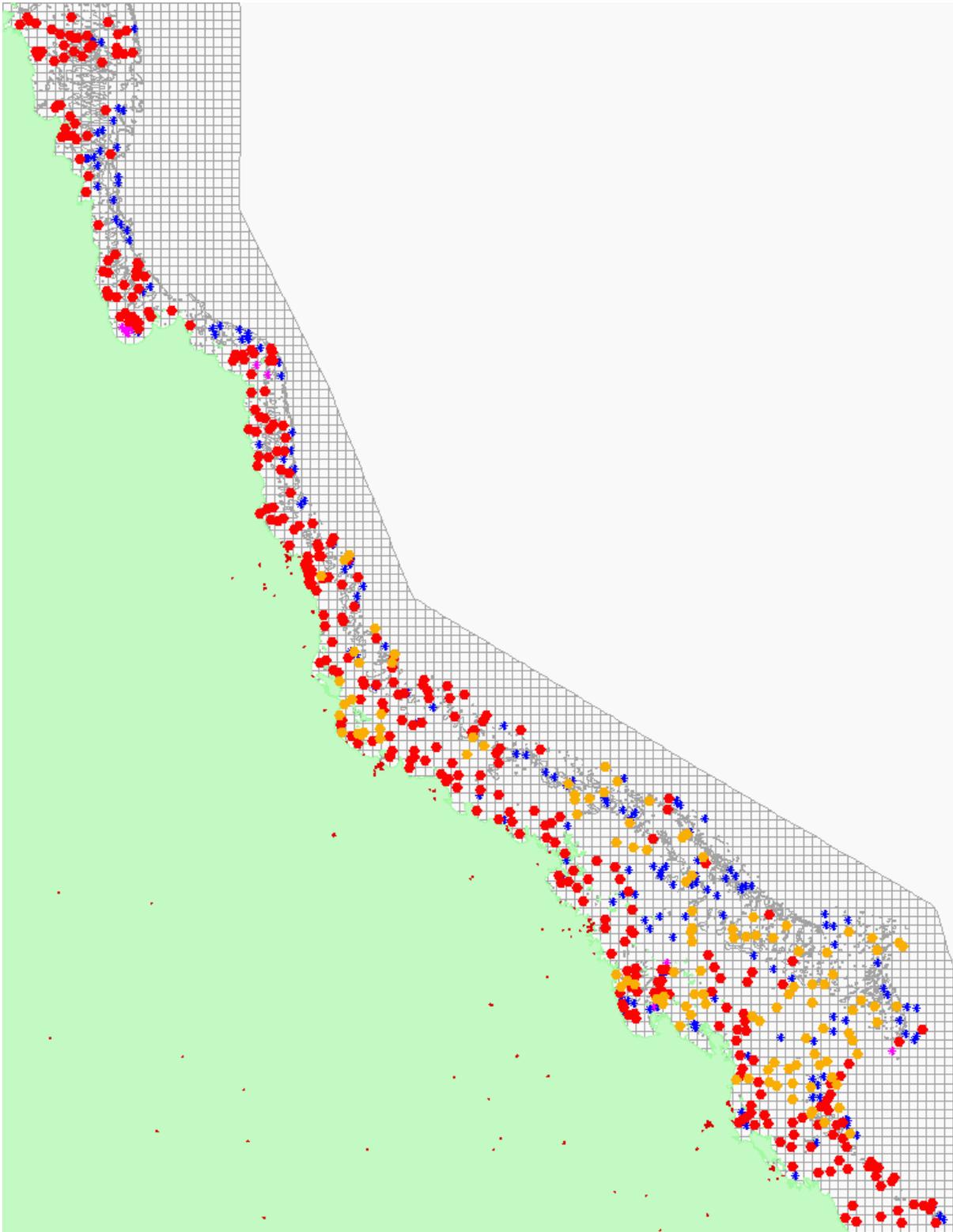
*"Task Supervisor" is the postgraduate student supervisor where the Task Leader is a student. Most non-student tasks will not have a Task Supervisor.*

<b>Role</b>	<b>Signature</b>	<b>Date</b>
