

**NCRIS CAPABILITY 5.12**

**INTEGRATED MARINE OBSERVING SYSTEM**

**ANNUAL BUSINESS PLAN 2008/09**

<b>CONTENTS:</b>	<b>PAGE</b>
<b>1. Executive Summary</b>	<b>2</b>
<b>2. Status of the Project</b>	<b>5</b>
<b>3. Research Infrastructure</b>	<b>7</b>
<b>4. Governance</b>	<b>10</b>
<b>5. Promotion</b>	<b>14</b>
<b>6. Access and Pricing</b>	<b>15</b>
<b>7. Financial &amp; Human Resources</b>	<b>15</b>
<b>8. Milestones</b>	<b>16</b>
<b>9. Confidential Items</b>	<b>17</b>

**ATTACHMENTS:**

<b>A. Facility Plans</b>	<b>19</b>
A.1 Argo Australia	19
A.2 Enhancing Measurement Programs from Ships of Opportunity	25
A.3 Southern Ocean Time Series	41
A.4 Australian National Facility for Ocean Gliders	45
A.5 Autonomous Underwater Vehicle Facility	48
A.6 Australian National Mooring Network	52
A.7 Australian Coastal Ocean Radar Network	69
A.8 Australian Acoustic Tagging and Monitoring System	74
A.9 Facility for Automated Intelligent Monitoring of Marine Systems	77
A.10 electronic Marine Information Infrastructure	80
A.11 Satellite Remote Sensing	87
A.12 IMOS Office	100
<b>B. Budget and Financial Tables</b>	<b>104</b>
<b>C. Communication Plan</b>	<b>108</b>
<b>D. Summary of Successful Proposals to access IMOS Infrastructure</b>	<b>113</b>
<b>E. Detailed Facility Budgets</b>	<b>114</b>
<b>F. List of Acronyms</b>	<b>122</b>

## 1. Executive Summary

The Integrated Marine Observing System (IMOS) is a distributed set of equipment and data and information services. Collectively they will contribute to meeting the needs of marine research and other uses in Australia for ocean observing data in both open oceans and coastal oceans. The value from this infrastructure investment lies in the coordinated deployment of a wide range of equipment aimed at deriving critical data sets. These, in turn, become the infrastructure for a wide range of research and applications at a variety of scales. The infrastructure also contributes to Australia's role in international programs of ocean observing. Installation of the equipment is carried out by nine national facilities, each specializing in a specific instrument or group of related instruments. Three facilities—the so called Bluewater and Climate facilities—collect data from the large scale oceans around Australia. Three facilities collect data on currents and water properties over the continental shelf. And three facilities collect physical and biological data relevant to management of coastal ecosystems. Data management is the responsibility of two facilities, one to assemble satellite remote sensing data and the second to provide access to all IMOS data.

This summary covers expected progress in development of the facilities in 2008/09 in some detail, followed by brief key points from the other sections of the plan.

### **Expected progress with the project in the coming year**

**Bluewater and Climate Facilities:** The Bluewater and Climate Facilities are Argo Australia, Enhanced Measurements from Ships of Opportunity (SOOP) and Southern Ocean Time Series (SOTS). They are enhancing existing monitoring systems in the oceans around Australia by increasing the number of Argo floats in our region, increasing the number and type of measurements made from Volunteer Observing Ships (VOS) and establishing a moored station for ocean-atmosphere measurements in the Southern Ocean. Argo and SOOP were already established before IMOS. The planned enhancements will be largely achieved in the coming year, and the effort will turn to maintenance and providing access to research-quality, long time-series data streams. Argo will continue to coordinate with activity in other countries, which have deployed more than half the active floats in the Australian region. Argo Australia will also fill emerging gaps in the global, southern hemisphere array as opportunities for deployment arise. SOOP will be converted from primarily physical oceanographic monitoring to biophysical monitoring, with greater relevance to identifying climate impacts on ecosystems. SOTS is a new and challenging undertaking. Progress in the coming year will be focused on engineering analysis of trial deployments and refining the design of five types of mooring.

**Coastal Current and Water Property Facilities:** These Facilities are Australian Coastal Ocean Radar Network (ACORN), Australian National Facility for Ocean Gliders

(ANFOG) and the Australian National Mooring Network (ANMN). They bring advanced technologies into widespread usage in Australian marine research and provide a new means to observe and understand the impacts of basin-scale ocean-climate on the coastal environment. HF Radar systems will be installed in Queensland, New South Wales, South Australia and West Australia early in the coming year, and attention will turn to the challenges of tuning the rather delicate systems, processing the huge streams of raw data (Gbytes per day) and providing access to reduced data. ANFOG will take delivery of the full planned stable of eight gliders and gain experience in deployment and recovery in NSW, TAS, SA and WA. While the goal is clear—to monitor the major boundary currents and coastal impacts—the method has to be learned by trial and error. Navigation of gliders will be assisted by real-time information on currents from BlueLINK. Mooring technology is well established in AIMS and CSIRO. The ANMN goal is to build capability in other groups around the country. By the end of the coming year seven National Reference Stations, twenty coastal moorings and 4 thermistor chains will be installed.

**Coastal Ecosystems Facilities:** These Facilities are Australian Acoustic Tagging & Monitoring System (AATAMS), Facility for Automated Intelligent Monitoring of Marine Systems (FAIMMS) and Autonomous Underwater Vehicle (AUV). They consist of two fixed networks for biophysical data acquisition and one mobile observing system. Together they will provide widely dispersed and sustained data streams for assessment of ocean-climate impacts on the marine physical environment and ecosystems. AATAMS has been greatly enhanced by national and international collaborations. Acoustic tracking screens and arrays will be established on the coasts of Ningaloo Reef, southwest WA, SA, both ends of Bass Strait, NSW and QLD. FAIMMS will establish sensor networks at all of the planned locations on the Great Barrier Reef, refine the data management techniques and provide real-time access to data through eMII. The AUV will be deployed this year primarily in SA for four projects approved by IMOS; with additional possible deployments also off NSW, GBR, WA and Tasmania.

**Data Management Facilities:** The data management Facilities are eMarine Information Infrastructure (eMII) and Satellite Remote Sensing (SRS). In the coming year SRS will provide access (through eMII) to a range of marine data products (based primarily on ocean colour and sea surface temperature) from three satellites (AVHRR, MODIS, and MTSAT-1R imager). The products will include high resolution maps of real-time sea surface temperature. The upgrade of satellite receiving stations will be completed. eMII will deliver an integrated data management framework which permits data-discovery, access and integration of data streams. The focus will be on the immediate needs of the established IMOS metadata and data-flows. The infrastructure for storage and description of all raw and processed IMOS data streams will be established; and the first version of a user interface for discovery and access will be available. The framework for interoperable use of multiple IMOS data streams and some value added products will be available. A joint project with Platforms for Collaboration under the NeAT project will make it possible to combine the IMOS data streams with other data libraries that are often used in marine and climate research.

**Additional key points:**

**Governance structure:** Experience during the first year suggested that some refinement and simplification in structure would be more efficient.

**Promotion:** User uptake of IMOS data will be enhanced by targeted activity in the nodes. The main event for the year will be a national IMOS data users workshop held in late 2008.

### **Explanation of any proposed material variations for the Project Plan**

The major variation relates to delays caused due to the late start-up of IMOS (resulting from delays in signing the contract with the government and with the Operators), which are expected to be largely caught up during the 2008/09 year. Otherwise, there are no proposed material variations to the Project Plan.

### **Key risk factors for the year and strategies to address them**

The biggest risk which continues to face IMOS is staffing and set-up of the eMII Office. As a consequence, there is a risk of failing to engage the research community and getting a large segment of it on side. Appointment of a very capable eMII Director, realigning the eMII-work program and taking a proactive approach to uptake of the data will mitigate this risk. The platforms for Southern Ocean Time Series (SOTS) are to be deployed in a harsh environment where weather and big waves are a threat to instruments, which makes SOTS a highly risky component of the IMOS infrastructure. Similarly, the tropical and sub-tropical coastal and continental shelf deployments are at risk to tropical cyclones. Reduction or cessation of Southern Surveyor voyages would have a detrimental effect particularly on the Argo, SOOP, and SOTS facilities. Another risk is the loss (through retirement/alternate employment) of key Facility and Node personnel. A serious administrative and human resources problem is threatening the viability of ACORN. Additional risks and how these will be addressed are discussed in the Governance section below.

### **Call for Proposals to Access to IMOS Infrastructure**

We received 16 of which 14 were accepted for inclusion into this Business Plan. Details of the successful proposals are listed in *Attachment D* and are also parts of the plans for each of the relevant facilities.

## 2. Status of Project

A complete update on the status of each Facility and the IMOS Office is provided in *Attachment A*. Highlights are:

### **Bluewater and Climate Facilities**

- Argo Australia – the international Argo programme has reached its design target of 3000 floats globally; with the Australian array exceeding its target of 50 floats per year, with an expected array of 180 floats by June 2009, with an increased numbers of floats having oxygen sensors. Any reduction in the sea-time of Southern Surveyor will affect plans for deployment of floats
- Enhancing Measurements from Ships of Opportunity (SOOP) - All of the sub-facilities are progressing on schedule and will be nearly fully operational within the 08-09 period. Any reduction in the sea-time of Southern Surveyor will have a corresponding restriction on the underway measurements obtained from the newly installed Air-Sea flux and pCO<sub>2</sub> instrumentation.
- Southern Ocean Time Series (SOTS) – This facility consists of 5 moored platforms, intended to work in combination to enhance the overall data stream. The design phase has been completed, with purchasing and engineering tests currently underway, ahead of trial deployments, initially for the subsurface platforms 2-5 and after June 2008 for the surface platform 1. Any reduction in the sea-time of Southern Surveyor will affect the trial deployments.

### **Coastal Current and Water Property Facilities**

- Australian Coastal Ocean Radar Network (ACORN) – The GBR stations were installed and operational in December 2007 (data is being stored until eMII is operational). For the SA and WA installations, sites have been identified and surveyed and approvals from landowners and local governments are proceeding well – these are expected to be installed by December 2008. Planning is just commencing for the remaining two installations in NSW and on the Bonney Coast (SA/Victoria), with instalments planned by December 2009. The structure of ACORN within JCU is being reviewed because of some operational issues.
- Australian National Facility for Ocean Gliders (ANFOG) – The complete fleet of 5 deep water ‘Seagliders’ and 3 shelf ‘Slocum’ gliders will be in place by June 2008. Test deployments have already taken place in WA and SA and planned for Tasmania; and further deployments are planned from July 2008 in WA, SA/Victoria, NSW and Tasmania.
- Australian National Mooring Network (ANMN) – Eight sub-surface moorings were deployed in Queensland in 2007 collecting CTD and current data. A mooring was deployed in South Australia in January 2008. ANMN also assisted with the provision of pressure moorings in Bass Strait to calibrate the Jason II Altimetry satellite. A data handling workshop was held in February 2008, all parties showed a high level of cooperation and collaboration to develop a set of common tools and data standards to ensure consistency across sub facilities.

Staff have been appointed in Queensland, South Australia, and Tasmania to form the core elements of the Australian National Moorings Network. In Western Australia it is anticipated to appoint a technician by the end of April and in NSW the process of contracting out services to commercial entities is well underway. In Tasmania economies of scale have been made by sharing appointments with the Southern Ocean Time series, this is allowing the development of a highly capable Ocean Sensors Deployment Team. The first passive acoustic logger was deployed in February with the first full array anticipated to be in the water in the Perth Canyon by June 2008.

### **Coastal Ecosystem Facilities**

- Australian Acoustic Tagging and Monitoring System – 70 receivers have been deployed off Southwest Australia, and 96 off Ningaloo Reef with the remainder to be completed by July 2008. Further deployments off eastern and southern Australia and the Ocean Tracking Network deployments off WA and Victoria are planned for the 2008/09 year. First data should be available from July 2008.
- Facility for Automated Intelligent Monitoring of Marine Systems (FAIMMS) – Initial field trials have been completed with successful test of instruments and the wireless network communication design. First major deployments are planned for June 2008, first data available in July 2008, and full deployment of the network by March 2009.
- Autonomous Underwater Vehicle Facility (AUV) – Two major cruises were operated in 2007, along the Great Barrier Reef and Ningaloo Reef. Four proposals for the AUV in SA have been approved in 2008, along with further planned deployments off NSW, GBR, WA and Tasmania during the coming year.

### **Data Management Facilities**

- electronic Marine Information Infrastructure (eMII) – Development of a Metadata Entry and Search Tool (MEST) has been a major achievement. Recruitment of staff is a significant difficulty, however we anticipate most senior positions to be filled by June 2008, after which it is expected significant progress can be made with the implementation of eMII. A joint project with Platforms for Collaboration/NeAT has been approved in principle and a work-plan is being prepared.
- Satellite Remote Sensing (SRS) – The development of the facility is well underway and close to schedule. A lack of cooling capacity at BoM has meant delay in some hardware purchases and relocation of other hardware. It is expected this facility will be fully operational in 2008-09.

### **IMOS Office**

- IMOS Office – With set-up complete, the focus will turn toward communications and development of IMOS, ensuring that we understand the needs of users. The mid-term review will be held in less than one year, and this will be a major focus, along with initial planning on ways to sustain IMOS in the longer term.

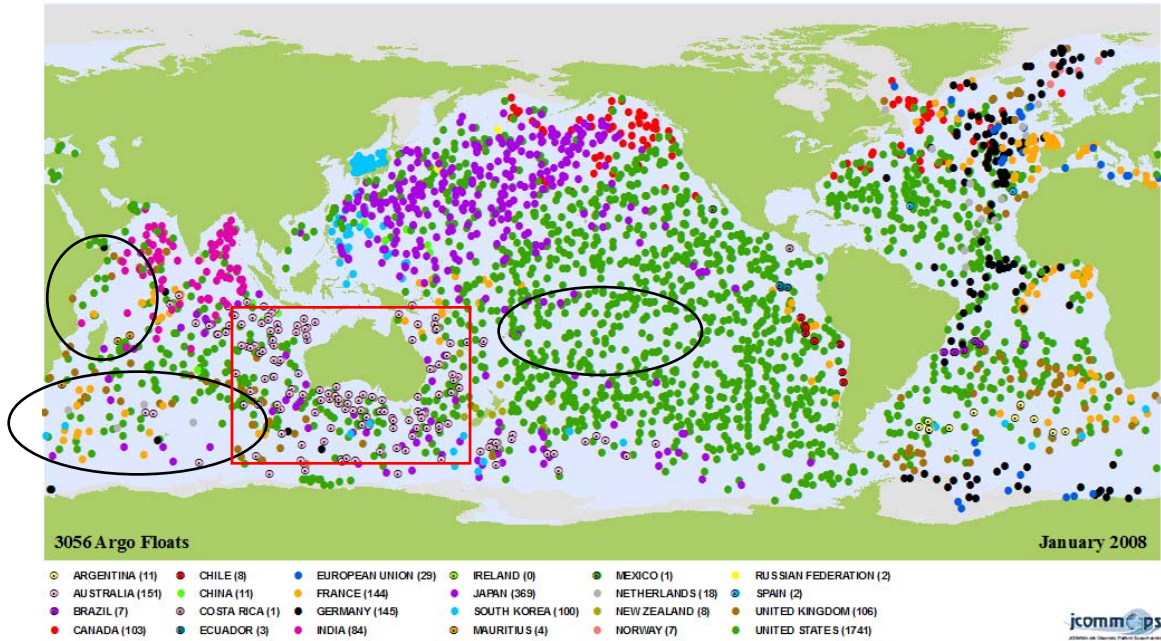
### 3. Research Infrastructure

- *describe expected progress with implementation and operation of the research infrastructure during the period of the Annual Business Plan*

**Attachment A** provides for each facility a description of the expected progress with implementation and operation of the research infrastructure during the 2008/09 year.

A summary of the deployments to June 2009 is given in Figures 1-4. The maps include all of the infrastructure developed since the start of this capability. The priority regions for IMOS Argo deployments are presented in Figure 1. Argo floats will be deployed in the core region surrounding Australia to ensure design density (red box). Note that more than half of the active floats in our region have been provided by international collaborators. Global Argo coverage is needed to address key questions around climate variability and change; therefore in conjunction with international partners Argo will target gaps opening up in neighbouring Southern Hemisphere oceans (black circles). The other Bluewater deployments are shown in Figure 2. Ship of Opportunity instruments will be deployed on several merchant shipping lines and on four research vessels. Hull-mounted Sea Surface Temperature (SST) sensors will be installed on Australian Volunteer Observing Fleet (AVOF) ships with coverage across the yellow shaded region. SOTS will focus on engineering testing of the moorings. Activity in the coastal facilities ACORN, ANFOG, AATAMS, AUV, SRS and FAIMMS is represented in Figure 3. In addition to the four radars depicted on the map, the installation of a fifth radar, at Coffs Harbour in NSW will likely be completed very soon after June 2009. The deployment of the Ocean Tracking Network (OTN) acoustic receivers in the AATAMS facility is dependant upon funding from OTN and any delay in this funding could cause a delay in the installation. The Mobile receivers are available for strategic deployment and are allocated through a competitive process advertised to the user community. Mooring deployments in the coastal mooring facility (ANMN) is indicated in Figure 4.

**Figure 1: Argo Australia**



**Figure 2: Other Bluewater (SOOP & SOTS), plus SRS**

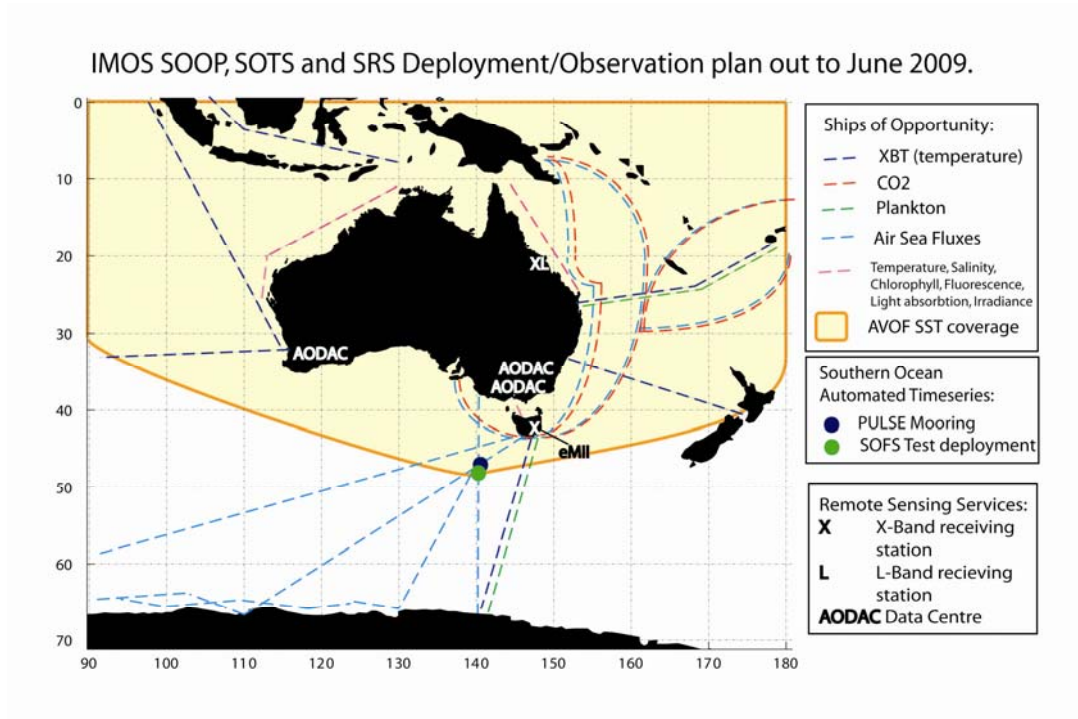


Figure 3: Coastal facilities

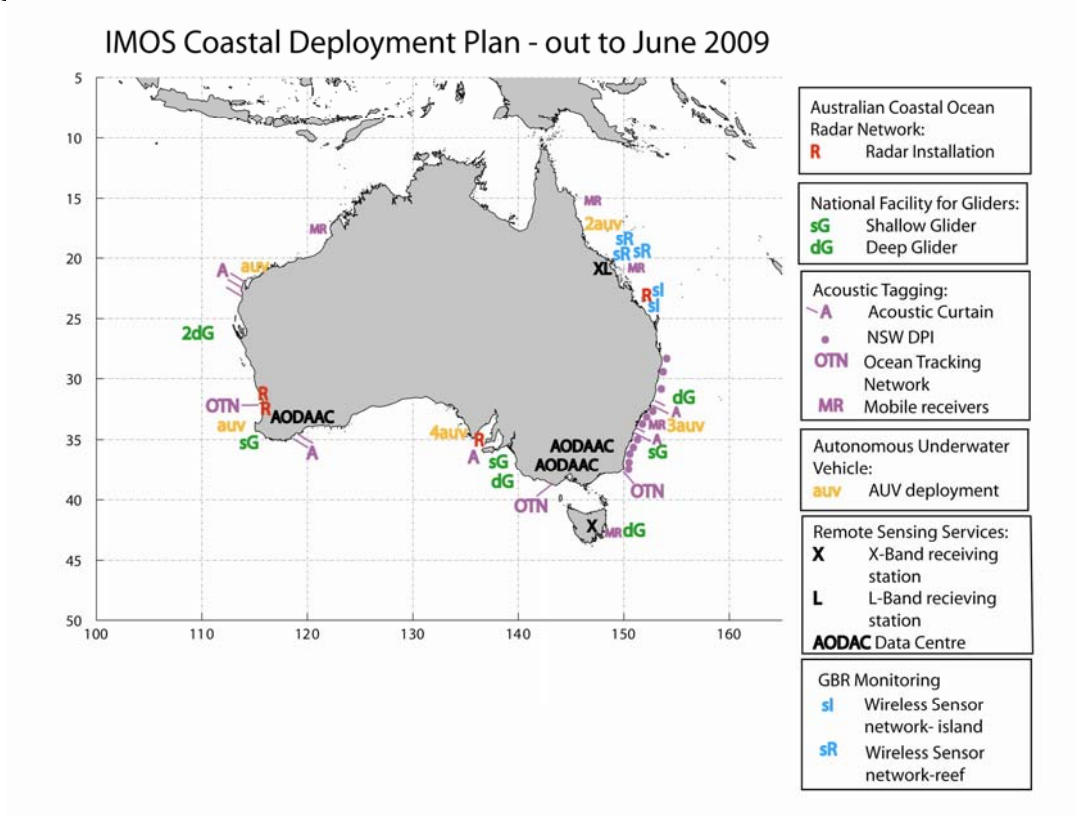
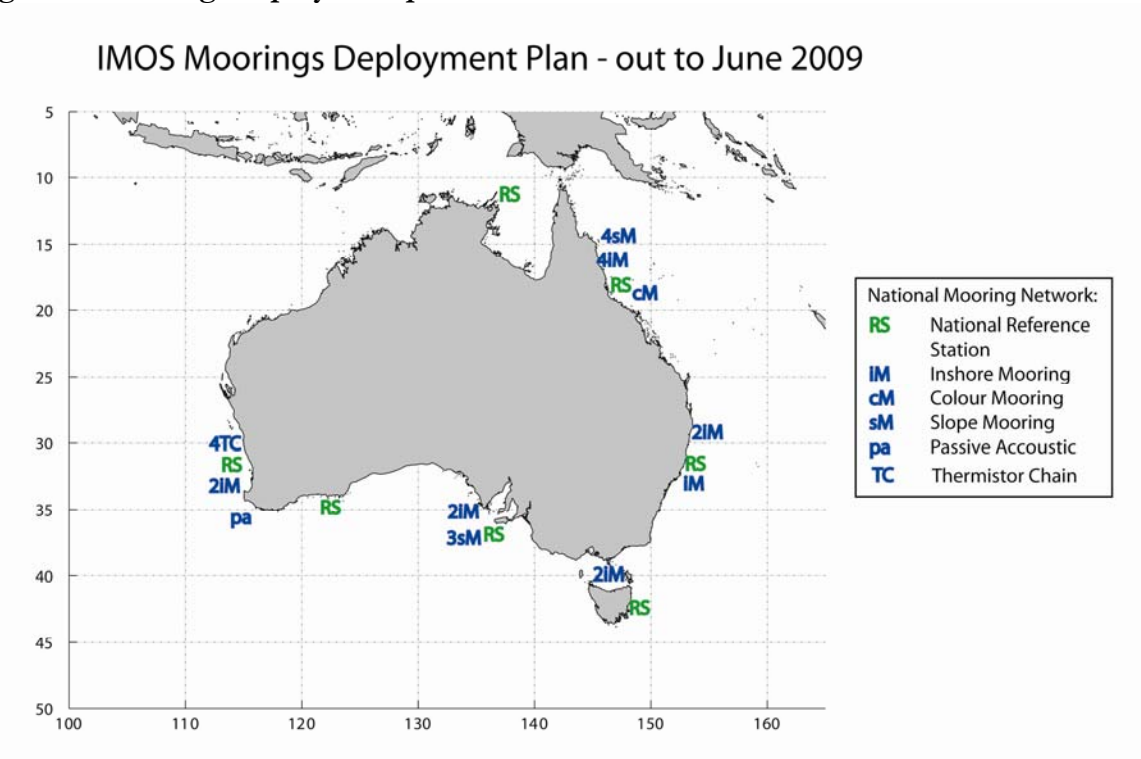