Task Leader / Principal Investigator		
CRC Program Leader		
Task Associate		

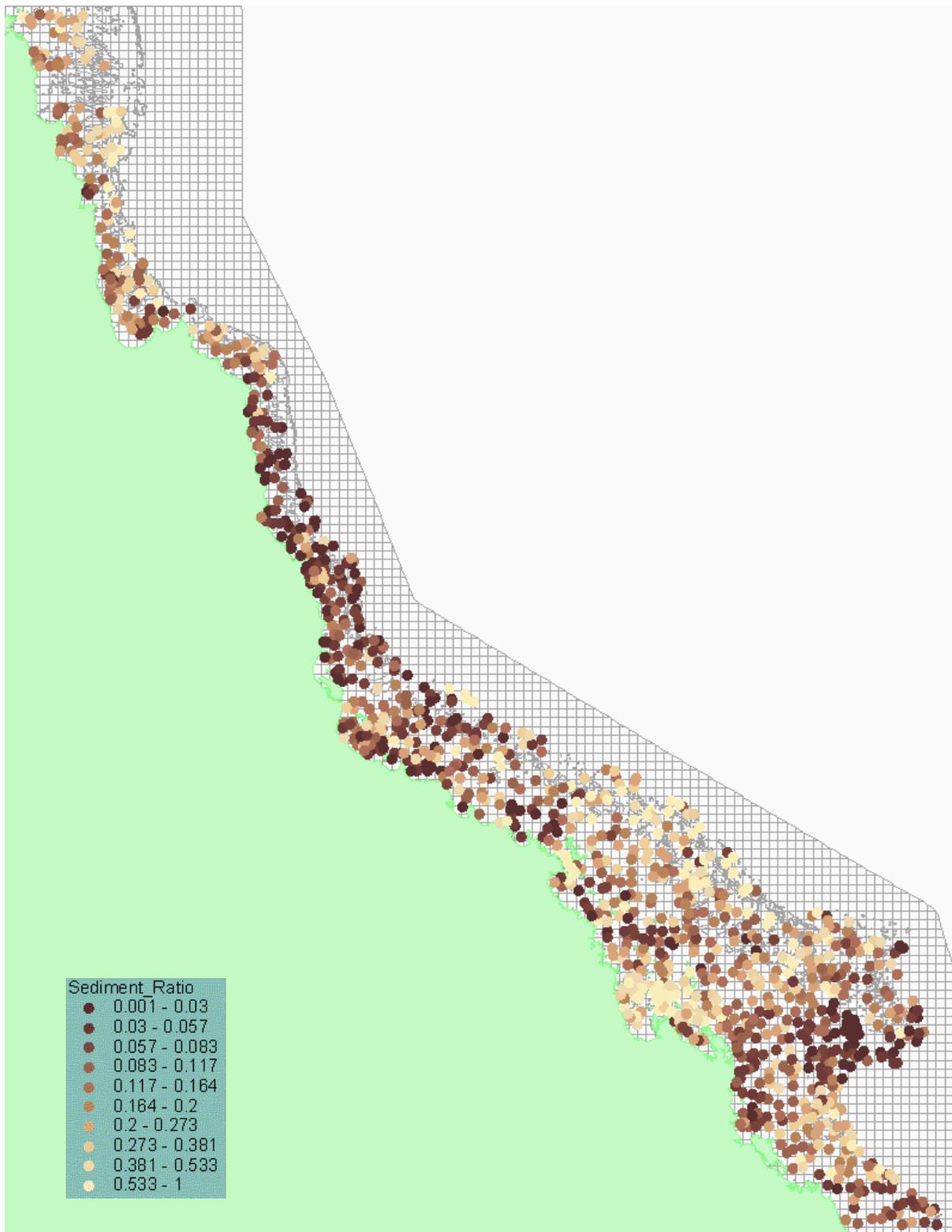
Appendix



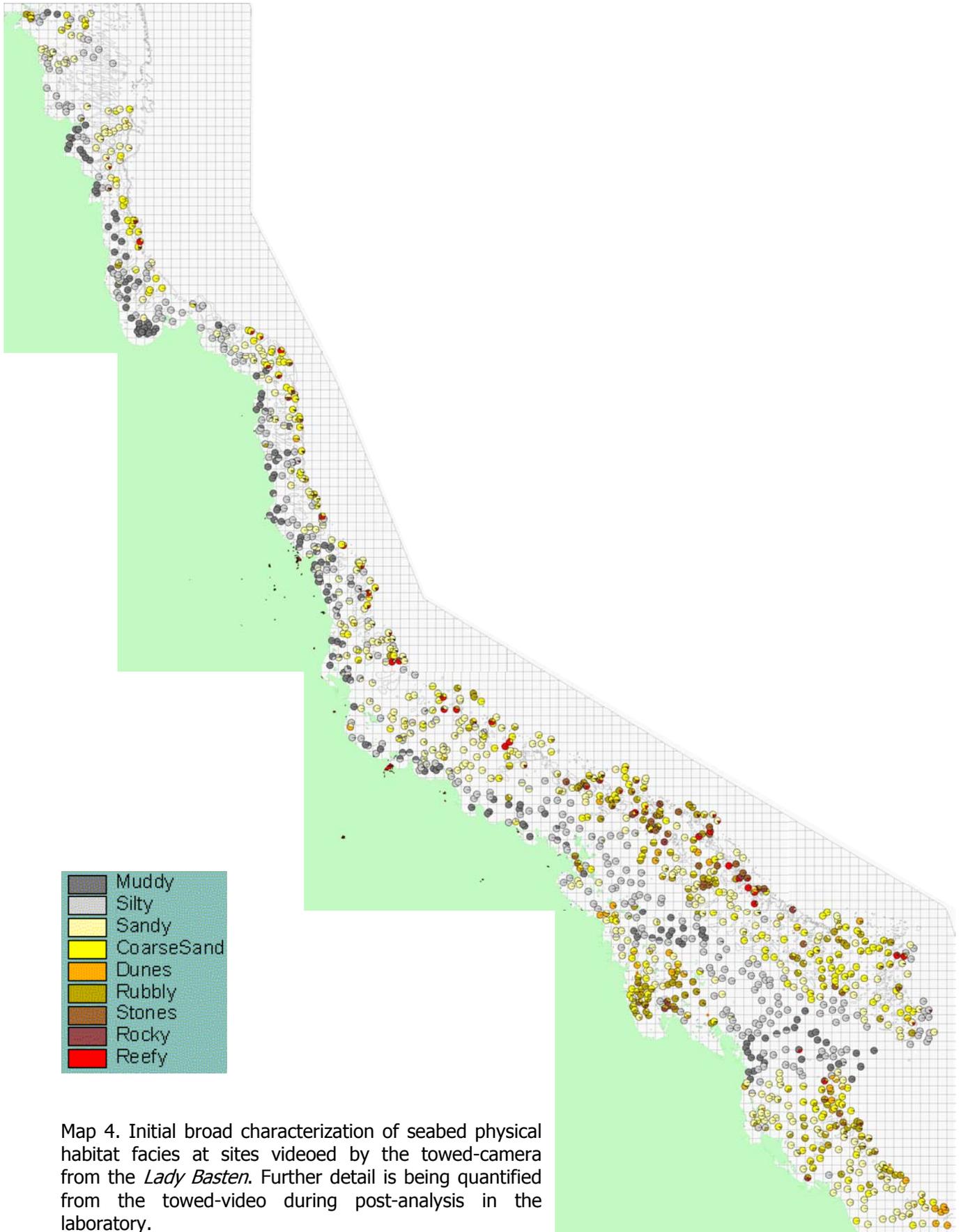
Map 1. Sites sampled for seabed habitat/epibenthos by the *Lady Basten* trips 1-5 (●) and #6 (●) and indicating sites that remain unsampled (+) (particularly in the far northern GBR due to time lost to cyclonic conditions in LB trip 5).