Figure 4: Moorings deployment plan



## 4. Governance

### **Describe the expected governance and management activities and developments during the period of the Annual Business Plan**

The Advisory Board will meet in September 2008 to approve the Annual Progress Report, including an update of the risk analysis for each facility. The Board will meet at least once in early 2009 to carry out the mid-term strategic review and approve the Annual Business Plan 2009/10. The Annual Planning Meeting of Node and Facility Leaders and Operator contacts will be held in early 2009 as part of the review.

The five IMOS nodes will each meet at least twice during the year. The nodes will complete or revise their Science and Implementation Plans following a preliminary review by the Board at the March 2008 meeting. The major challenge for nodes during the 2008/09 year is engagement with the research community to promote the use of IMOS data.

Following on the experience of the first year of IMOS operations, we wish to update the information on the IMOS Steering Committee and Implementation Panel (to be replaced by the IMOS Technical Reference Group), as detailed on page A-15 of the IMOS Funding Agreement. The reason for the amendment is that the initial structure proved to be overly-governed, and with the facility leaders being able to report directly to the IMOS Director, the Implementation Panel is not required.

Following developments in the regional and bluewater nodes, revised membership of the IMOS committees is as follows:

<b>Person</b>	<b>Node Leader</b>	<b>Steering Committee</b>	<b>Technical Reference Group</b>
Ken Ridgway	Bluewater	Bluewater	Bluewater & climate
Scott Bainbridge			Coastal ecosystems
Peter Doherty	GBROOS	GBROOS	
Iain Suthers	NSWIMOS	NSWIMOS	
Laurent Seuront	SAIMOS	SAIMOS	
Chari Pattiaratchi	WAIMOS	WAIMOS	
Craig Johnson		eMII	
eMII Director tba			eMII
Simon Allen			Coastal current and water properties

Node Leaders: The marine community has formed regional nodes, which provide the scientific rationale and research goals for marine observing. Key roles for the Node Leaders in the upcoming period are:

- Oversee the implementation and running of the regional node.
- Organise meetings (at least 2 per year), approve membership and encourage of use of IMOS equipment and data for research.

- Encourage applications from the Node in response to periodic ‘call for proposals’.

Steering Committee: Made up of Node Leaders, the IMOS Director and the eMII science leader. Key responsibilities include:

- Advice and assessment of implementation
- Reviewing ‘call for proposal’ applications.
- Ongoing, the role will be to assist with the 2009 strategic review of IMOS and plans for post-June 2011.
- The Steering Committee will have the opportunity to comment on the annual business plans and annual reports, prior to their being approved by the Advisory Board.

It is not necessary for this committee to meet on a regular basis, rather to be available as necessary to discuss issues arising.

Technical Reference Group (previously Implementation Panel): The Technical Reference Group will consolidate technical information from the facilities for annual reporting. It is composed of three facility leaders – one each for:

- Coastal ecosystems – AATAMS, FAIMMS, SRS and AUV
  - Coastal currents and water properties – ACORN, ANFOG and ANMN
  - Bluewater and climate – Argo, SOTS and SOOP;
- plus the IMOS Director and the eMII Director.

It is not normally necessary for Technical Panel to meet on a regular basis, rather to be available as necessary to advise/assist the IMOS Director when issues arise in respect to their group of facilities, and to assist with the preparation of the annual report in September each year.

### **Key risks and risk management strategies for the period of the Annual Business Plan**

We are currently discussing key risks with each of the facilities, and expect to complete a full risk assessment by the September 2008 Advisory Board meeting. Early indications of the major risks which face IMOS, as discussed at the February 2008 Annual Planning Meeting are:

- Staffing and set-up of eMII and ensuring the data are available to be used is the key risk to mitigate. The eMII Director starts in July 2008, at which time the eMII Office should be fully staffed, so we expect to be then able to ramp up this key component of the IMOS plans. More effort will be directed toward preparing facilities to use the tools for data submission.
- eMII requires the collection, storage and retrieval of varied and complex data sets, requiring complex systems. Whilst these are being developed there is a need to monitor and manage any potential “blow out” of the system development timetable, delaying full access by the marine research community. The IMOS office is closely monitoring this potential issue.

- Convincing a large segment of the marine research community that IMOS will serve the broad needs of the whole community is a challenge and a risk to IMOS. To mitigate this risk, the IMOS Office will proactively increase its activity in this regard during the coming year by ensuring we clearly understand the needs of our user base, and that data is able to meet their needs. User engagement will be emphasized in the node meetings and a national user workshop will be held in late 2008.
- The ACORN facility is experiencing problems in administration and human resources that threaten its viability.
- Loss of key Facility and Node personnel is being addressed as part of a Risk Assessment and Management Program being undertaken, with the aim of developing a Succession Plan through identification and development of potential future IMOS related leaders.
- Addressing the start-up delays, and ensuring revised plans are adequate to deliver on the IMOS objectives and budget by June 2009 is part of all planning. It is dependent on IMOS being fully staffed early in the planning period. Risk is being mitigated by proactively filling all the positions.
- Reduction or cessation of Southern Surveyor voyages – this would have a detrimental effect particularly on the Argo, SOOP and SOTS facilities and IMOS is working with the broader Australian marine science community to ensure ongoing support for the national facility.
- Extreme operational conditions – The SOTS platforms are to be deployed in the South Indian Ocean, which makes this the most risky component of the IMOS infrastructure. The risk of the mooring breaking free has been considered in the engineering of the platforms, with surface instrumentation expected to be a greater risk than that below the surface. This risk is being mitigated by doing test deployments initially, and designing moorings so that if something goes wrong it will only affect a fraction of the planned deployment. Tropical cyclones pose a particular threat to the coastal and continental shelf facilities including AATAMS, FAIMMS, SRS, ACORN, ANFOG, ANMN and AUV; as damage to or loss of sensitive electronic equipment is a real concern. Insurance may address some of these, however some components (for example antennas, cabling) are not insurable. Some facilities have budgeted for replacement instruments using an expected rate of loss.
- Vital component failure, either beyond the scope of repairs and maintenance, or beyond the control of IMOS. For example in Argo floats are not deployed en-mass, to minimise vulnerability to batch manufacturing problems. For SRS, loss of access to a satellite is beyond the control of IMOS, but would mean breaks in the continuity of the data.
- Unbudgeted excess on insurance policy – while IMOS infrastructure is either fully insured or self-insured (by holding funds to cope with contingencies), the insurance excess will not be known until the facilities are fully planned and discussed with insurers – this could be a risk with SOTS in particular, given the

extreme environment it will operate in.

- Unforeseen costs of implementing the infrastructure – for example with ACORN we may have to use environmental power rather than cheaper forms.
- Loss of continuous data streams – our key deliverable for many facilities is provision of a continuous data stream, rather than provision of a piece of equipment. Loss of confidence in IMOS by the users is likely if data streams are delayed or have large gaps. This will be a key issue for eMII to address.

In each of the above cases, the onus will be on the facility to investigate mitigating actions. However, the IMOS Director will be contacted if full mitigation is not possible to determine how risks will be addressed.

## 5. Promotion

The IMOS Communication Plan has been developed and approved by the Board to address the key promotional activities for IMOS for the period January 2008 to June 2009. The purpose of the communication plan is

- to outline the communication activities necessary to engage and understand the needs of IMOS users and researchers,
- to ensure that business planning takes into account these needs and operational factors
- to communicate with stakeholders external to the IMOS community the benefits and longer term plans and issues surrounding a sustainable marine observing system.

A copy of the Plan is provided as *Attachment C*.

Facility staff will promote IMOS at national conferences and workshops (see details in Appendix A), including the annual meetings of AMSA (July 2008) and AMOS (February 2009) and at 11 international conferences. Details are in Appendix A. They will take advantage of additional meetings and seminars throughout the year.

The Director and relevant Node Leaders will participate in the BLUElink user forums, which will take place around the country during the year. BLUElink is an ocean forecast system for the Australian region and a major user of IMOS data. The forums, convened by the Bureau of Meteorology, bring together industrial users of BLUElink products, which assimilate IMOS data.

IMOS is now a standing agenda item for meetings of the Federal Government's Oceans Policy Science Advisory Group. Members are the heads of marine agencies, which employ many of the potential research users of IMOS data.

Promotion of the use of IMOS data for research will be the major challenge of the nodes during this period. The major event for the year will be a national IMOS data users workshop, to be held in the latter part of 2008. This workshop will draw on the experience of the European Argo Users Workshop, to be held in June 2008 and convened by Prof John Gould, the international member of the IMOS Advisory Board.

The Director will coordinate with and exchange ideas with international ocean observing activities, particularly with regard to management of multi-agency, widely dispersed observing systems. The international activities will include US Integrated Ocean Observing System (IOOS), European Global Ocean Observing System (EuroGOOS) and the Indian Ocean and Southeast Asian Regional GOOS Alliances.

A major activity this year will be promoting new research projects that will use IMOS data.

## 6. Access and Pricing

- *describe the intended conduct of the processes to decide access and pricing for merit-based research during the period of the Annual Business Plan*
- *describe the intended conduct of the processes to decide access and pricing other than through the merit-based processes for the period of the Annual Business Plan*
- *describe the expected nature and level of usage of the infrastructure*

A call for proposals for access to the unallocated IMOS capital items of equipment was issued in late 2007 and the proposals were formally assessed by the IMOS Steering Committee following a publicised list of criteria. All of the IMOS equipment has now been allocated. Another call for proposals will be issued in relation to the strategic review to be held in early 2009. It is the hope of the IMOS Office that the IMOS facilities can be extended if we find additional co-investments for the equipment already purchased. The goal is to extend deployments to all of the proposed activity that is given a high rating. This will require the purchase of gliders and radar systems, in addition to those already purchased with NCRIS funding.

All of the data collected by IMOS is openly and freely available in a timely manner to all users through eMII. This includes users for research, as well as operational activities such as BLUElink and seasonal climate forecasting and industrial applications. The highest priority for eMII is completing the framework to ingest and provide access to and interoperability across the IMOS data streams, then production of value-added products. Finally, in collaboration with NeAT researchers in future years will have access to commonly used marine and climate data libraries in an interoperable framework with the IMOS data streams.

## 7. Financial and Human Resources

- *summary of the expected funds on hand at the beginning and end of the period*
- *income and expenditure projections for the period of the Annual Business Plan including*
  - *expected NCRIS income*
  - *estimated interest income*
  - *expenditure of NCRIS Funds by organisation*

See **Attachment B**

- *expected co-investment income by organisation*
- *describe the expected level and nature of in-kind co-investment and its impact on the Project*

To be added at **Attachment B**

- *describe the staffing positions funded under the Project*

See the Facility Reports in **Attachment A**

## 8. Milestones

- *specify the Milestones to be achieved and the organisation responsible for achieving each Milestone during the period of the Annual Business Plan.*  
Detailed milestones for each facility are provided in facility reports in **Appendix A**. Below are the major milestones for the period of the business plan.
- *installation and commissioning of instruments/infrastructure*
  - Argo - array of over 150 active floats (CSIRO) Jun08
  - Argo - array of over 180 active floats (CSIRO) Jun09
  - SOOP Routine provision of pCO<sub>2</sub>, CPR, to eMII (CSIRO) Jun09
  - SOOP Routine provision of T/S, Chl data to eMII (AIMS) Jun09
  - SOOP Near real time SST and weather data from 4 vessels (BoM) Jun09
  - SOOP Routine transfer flux data from Southern Surveyor and Aurora Australis to eMII (BoM) Oct08
  - SOTS - construct and deploy operational version of platform 2. PULSE biogeochemical mooring (UTAS, CSIRO) Mar09
  - SOTS - complete construction of engineering test version of platform 1. SOFS meteorology mooring (UTAS, BOM, CSIRO) Sep09
  - ANFOG - Routine deployment of gliders in WA, SA, Tas, NSW (UWA) Jan09
  - AUV - Confirmation of plans for deployment in NSW, Qld and WA (SIMS) Oct08
  - ANMN - All National Reference Stations and coastal moorings installed (CSIRO, AIMS, SIMS, SARDI, CUT) Jun09
  - ACORN - systems operating in Qld, WA and SA (JCU) Dec08
  - ACORN - systems ordered for NSW, SA/VIC (JCU) Feb09
  - AATAMS - Complete all acoustic tracking installations (SIMS) Jun09
  - AATAMS - User access of tracking data from eMII (SIMS) Jan09
  - FAIMMS - Wireless sensor network operating at all GBR Locations (AIMS) Mar09
  - FAIMMS - data management jointly developed with eMII (AIMS) Dec08
- *staffing targets*
  - SOOP Appoint plankton analysts and P.Jackson replacement Jul08
  - SOOP Appoint pCO<sub>2</sub> staff Aug08
  - ANMN Appoint 3 technicians for mooring support (CMAR) Jul08
- *nature and level of usage of infrastructure*
  - eMII - Report on eMII MEST and data-flow workshop (UTAS) Jul09
  - Office - Report on National IMOS Data users workshop (UTAS) Jan09
  - eMII - All IMOS data streams including SRS data are reliably discoverable and available in a timely manner, dataflow processes fully communicated, and monitoring established to address blockages (UTAS) Jun09
  - eMII/NeAT – Prepare work-plan and initiate project Jul08

- *promotional activities*
  - Office - National IMOS data users workshop (UTAS)

Nov08

## **9. Confidential Information**

None of the material in this report is to be treated as confidential.

# **ATTACHMENTS**

## FACILITY PLANS

## A.1 – Argo Australia (Facility Leader: Dr Susan Wijffels)

**Status of the Project**

○ *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*  
 During the last 18 months, the international Argo program achieved its design target of having 3000 active floats globally. The challenge now is to ensure that the array remains complete and that density is uniform globally by continually reseeding areas where floats are sparse. The northern hemisphere bias in the global array is being slowly addressed but still remains. Through IMOS the coverage in the Australian sector is reaching design density.

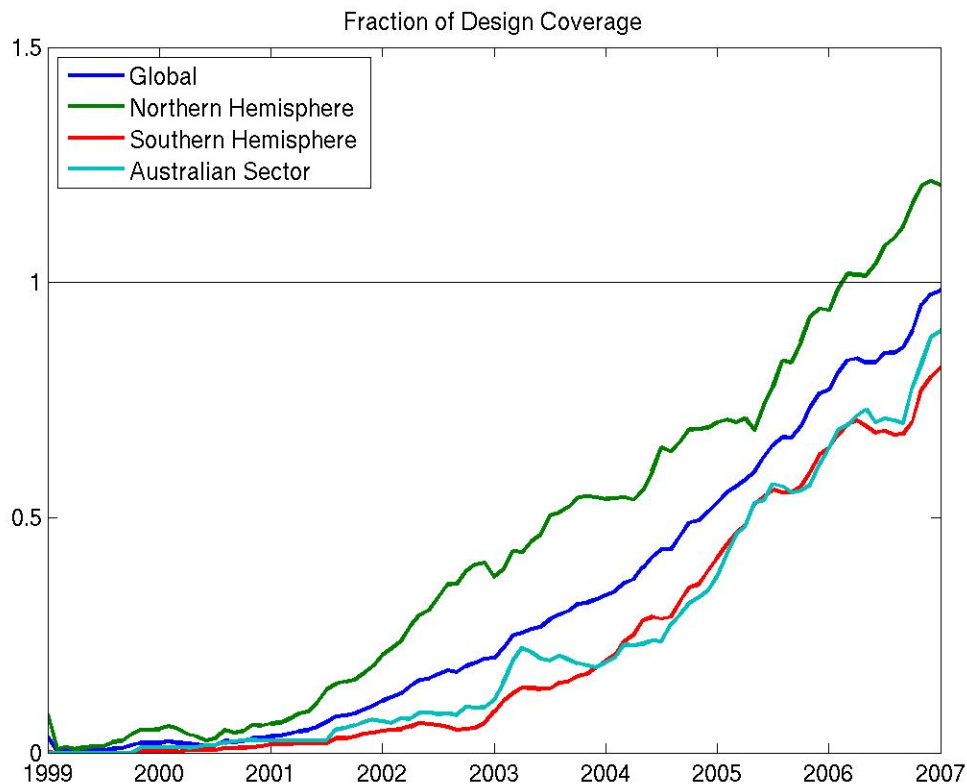


Figure caption: Time history of the fraction of design density reached by Argo averaged over various areas. A fraction of 1 means design density has been achieved. Globally averaged, Argo achieved design coverage at the end of 2007. Note, however, that the northern hemisphere is over-sampled and the southern hemisphere is under-sampled.

The CSIRO funded an additional 10 oxygen floats as a contribution to Argo Australia to help build capability in a pilot mode and support ocean biogeochemical science. Four of these floats have been deployed in the Southern Ocean. Sensor performance is looking promising, though a detailed quality-control method is yet to be created.

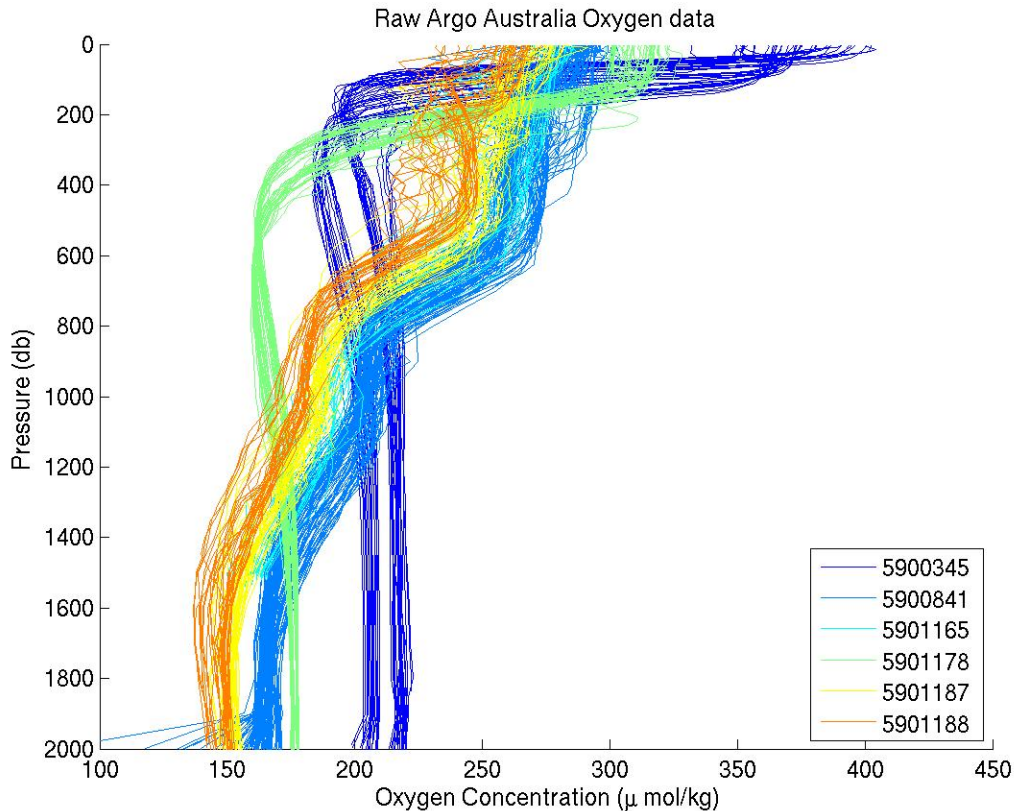


Figure caption: Raw oxygen concentration data from Australian floats equipped with oxygen sensors. Data look promising but quantitative evaluations are required.

The Argo Australia team hosted the International Argo Data Management Team (ADMT) in Hobart in November, 2007. The meeting was very successful and worked through many issues around improvements to the Argo data stream. Surrounding the meeting was good media coverage of the Argo 3000 float milestone and the awarding of the Sverdrup Medal to Dean Roemmich, who has provided international leadership for Argo since its inception.

**Facility Progress up to January 2007:** Between January 2007 and January 2008, 47 Argo floats were deployed by IMOS - thus we are largely on track to meeting our goal of deploying 50 floats per year. We currently have 83 floats in the laboratory or on ships about to be deployed. We expect to deploy > 40 of these in the next 3 months with further deployments in the Southern Ocean during the next summer season and as ship schedules become available. Precluding any unexpected technical issues, total deployments in the 08/09 reporting period should be well over 50 floats.