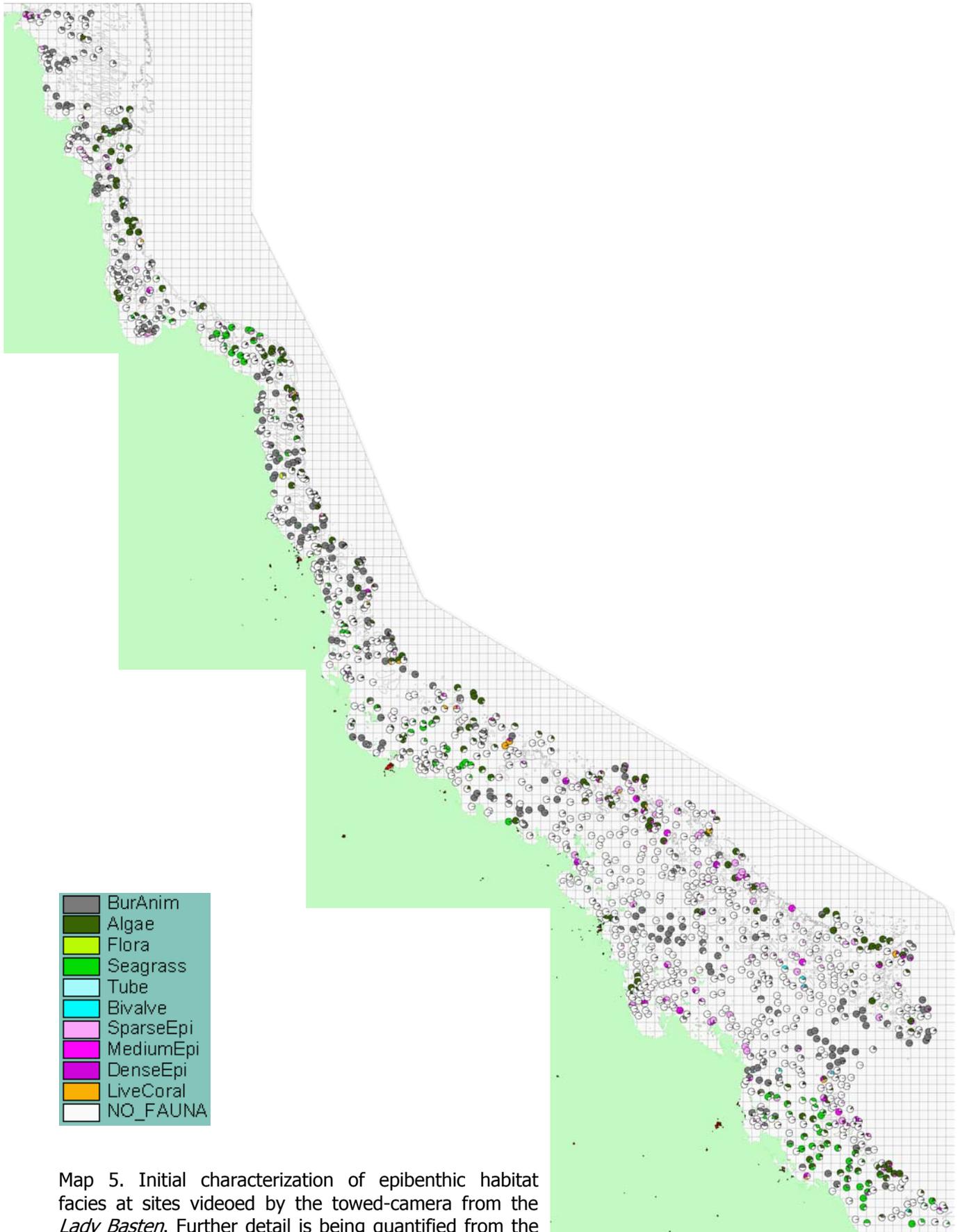
Map 2. Sites sampled for seabed seabed fish and mobile invertebrates by the *Gwendoline May* trips 1-3 (●) and #4 (●) and indicating sites that remain unsampled (\*<sub>blue</sub>) – many of which were too rough.