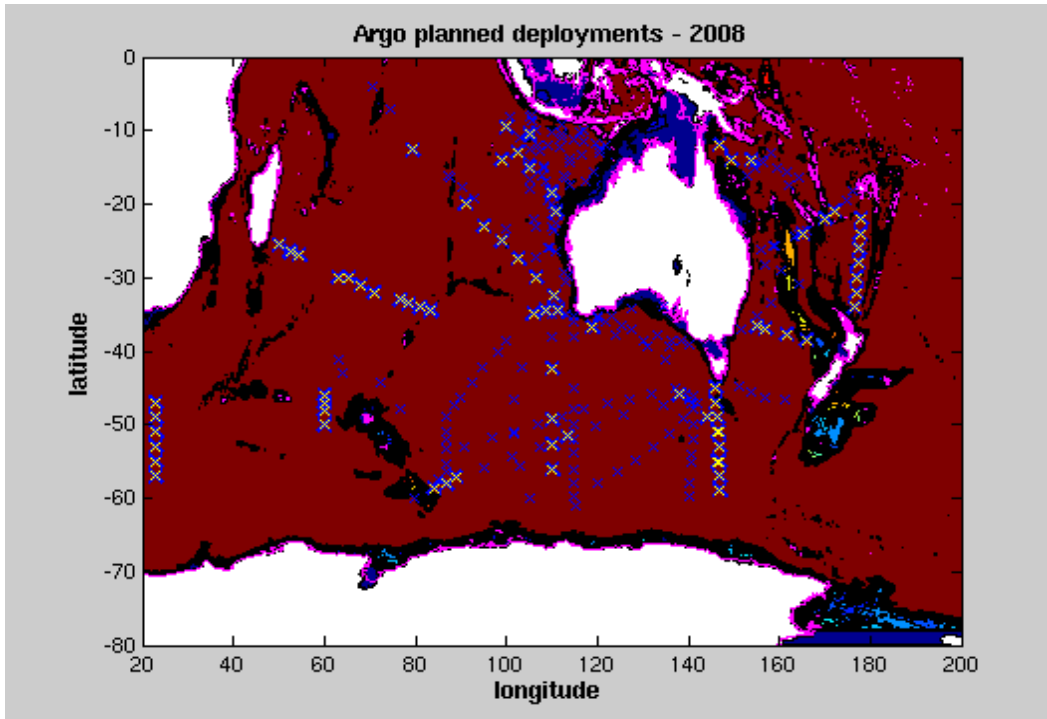


Figure caption: Yellow-white 'x' - planned deployment locations of fy 07/08 floats either on ships, in the laboratory or shortly to be delivered; blue 'x' – past deployments. Most Southern Ocean deployments can only be done in the Australian summer. Most deployments north of 40°S will take place in the next 3 months.

**Gaps opening up in the Southern Hemisphere:** While Argo has made tremendous progress internationally, the array density remains biased towards the Northern Hemisphere. While IMOS NCRIS has allowed coverage around Australia to grow towards design density, coverage in the SW Indian and central Pacific is inadequate. IMOS Australia has the opportunity to help fill some of these gaps, thus we have planned deployments out of African ports and around Kerguelan. In addition, we may participate in deployments further to the east in the central South Pacific to target large gaps in the array there.

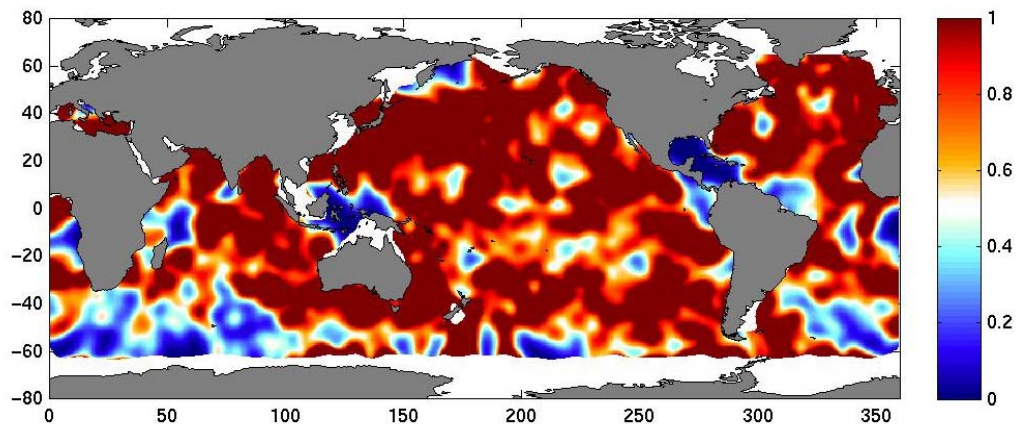


Figure caption: Argo density as a fraction of optimal design coverage in January 2008. Blue regions indicate where coverage is half or less of optimal.

**Operational Changes:** All floats now contain a full complement of lithium batteries, rather than mixed lithium/alkaline battery packs. The switch was made to: 1) avoid any premature float failures associated with alkaline cell reliability; and 2) to extend the life of the floats. Argo Australia has proved that APEX floats can profile usefully to 2000m for 5 years +.

**Problems solved in the last year:**

- 1) the manufacturer discovered a programming bug in the oxygen-equipped float software. Deployments are now delayed until the bug fix is tested and sent to us. However 4 floats were deployed with the bug.
- 2) we observed erratic reports by some recently deployed floats – deployments were halted, the manufacturer alerted and subsequently identified a software bug. The remaining floats were reprogrammed and we have received replacements for the deployed floats from the manufacturer.
- 3) lab. tests found faults in buoyancy bladder manufacture that required some floats to be returned to the manufacturer for repair. The manufacturer has changed their QA/QC procedures.
- 4) lab. testing found faulty batteries from one of our suppliers and this, along with observed unexpected early voltage drops in a particular float batch halted deployments while all batteries were re-tested. This has now been completed and we are satisfied our installed packs are all good. Deployments will recommence. Further lab tests will be carried out to identify the reason for the fast discharge of some floats in the field. All battery packs will now be load-tested before future installations. We continue to dialogue with the battery manufacturers on the causes of these failures.

Thus, the above problems have been either fixed or have been solved to our satisfaction and deployments will begin again in March 2008.

- *Outlook for future years:*
  - Pending no further unexpected technical problems, we aim to deploy approximately 50-80 floats in the next 18 months – this may allow us to reach our target of operating 240 active Australian floats earlier than planned.
  - With continuing support from CSIRO, we also expect to slowly increase our deployments of additional floats equipped with oxygen as part of the IMOS Argo program. Due to ongoing support from the ACE CRC for the core data quality control, there are good prospects for developing both Real-time and Delayed mode QC capability for the oxygen data stream.

**Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*
  - 50 standard mission Argo floats will be purchased, prepared and deployed.
  - A request to CSIRO for an additional 10 oxygen-equipped floats has been made
  - Budget savings on salaries, extended support from the ACE CRC for DMQC and capital (exchange rate) savings may allow us to purchase additional

## Promotion

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*
  - The national Argo meeting is held yearly in March/April and this is an opportunity to let our partner organizations know the state of the program and the NCRIS contribution
  - We will aim to improve the IMOS Facility website including examples of plots and uses of Argo data, and a link to the international Argo bibliography

## Access and pricing

- *Describe the expected nature and level of usage of the infrastructure:*
  - Increasing scientific utilization is evident, both nationally and internationally. In 2007 more than 50 peer-reviewed papers were published using Argo data. In particular, use by Australian PhD students is increasing.
  - Argo is the key *in situ* data stream for Australia's first operational ocean analysis and forecast system – BlueLink – which went 'live' in August 2007. The associated ocean re-analyses will also greatly facilitate research in many areas.
  - Thus both raw and gridded Argo data are available. It is, however, urgent that EMII be progressed so that these can be served centrally via the IMOS data portal.
- *(if applicable) Describe the intended processes to decide access and pricing for merit-based research:*
  - Access is free and open via the internet at the Global Data Assembly Centers and also locally from the IMOS Argo Facility page.

## Financial and Human Resources

- *Include here any explanatory notes on the budget provided in Attachment B*
  - 1) ACE CRC is able to continue to fund a DMQC operator for a further 2 years beyond 07/08. However our initial estimate of this cost was inflated as we assumed a much higher overhead rate than is actually charged at the University. This is an overall positive for the budget as it frees up a position on the NCRIS budget which we propose to use to fund the development of the Argo oxygen data stream.
  - 2) The portion of ACCSP funding going to Argo versus SOOP has changed, though the total support of \$700k for the joint activity is level funded through fy 08/09. After this year ACCSP will be replaced by a new program and funding is not secure.
  - 3) In fy 07/08 CSIRO purchased 10 standard and also 10 oxygen-equipped Argo floats. A request has gone in to repeat this in fy08/09, however we have only indicated the 10 standard floats in the forward budget.

- 4) In fy07/08 BoM was able to contribute 14 rather than 5 floats. The level of contribution in fy08/09 is unknown and we have assumed 5.
  - 5) Exchange rate savings on capital will continue to occur with the AUD rising against the USD. Rather than increase the number of standard Argo floats deployed we propose to purchase additional floats equipped with oxygen sensors, and solicit proposals via the IMOS Office on where these additional floats might be deployed in order to maximize science utilization.
- *Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan):*
    - Co-investment by BOM: at least 5 Argo floats at an estimated cost of \$100,000, plus staff as detailed below
    - Co-investment by RAN: an undetermined number of Argo floats plus deployment assistance in the form of shipping time, and staff to deploy floats.
    - Co-investment by CMAR: 10 Argo standard floats per year (\$190k). Addition request for oxygen floats may increase this to ~ \$380,000
    - Co-investment by CMAR/ACCSP: satellite communication costs: \$240,000 per year plus operating costs (travel, batteries, etc) to a total of ~\$500,000.
  - *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*

Funding Source	Description	FTE	Duration	Name
ACCSP/CMAR In-kind	Operational and data management	0.15	Ongoing	Ann Thresher
NCRIS	Operational and data management	0.40	Ongoing	Ann Thresher
BoM In-kind	Data management	.12	Ongoing	Lisa Cowen
NCRIS	Argo Engineer	1.0	Ongoing	Vito Dirita
NCRIS	Data management	1.0	2007-08	Tseviet Tchen
ACE CRC In-kind	Data management	1.0	Ongoing	Esmee Van Wijk
NCRIS	Argo Technician	.1	Ongoing	Peter Jackson
NCRIS	Argo Technician	1.0	Ongoing	Bob Weldon
NCRIS	Program oversight	.1	Ongoing	Susan Wijffels
NCRIS	Data stream devel.	.75	2008- on	Jeff Dunn

#### **Milestones – completed, current period and remaining period of project**

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
<b>To be completed by 30 June 2008</b>				
Be operating an Argo array of over 150 active floats	CSIRO	12	Jul07	Jun08
<b>During the period of the Annual Business Plan</b>				
Be operating an Argo array of over 180 active floats	CSIRO	12	Jul08	Jun09

## **A.2 – Enhancing Measurement Programs from Ships of Opportunity (Facility Leader: Ken Ridgway)**

### **A.2.a Multi-disciplinary Underway Network (Sub-Facility Leader: Ken Ridgway)**

#### **Status of the Project**

##### *o Highlights,*

- New Devil Data Acquisition systems, laptops and transmitters have been purchased and deployed on our ships, giving us redundancy for the first time.
- New software written by Lindsay Pender which incorporates enhancements, simplifications and has eliminated known bugs.
- Tested Iridium data transmission in real time. Real time data transmission is not yet operational but we expect it to be so in the next 3 months. We still need to purchase 3 iridium transmitters; this will occur in the next 2 months.
  
- The pCO<sub>2</sub> system was purchased and delivered in late April 2007.
- The pCO<sub>2</sub> system was installed on Southern Surveyor, and the data is being delivered daily to CMAR for processing, with a near real time data display made available through the National Facility web site.
- A user interface for preliminary QC of data has been written and is now used to check the data delivered from the ship each day.
- Software for final QC of data has been written and is awaiting testing.
  
- Employed 0.75 FTE (Frank Coman) to organize logistics for AusCPR
- Plankton analysis training already started
- 2 Continuous Plankton Recorders (CPRs) have been built by the Australian Antarctic Division
- Equipped a plankton counting laboratory in Cleveland
- Advertised for 2.5 plankton analyst positions to be based at the Australian Antarctic Division (AAD). These position will be filled in the next month
- Design for winches and hauling A-frame for ships
- Routine Continuous Plankton Recorder tows this year

##### *o Difficulties*

- A major challenge has been the retirement of our senior technical officer after illness – he is still working with us but expects to be fully retired by March 2009, after taking his long service and recreation leave entitlements. We now have his replacement position approved, have piggy-backed on the selection process for a seagoing electronics technician already advertised and have selected a replacement. We are therefore on track to maintain intellectual continuity through overlapping of the technician and his replacement. Given that this overlap is likely to occur next year, we are facing some budget constraints. We will have significant excess funds in this year's labour budget because sick leave is not charged to the projects but if this cannot be carried

over, we will potentially have a deficit next year. This probably is manageable but carry-over of labour in this case would be beneficial.

- A few components in the system were not suitable for coastal tropical waters with high particle loads and these have been replaced. The ship's water supply is still being optimized for the pCO<sub>2</sub> system.
  - Some delays in the development of data processing software for the pCO<sub>2</sub> system have resulted from late release of funds to do the work at CMAR.
  - Late project signing and money available have delayed work in the CPR system
  - There have been difficulties in contract negotiations with AAD
  - There have been delays in the appointing of staff at CSIRO, as there have been protracted discussions about whether they should be AAD or CSIRO employees
- *Breakthroughs*
    - An agreement negotiated between CSIRO and AAD
    - Staff issues sorted out (staff will be CSIRO employees but based at AAD), and the first staff member has been appointed
    - Designs for CPR towing equipment has been completed
  - *Outlook for future years:*
    - The new XBT technical officer is proficient in both electrical and mechanical design. We therefore envision him taking on the project of building an autolauncher to integrate with the devil data acquisition system. This will be a valuable addition to our on-board equipment, allowing the operator to load multiple probes with the computer performing data quality checks and controlling the launch of scheduled and repeat XBTs.
    - XBT data collection, QC and delivery will be on-going.
    - Training in plankton analysis has already happened for the first staff member appointed, but will continue for him and the remaining staff members in the future
    - Effort will go into further integration with international programs such as the North Atlantic CPR survey

### **Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*
  - We expect to occupy 4 high density XBT sections on each of 2 Tasman Sea lines in 2008-2009. We also intend to undertake 6 sections on the Antarctic resupply run to Durmont d'Urville. We will continue to provide logistic support to all Australian XBT high density sampling lines and the line PX15, funded by Scripps Institution of Oceanography; it is possible that one of our staff will ride this ship, collecting high density data.
  - By July 2008 we expect to have the pCO<sub>2</sub> data processing complete and data being delivered routinely.
  - CPR routes will be operational by end of 2008

## **Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*
  - Susan Wijffels and Ann Thresher will attend the Ocean Sciences 2008 conference to present papers deriving from the XBT data.
  - Both will also attend an XBT fall rate workshop which will address concerns about delayed mode QC of XBT profiles and the use of such profiles for climate research.
  - Ann Thresher will attend the Ship Operations Team meeting in early 2009.
  - The annual National SOOP meeting will also showcase the contribution of NCRIS to our national capability in this area.
  - Presentation to relevant State Governments in 2009 of operational system
  - Presentation of work at both an international and a national conference (AMSA)

## **Access and pricing**

- *Describe the expected nature and level of usage of the infrastructure:*
  - Pricing is free and data is provided through the US NODC, Australian AODC and the Global Telecommunications System (GTS) in real-time. It will also be provided through EMII. This data is accessed daily by international and national MET offices.

## **Financial and Human Resources**

- *Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan):*

Co-investment remains as projected:

  - \$207,360 from Scripps in the form of XBTs for our high density and frequently repeated sampling.
  - \$96,000 from RAN in the form of XBTs for the high density sampling lines.
  - RAN's co-investment level is expected to remain the same through the end of the program.
  - \$50,000 from BOM for XBTs for the frequently repeated XBT lines – this is up on the original estimates.
  - \$5,000 communications costs in-kind from BOM
  - \$17,000 for ship greeting/PMA costs from BOM
  - Plus in-kind salary, overheads and duty at sea (see below)

- Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):

Staffing detail for FY 0809

Funding Source	Description	FTE	Duration	Name
NCRIS	Data management	0.25	Ongoing	Ann Thresher
BoM In-kind	Data management	0.1	Ongoing	Lisa Cowen
ACCSP/CMAR In-kind	SOOP Technician	0.25	Ongoing	Peter Jackson
CMAR In-kind	XBT Coordination	0.20	Ongoing	Ann Thresher
BoM In-kind	Data management	0.02	Ongoing	Claire Spillman
CMAR	Equipment setup, testing	0.3		Bronte Tilbrook
CMAR	Data management	0.4		John Aki
CMAR	Equipment setup	0.3		Toby Paterson
NCRIS	Logistics	0.75		Frank Conan
NCRIS	Plankton Analyst	1.0		Advertised
NCRIS	Tow logistics	0.1		Peter Jackson
NCRIS	Plankton Analyst	1.0		Advertised
NCRIS	Plankton Analyst	0.5		Advertised

**Milestones – completed, current period and remaining period of project**

- Devil systems were purchased in late 2007 and are now operational. All high density XBT voyages now have redundancy and are providing reliable data.
- All high density XBT lines have been undertaken on schedule, the data qc'd and delivered to the national and international data centres in both real-time and delayed mode. All 2007 data was delivered in early Jan 2008.

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
<b>Expected to be completed by 30 June 2008</b>				
Develop software for transmission of XBT data in real-time	CMAR	4	Jul 07	Jun08
New XBT Data Acquisition systems, laptops and transmitters purchased and deployed.	CMAR		Jul 07	
Routine collection, QC and delivery of XBT data	CMAR	12	Jul 07	Jun 11
Replacement XBT technician recruited				
Purchase and install pCO2 system on Sth Surveyor	CMAR			

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
Daily collection and processing of pCO <sub>2</sub> data – near-real time data stream available through the National Facility web site.	CMAR			
Complete acquisition and installation of CPR systems	CSIRO/AAD	8	10/2007	6/2008
Complete recruitment and training of staff for AusCPR	CSIRO/AAD	8	10/2007	6/2008
Complete negotiation with shipping companies for AusCPR deployments	CSIRO/AAD	6	1/2008	6/2008
Establish CPR laboratories (Cleveland)	CSIRO/AAD	8	10/2007	6/2008
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Routine collection, QC and real-time delivery of XBT data	CMAR	12		
Recruit staff for pCO <sub>2</sub> data collection and processing				
Routine pCO <sub>2</sub> data processing, and real-time delivery				
Complete CPR deployment	CSIRO/AAD	12	6/2008	6/2009
Routine collection and counting of CPR data	CSIRO/AAD	12	6/2008	6/2009
Routine provision of data to eMII	CSIRO/AAD	12	12/2008	ongoing
<b>During the remaining term of IMOS (July 2009 to June 2011)</b>				
Routine instrument maintenance, calibration, data collection, sample counting, and databasing of data (ongoing)	CSIRO/AAD	24	7/2009	6/2011

## **A.2.b Sensors on Tropical Research Vessels (Sub-Facility Leader: Miles Furnas)**

### **Status of the Project**

#### ○ **R.V. Cape Ferguson**

- Piping and electricals for underway system installed during refit in July 2007
- Thermosalinograph (SBE21) and chlorophyll sensor (WetLabs EcoFLNTU) and associated computing gear installed in October 2007 during AIMS Bio Ocean group cruise. Difficulties occurred during installation due to mis-wired cable supplied with instrumentation.
- First operational test – November 2007 – unsuccessful as the dedicated seawater pump became jammed with debris. Somehow, debris was being sucked into the vessel sea chest and was ingested by pump. Pump removed, cleaned, tested and replaced. Plans made to fit additional strainer in seawater line to underway pump at earliest opportunity.
- Operational test planned for 12-24 Feb cruise to Keppel Bay by AIMS Bio Ocean group- Burdekin and Fitzroy river plumes

#### ○ **R.V. Solander**

- Plumbing and electrics installed during construction – 2007
- Start to installation planned for April 2008 when vessel came over to east coast. Ship schedule changed late 2007 for continuous work in NW over next 3 years on externally funded contract.
- Visit to ship in Broome by engineer – Feb 2008 to inspect underway system pump/plumbing/electricals and to measure up ship for SBE21 installation in wet lab. Installation planned for mid-June 2008 when Bio Ocean group gets first cruise on Solander – ex Broome.
- Computing gear for underway system to be purchased in Feb 2008
- Development of data management system – planned for Feb-Apr 2008 when GBROOS data manager on-board at AIMS and working on data systems.
- Operations manual for underway system and data logging written for routine use on Cape Ferguson – to be adapted to other ships (Solander, Heron Island Ferry) as those systems are installed.

#### ○ **Outlook for future**

- R.V. Cape Ferguson – system should be operational from March 2008 (slight delay - plumbing)
- R.V. Solander – system operational from July 2009 (barring hang-ups during installation). Remote location of vessel will delay progress of ad-hoc repairs or changes due to ship schedule and operations ex-Broome and ability of necessary personnel to access ship in a timely and cost-effective manner.

Instruments to be set up so relatively little training required to operate system (ship's crew or other scientific parties)

Formal protocols for ongoing calibration to be devised and implemented – Feb-June 2008

**Research infrastructure**

- Cape Ferguson operational from March 2008, Solander operational from July 2008 (nominal)

**Promotion**

- Announcement to IMOS community through IMOS network when systems operational and data in pipeline. Need to find a way to make ship-schedule and areas of operation more accessible to allow potential users to see when and where ships will be operating
- Attendance at underway systems workshop in Seattle, June 2008 (planning in process)

**Access and pricing**

- *Usage* – ad hoc, or by request
- *Pricing* – free
- *Time frames for access* – dependent upon development of data system to get validated data into the IMOS data system
- *Describe the intended processes to decide access and pricing for merit-based research:* - unresolved at present, likely via email or web query to Townsville-based IMOS data manager
- *Describe the intended processes to decide access and pricing for other than merit based processes:* - unresolved at present, likely via email or web query to Townsville-based IMOS data manger

**Financial and Human Resources**

- *Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan):* Ongoing support of instruments aboard AIMS research vessels by vessel crews and AIMS IT personnel for computer support and data system management.
- *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*
  - 0.5 FTE for technical support person (day-to-day management, data assimilation, validation)
  - 0.05 FTE (in kind) – Overall project management.

Staffing detail for FY 08/09

Funding Source	Description	FTE	Duration	Name
NCRIS	Technical Support	0.5	ongoing	
AIMS	Project Management	0.05	Ongoing	

**Milestones – completed, current period and remaining period of project**

- *Installation and commissioning of instruments / infrastructure* – generally on target (Cape Ferguson: pump clogging, fix underway) or with slight delays (Solander: due to changes in vessel operations outside of our control).
- *Staffing targets* – on target
- *Nature and level of usage of infrastructure* – slight delay due to equipment failure (pump – see above).
- *Financial targets* – on target
- *Levels of co-investment*– on target
- *Promotional activities* – pending operationalization

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
<b>Expected to be completed by 30 June 2008</b>				
Underway thermosalinograph/chl system on R.V. Ferguson operational	AIMS			
Data system for underway thermosalinograph system operational	AIMS			
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Underway thermosalinograph/chl system on R.V. Solander operational	AIMS			Nov 08
Ongoing calibration and validation of underway systems	AIMS			Ongoing
Routine maintenance of underway system on R.V. Ferguson during refit	AIMS			Jun 09
Completion of annual report on activities				
<b>During the remaining term of IMOS (July 2009 to June 2011)</b>				
Ongoing calibrations and validation of underway systems	AIMS			Ongoing
Routine maintenance of underway system on R.V. Ferguson during refit	AIMS			June
Routine maintenance of underway system on R.V. Solander during refit	AIMS			June
Completion of annual reports.				