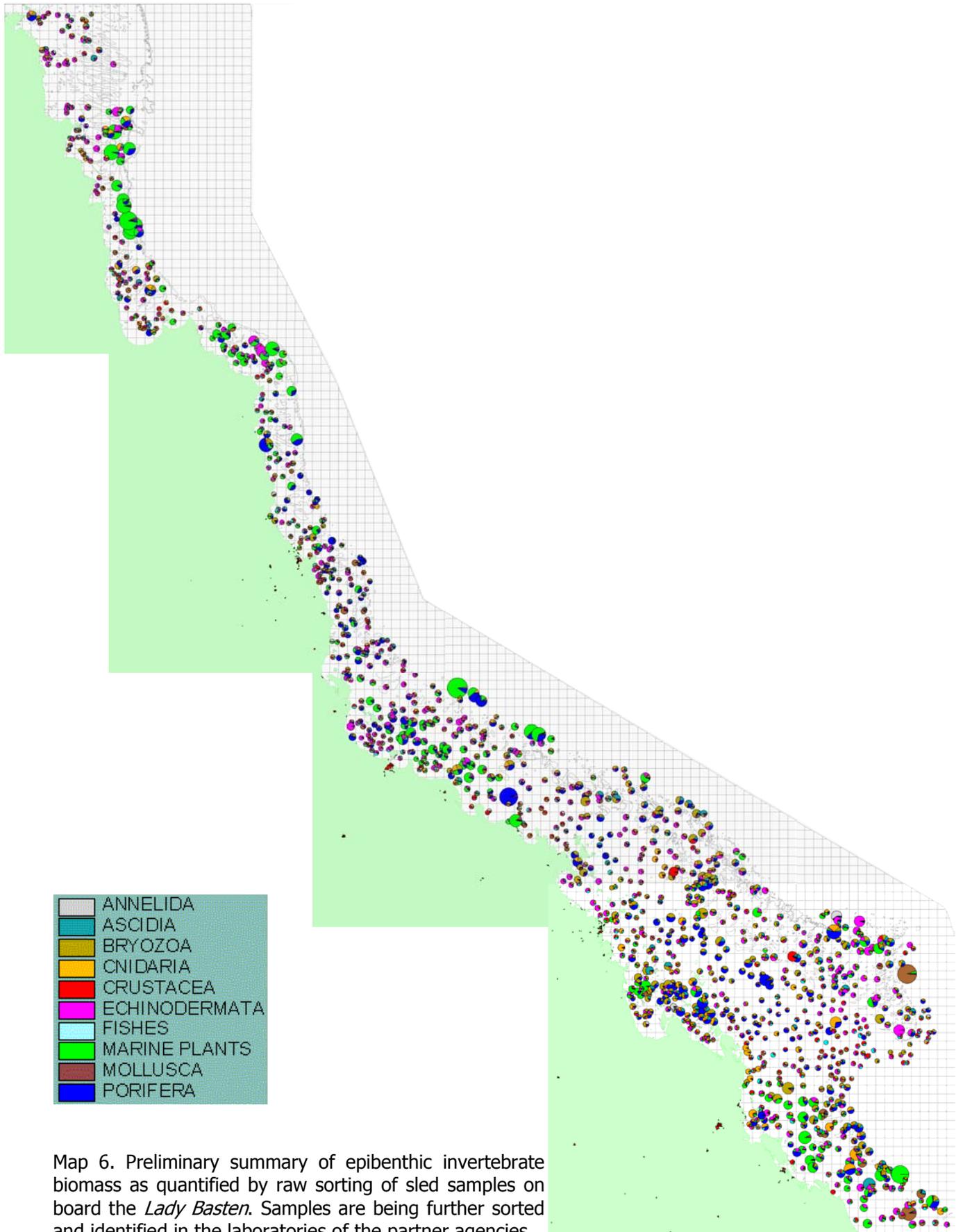


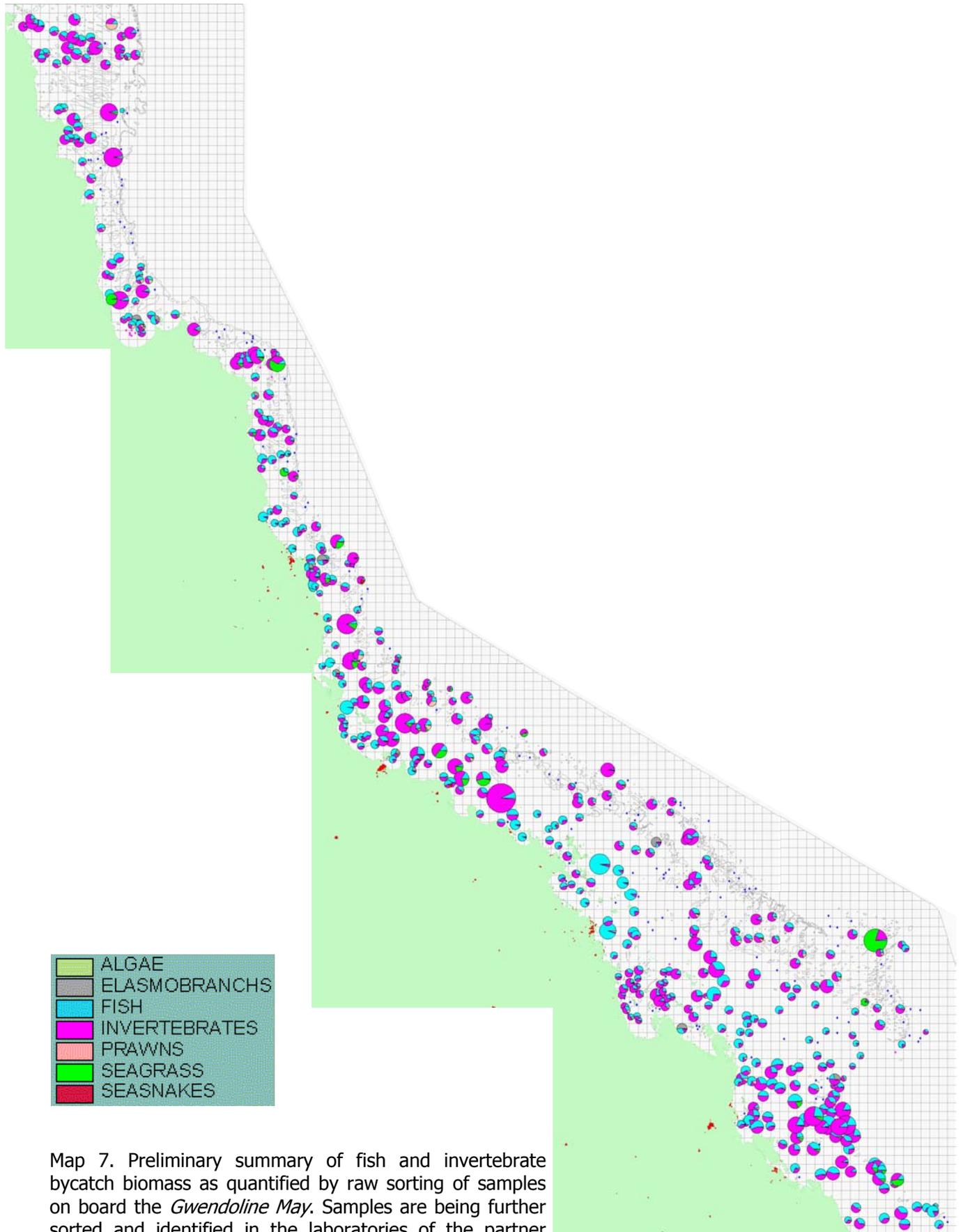
Map 3. Initial quantification of sediment at sites sampled by the *Lady Basten*, prior to full composition analysis becoming available from Geoscience Australia. "Sediment ratio" is the weight of the sediment fraction retained by a 1 mm mesh sieve divided by the weight of an equivalent volume of un-seived sediment. Low values of ratio indicate little coarse material in the sediment, high values indicates substantial coarse fraction in the sediment.



Map 4. Initial broad characterization of seabed physical habitat facies at sites videoed by the towed-camera from the *Lady Basten*. Further detail is being quantified from the towed-video during post-analysis in the laboratory.







Map 7. Preliminary summary of fish and invertebrate bycatch biomass as quantified by raw sorting of samples on board the *Gwendoline May*. Samples are being further sorted and identified in the laboratories of the partner agencies.