## **A.2.c Sea Surface Temperature Sensors (Sub-Facility Leader: Helen Beggs)**

### **Status of the Project**

○ *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*

#### Highlights:

- BoM: Purchased and tested (in the instrument calibration lab) two SeaBird SBE48 hull-contact temperature sensors. Purchased two pairs of data transmission power modems and tested on Spirit of Tasmania II. Expect to purchase the remaining the remaining 9 SBE48 sensor units by end of June 2008. Expect to fit one hull-contact system on Spirit of Tasmania II and possibly Southern Champion by end of June 2008.
- BoM: Employed Ruslan Verein as IMOS Marine Observations Support Scientist on 21 Nov 2007.
- BoM: Planning quality control and data transmission system for hull-contact temperature data.
- BoM: BoM subcontract with AIMS signed.
- CMAR: Refurbished SST measurement system and the associated data logger have been installed on Rottneest Island Ferry and are undergoing commissioning.
- CMAR: Planning near real-time (daily) data transmission system to eMII via BoM. Should be operational by July 2008.
- AIMS: A thermosalinograph for the Heron Island Ferry was purchased and received at AIMS in June 2007. The instrument is a SBE Seacat 21 Thermosalinograph (\$18,875 capital expenditure). BoM has been invoiced and payment sent to AIMS in Jan/Feb 2008.
- AIMS: Planning real-time data transmission system to eMII via BoM. Aiming to deliver test and operational data sets to BoM and eMII by June 2008.
- AIMS: Installation of the *Fantasea* Whitsunday Radiometer and bulk SST system is planned for February 2008. Electrical cabling had been severed during a re-fit and so unexpected work was required.
- AIMS: Negotiations with Voyage Marine's Heron Island ferry were positive and they plan to install the thermosalinograph by May 2008. Some teething problems were apparent on a similar underway system on the AIMS Research vessels and so AIMS prefers to delay installation until these problems are resolved.

#### Difficulties:

- CMAR not yet sent letter of understanding to BoM so unable to pay them IMOS funds for FY07/08.
- Technical problems with power modems mean they may not function on all AVOF vessels. BoM has contacted manufacturer for a solution.

- *Outlook for future years:*
  - BoM: All AVOF vessels fitted with functioning Automatic Weather Stations will be fitted with hull-contact sea surface temperature sensors. This data will be transmitted in real-time to BoM where it will be QC'd in real-time and placed on the Global Telecommunications System (GTS) and made available to eMII.
  - CMAR: Ensure the data quality of Rottneest Island ferry SST data is maintained and develop long-term data archives. The possibility of including other parameters in the data stream will be investigated if sufficient funding is available to augment the measurement system.
  - AIMS: Plan real-time SST data transmission to be operational by July 2008 and focus will be on QA, QC and timely data delivery.
  - AIMS: Will investigate ways to improve continuity of Whitsunday SST data as the Radiometer will need regular servicing back in the lab.

### **Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*
  - BoM: Expect to fit 6 to 7 vessels with the hull-contact temperature sensor systems subject to surveying the vessels for data transmission on board via power modems.
  - CMAR: Complete the quality control of the near real-time transfer and continue to ensure regular calibration and validation of the ferry system.
  - AIMS: Continue to ensure regular calibration and validation of the ferry system.
  - AIMS: Expect instrumentation to be fully operational by July 2008.

### **Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*
  - BoM: Beggs to present IMOS 2c work at 9<sup>th</sup> GODAE High Resolution Sea Surface Temperature Pilot Project (GHRSSST-PP) Science Team Meeting, France, June 2008.
  - AMOS 2009 Meeting, Melbourne, Feb 2009.
  - AIMS: Media release to launch the Heron thermosalinograph.
  - AIMS: GBROOS seminar by Bainbridge at ICRS in Florida, July 2008

### **Access and pricing**

- *Describe the expected nature and level of usage of the infrastructure:*

The SST data from the AVOF and ferries will be available in real-time and near real-time via both the GTS and IMOS eMII (via the web). Australian researchers will access the data via eMII whereas international meteorological agencies (eg. NOAA, Met Office, Meteo-France) will access the data from the GTS (for real-time SST analysis systems and satellite SST validation).

The BoM will use the SST data in real-time for validation of satellite SST products, analyses and ocean forecasts. In this way, the data will have direct impact on

improving the accuracy of the Bureau's ocean analysis and forecast system and its Numerical Weather Prediction models.

- *(if applicable) Describe the intended processes to decide access and pricing for merit-based research:*  
The data will be made freely available through eMII, GTS and AIMS.

### **Financial and Human Resources**

No significant change from the approved budget

- *Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan):*  
BoM: Coinvestment to this sub-facility has increased due to the necessity of more technical and scientific personnel support than originally envisaged. (See IMOS financial acquittal for sub-facility 2c for FY07/08 and ABP Budget Details).  
AIMS: Plan to meet or better the current levels of co-investment of an on-going \$5,000 pa. Will look at improving the systems as more knowledge is gained on their operability.
- *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*  
**NCRIS funded:** Ruslan Verein (Marine Observations Scientist): 0.1 FTE from 1 Jan 2008 to Jun 2011.

#### **BoM in kind co-investment:**

Helen Beggs 0.2 FTE over year  
Brenda Coutinho 2.5 days  
Ross Hibbins 0.01 FTE over year  
Murray Turner 5 days  
Alan Thomas 15 days  
John Gorman 10 days  
Lisa Cowen 6 days  
Peter Dexter 2 days  
Margaret Hughes 2 days

#### **AIMS in kind co-investment:**

Mike Mahoney 0.35 FTE over year  
Craig Steinberg 0.05 FTE over year  
Engineering and Oceanographic workshops 0.10 FTE over year

Staffing detail for FY 08/09

Funding Source	Description	FTE	Duration	Name
NCRIS	Data management	0.1	Ongoing	Ruslan Verein
BOM		0.2	Ongoing	Helen Beggs
BOM	Assorted Tasks		32 days	6 staff
AIMS		0.35	ongoing	Mike Mahoney
AIMS		0.05	ongoing	Craig Steinberg
AIMS	Engineering	0.1	ongoing	

**Milestones – completed, current period and remaining period of project**

<b>Activity</b>	<b>Responsible Organisation(s)</b>	<b>Duration (months)</b>	<b>Start</b>	<b>Finish</b>
<b>Expected to be completed by 30 June 2008</b>				
Initial construction and integration of one hull-mounted temperature sensing system into an existing AWS system, including calibration	BoM	9	Sep 07	Jun 08
Installation of up-to-date devices and data transmission systems on the Rottneest ferry and a new ferry (Whitsunday Ferry)	CMAR/AIMS	12	Jul 07	Jun 08
Installation of the hull-mounted temperature sensing system on a Bass Strait ferry (including validation)	BoM	3	Apr 08	Jun 08
Recruitment and completed training of staff for air/sea flux data management	BoM	4	Sep 07	Dec 07
Software for transmission of data to eMII developed for all new installations	BoM/AIMS/CMAR	6	Jan 08	Jun 08
Completed on-board, at sea testing of all newly purchased equipment and final design of all installations	BoM/AIMS/CMAR	6	Jan 08	Jun 08
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Ongoing construction, integration installation and calibration of hull-mounted SST systems into other existing AWS systems	BoM	12	Jul 08	Jun 09
Assessment of SST data quality from temperature sensors and ongoing data management	BoM/AIMS/CMAR	12	Jul 08	Jun 09
Ongoing ship-based instrument maintenance	BoM/AIMS/CMAR	12	Jul 08	Jun 09
Produce near real-time QC'd data files from 3 ferries and at least one AVOF vessel in eMII-compliant format	BoM/AIMS/CMAR	12	Jul 08	Jun 09
<b>During the remaining term of IMOS (July 2009 to June 2011)</b>				
Ongoing construction, integration installation and calibration of hull-mounted SST systems into other existing AWS systems	BoM	24	Jul 09	Jun 11
Assessment of SST data quality from temperature sensors and ongoing data management	BoM/AIMS/CMAR	24	Jul 09	Jun 11
Ongoing ship-based instrument maintenance	BoM/AIMS/CMAR	24	Jul 09	Jun 11
Produce near real-time QC'd data files from 3 ferries and 8 to 10 AVOF vessels in eMII-compliant format	BoM/AIMS/CMAR	24	Jul 09	Jun 11

## **A.2.d Research Vessel Real Time Air-Sea Fluxes (Sub-Facility Leader: Eric Schulz)**

### **Status of the Project**

- *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*

#### Highlights

- Most of the meteorological equipment was purchased and delivered to the ship operators by the end of 2007
- Preliminary routine transmission of Southern Surveyor (SS) underway data was achieved by the end of 2007
- Completed mechanical work on SS foredeck to support power and data infrastructure.
- Employed real-time data management - product development staff at BMRC, @ 0.5 FTE commencing January 2008
- Real-time data management staff has commenced building the data management system
- Arranged to visit Shawn Smith at Florida State University in April 2008 to discuss detail of linking IMOS project 2d into the international program: the Shipboard Automated Meteorological and Oceanographic System (SAMOS) initiative (<http://samos.coaps.fsu.edu/html/>).
- Expect to have all instruments (except the ORG) installed and data transmitted routinely by June 2008
- Expect to have radiometers installed and data transmission available for the 0809 cruise season (commences spring 2008)

#### Difficulties

- Change of staff at the Australian Antarctic Division (AAD) has lead to a potential renegotiation of the in-kind co-investment that AAD can make to IMOS project 2d with regards to installing instruments on the Aurora Australis (AA).
- Slow, patchy and sometimes non-existent response from the Optical rain gauge (ORG) suppliers (Optical Scientific Inc.) has lead to delays with purchasing the ORGs. This may cause delays in installation and integration of the ORGs onto the ships.

#### Breakthroughs

- AAD have agreed to perform work up to the dollar value agreed in the initial IMOS proposal, although this may not cover all the work required to complete the system.

- *Outlook for future years:*

- From 2009 onwards the project only involves maintenance and operation of the system

- Once the data management system has been implemented, work will focus on generating value added products like air-sea fluxes and enhancing the QC system
- Effort will go into further integration with international programs such as SAMOS

### Research infrastructure

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*
  - There will be some delay installing a complete system on AA. The ORG installation may be delayed due to supplier problems and potential increase in cost of AAD to install and integrate instrument on the AA. Expect complete system by end of 2008
  - We are not anticipation any major problems with operating the system once installation/integration is complete.

### Promotion

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*
  - Attend the 2nd Joint Global Ocean Surface Underway Data (GOSUD)/SAMOS Workshop.
  - Presentation at international/national conferences

### Access and pricing

- *Describe the expected nature and level of usage of the infrastructure:*
  - Pricing is free and access provided by EMII as set by IMOS

### Financial and Human Resources

Staffing detail for FY 0809

Funding Source	Description	FTE	Duration	Name
NCRIS	Data management	0.5	Ongoing	Ruslan Verein
BoM In-kind	Project Oversight	0.15	Ongoing	Eric Schulz
BoM In-kind	Project Management	2 days pa	Ongoing	Peter Dexter
BoM In-kind	Administration	1 day pa	Ongoing	Margaret Hughes

### Milestones – completed, current period and remaining period of project

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
<b>Expected to be completed by 30 June 2008</b>				
Purchase Instruments	BoM	6	10/2007	4/2008
Install and integrate instruments on Southern Surveyor	BoM	6	1/2008	6/2008
Complete system to routinely transfer of data from Southern Surveyor	BoM	6	1/2008	6/2008

<b>Activity</b>	<b>Responsible Organisation(s)</b>	<b>Duration (months)</b>	<b>Start</b>	<b>Finish</b>
Completed real-time data management system	BoM	6	1/2008	6/2008
Data provided to EMII	BoM	2	4/2008	6/2008
Employ IMOS real-time data management staff	BoM	6	7/2007	1/2008
Attend international workshop/meeting for SAMOS	BoM	1	4/2008	4/2008
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Install and integrate instruments on Aurora Australis	BoM	6	4/2008	10/2008
Complete system to routinely transfer of data from Aurora Australis	BoM	6	4/2008	10/2008
Generate value added air-sea flux products	BoM	12	7/2008	6/2009
Improve data quality control system	BoM	12	7/2008	6/2009
Attend international workshop/meeting for GOSUD/SAMOS	BoM	1	7/2008	7/2008
<b>During the remaining term of IMOS (July 2009 to June 2011)</b>				
Routine instrument maintenance and calibration (ongoing)	BoM	24	7/2009	6/2011

## **A.3 - Southern Ocean Time Series (Facility Leaders: Tom Trull and Eric Schulz)**

### **Status of the Project**

- *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*

The IMOS Southern Ocean Time Series incorporates 5 platforms:

1. Southern Ocean Flux Station (SOFS) Meteorological mooring
2. Pulse biogeochemical mooring
3. Glider transects to/from site – funded via Australian National Facility for Ocean Gliders (ANFOG)
4. Tethered profiling float
5. Deep ocean sediment trap moorings (in-kind contribution only)

While the platforms are separate, they are intended to work in combination to enhance the overall data stream, including providing some redundancy. Thus, while the most comprehensive set of biogeochemical instruments will be deployed on platform 2, some biogeochemical measurements are planned for all platforms. Similarly, some of the physical variables, which are the focus of platform 1, will also be collected from the other platforms (e.g. current meters on platforms 2 and 5 and CTD profiles from platforms 3 and 4).

Progress and plans are detailed platform by platform below. In brief, for Platform:

1. design work has progressed, with construction to be provided by Woods Hole Oceanographic Institution for deployment of an engineering test in 2009.
2. an engineering test version was deployed in Dec. 2007 and will be recovered in April 2008. Provided the test is successful the instrumented mooring will be deployed in ~Oct. 2008.
3. glider deployments were designed to provide spatial context to the fixed point time series observations, and will not be pursued until platform 1 or 2 is operational
4. the profiling float will be purchased in the next few months, with mission and tether engineering scheduled for late 2008.
5. the deep sediment trap mooring was successfully recovered in late 2007, and will next be deployed when platform 1 or 2 is operational.

Highlights:

#### Platform 1

- Revised plans for platform 1 so that an engineering test mooring will be built and deployed for 3-6 months to evaluate performance. If successful, the scientific payload will be added and a full deployment initiated.
- Completed negotiations with CMAR for the development of the motion reference unit, associated data logging and transmission system, and interface for the tension cell for platform 1
- Progressed plans for a Pulse type scientific package to be mounted in the platform 1 surface float

#### Platform 2-5

- Following the loss of the instrumented PULSE mooring in Jan. 2007 we redesigned the sub-surface buoy configuration (for details see the document

“A short History of Pulse” under the SOTS facility on the [www.imos.org.au](http://www.imos.org.au) website. We redeployed the mooring in Dec. 2007 in a reduced configuration for further engineering tests. This mooring is currently intact and reporting its surface position via the Iridium network every 4 hours, and is scheduled for recovery for engineering evaluation in April 2008. If the test is successful, the scientific instruments will be added and the mooring deployed in spring 2008 from Aurora Australis.

- MNF/SSurveyor proposal for shiptime support for 1 visit to the SOTS moorings in 2008-9 was awarded (but see Difficulties below).
- AAS/AAustralis proposal for shiptime support for 1 visit to the SOTS moorings was awarded for 2008-9.
- Submitted a MNF proposal for shiptime support for 2 visits to SOTS moorings in the 2009-10 season.

#### Difficulties

##### Platform 1

- Ran into major administrative roadblock with federal government contract procurement regulations for platform 1. Open tender process should be followed for large government department contracts. Exemptions are available for prototype/development type equipment contracts, but the Bureau is generally reluctant to use exemptions. A number of months were spent applying for the open tender exemption.

##### Platform 2-5

- The motion reference unit deployed on the mooring did not report via the Iridium network. Hopefully it is still logging the motions and this data will be recovered on recovery in April 2008.
- The previously awarded Marine National Facility on Southern Surveyor to service the SOTS mooring in March 2009 is in jeopardy owing to recent budget cuts at ministerial level to the MNF.

#### Breakthroughs

- Open tender exemption was granted for platform 1, allowing contract negotiations to resume with WHOI
  - In Feb. 2008, we hired Joe Adelstein at 40% FTE at IMOS-UTAS to serve as the managing engineer for SOTS platforms. This has gotten the project management moving.
- *Outlook for future years:*
- Deployment milestones for platform 1 have slipped by approximately 6 months.
  - Beyond June 2008 platform 1 will be completed and trial and full deployments commence
  - Deployment milestones for platform 2 have slipped by approximately 12 months owing to the mooring loss in 2007.

### **Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*
  - Platform 1 construction will be completed by early 2009
  - Platform 1 test deployment is scheduled for April 2009 and full deployment late 2009
  - Platform 2 PULSE deployment for a first season of observations (~Oct. 2008 to ~ April 2009)
  - Platform 3 GLIDER – application will be submitted to ANFOG after Pulse is successfully deployed and operational.
  - Platform 4 TETHERED FLOAT – sensor and mission programming will be completed in this period. Tether design will be evaluated. Float may be deployed untethered to gain experience with data-stream while tether development continues.
  - Platform 5 SEDIMENT TRAP mooring – will be prepared for deployment in Oct. 2008 – but only deployed in Platform 2 is operational for deployment at same time.

### **Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*
  - Continue liaison with OceanSITES program, including attending workshops
  - Promote IMOS at international and national conferences

### **Access and pricing**

- *Describe the expected nature and level of usage of the infrastructure:*
  - Expect platform 1 flux data will be heavily used by local and international climate community
  - Platform 5 samples are already heavily used (several publications/theses per year). Expect platform 2 sensor and sample will receive similar use. Platform 3 and 4 data use will depend on mission success with Glider and Float.

## Financial and Human Resources

Staffing detail for FY 0809

Funding Source	Description	FTE	Duration	Name
<b>Platform 1</b>				
BoM In-kind	Project Oversight	0.15	Ongoing	Eric Schulz
BoM In-kind	Project Management	2 days pa	Ongoing	Peter Dexter
BoM In-kind	Administration	1 day pa	Ongoing	Margaret Hughes
<b>Platform 2-5</b>				
NCIRS	Proj. Management	0.4	Feb. 08- Feb. 09	Joe Adelstein (UTAS)
ACE in-kind	Project Management	0.5	Ongoing	Tom Trull (ACE)
ACE in-kind	Deployment Tech	0.5	Ongoing	Steve Bray (ACE)
NCRIS	Mech. Eng. Support	~1	advertised	(CMAR)
NCRIS	Electro. Eng. Support	0.5	advertised	(CMAR)
NCRIS	Instrument support	~0.5	To be sourced	(CMAR)

## Milestones – completed, current period and remaining period of project

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
<b>Expected to be completed by 30 June 2008</b>				
Completed design phase of platform 1 at WHOI	BoM	12	3/07	3/08
Commenced build phase of platform 1 at WHOI	BoM	3	3/08	
Completion of Platform 2 Test	CMAR	6	12/07	05/08
Specification of Platform 2 Sensors and Integration	CMAR	4	02/08	06/08
Specification of Platform 4 Sensors and Mission	UTAS	2	02/08	04/08
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Complete engineering test version of platform 1 at WHOI	BoM	10	7/08	4/09
Deploy engineering test version of platform 1	BoM	6	4/09	9/09
Deploy operational Platform 2	CMAR	5	10/08	03/09
Apply for ANFOG support for Platform 3	UTAS	1	11/08	12/08
Test Platform 4	CMAR	1	12/08	01/09
<b>During the remaining term of IMOS (July 2009 to June 2011)</b>				
Employ real-time data management staff at 0.4 FTE	BoM	24	7/09	6/11
Complete full version of platform 1 at WHOI	BoM	6	4/09	9/09
Deploy full version of platform 1 (12 or 6 month deployment)	BoM	12	9/09	9/10
Provide data from platforms 2-5	CMAR-UTAS	ongoing		

## **A.4 - Australian National Facility for Ocean Gliders (Facility Leader: Chari Pattiaratchi)**

### **Status of the Project**

- *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*
  - (1) Delivery of 2 Slocum glider in January 2008
  - (2) Delivery of 3 Seagliders confirmed for April 2008.
  - (3) The complete glider fleet 5 Seagliders and 3 Slocum's to be in place by June 2008
  - (4) Initial deployments of the Slocum glider in Western Australia and South Australia.
  - (5) Initial deployment of the Seaglider off Western Australia and Tasmania.
  - (6) Establishment of a new laboratory for the glider facility at UWA.
  - (7) Problems were encountered with Iridium satellite communications – this has been solved through the purchase of an Iridium telephone and modem.

- *Outlook for future years:*

A call for proposals for the deployment of gliders across the different nodes was undertaken and the following deployments have been approved by the steering committee subject to satisfactory review in 2009:

- (1) Bluewater – 1 Seaglider for transect off Tasmania
- (2) NSW-IMOS – 1 Seaglider and 1 Slocum for the study of eddies in the East Australian Current.
- (3) SAIMOS – 1 Seaglider and 1 Slocum to be deployed in the Bonnie Upwelling and Kangaroo Island upwelling.
- (4) WAIMOS - 2 Seagliders and 1 Slocum to be deployed to investigate the variability of the Leeuwin Current.

Total of 5 Seagliders and 3 Slocum.

### **Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*

The capital purchases of the infrastructure are planned to be in place by June 2008. The operation of the research infrastructure in terms of providing routine data streams to the different nodes as approved by the Steering Committee is expected to be fully functional during the period July 2008 to June 2009.

### **Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*

Participation in National/International conferences:

- Australian Marine Sciences Association (AMSA) conference, New Zealand, July
- AGU Western Geophysics Meeting, 29 July -1 August, Cairns, Australia
- Physical of Estuaries and Coastal Seas (PECS) Conference, Liverpool, UK from 25-29 August 2008. Theme: Process studies in the pre-operational era.

- Australian Meteorology and Oceanography Society (AMOS), Annual Meeting, Feb 2009.
- Presentation of seminars at Universities.

### Access and pricing

- *Describe the expected nature and level of usage of the infrastructure:*  
The ocean gliders will provide data on temperature, salinity, dissolved oxygen, fluorescence, turbidity and dissolved organic matter variations with depth from different locations across Australia: off Tasmania, New South Wales, South Australia and Western Australia. These data streams will be used to monitor boundary current systems (Leeuwin, East Australian and Flinders Currents) and their eddy systems.
- *(if applicable) Describe the intended processes to decide access and pricing for merit-based research:*  
Data will be available publicly through eMII
- *(if applicable) Describe the intended processes to decide access and pricing for other than merit based processes:*  
None

### Financial and Human Resources

#### In-Kind Investment Plan to June 2008 - Revised Feb 2007

Australian National Facility for Ocean Gliders – in kind investment Plan 1 Jul 2006 - 30 Jun 2008\*

	Co- Investment	Jul06- Jun07	Jul07- Jun08	Jul08- Jun09	Jul09- Jun10	Jul10- Jun11	Totals
The University of Western Australia	host costs	\$132,127	\$138,146	\$144,224	\$150,367	\$156,825	\$721,690
Year Totals		\$132,127	\$138,146	\$144,224	\$150,367	\$156,825	\$721,690
Cumulative		\$132,127	\$270,273	\$414,498	\$564,865	\$721,690	

\* amounts after June 08 are indicative values

- *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*  
The following are employed by ANFOG(funded through NCRIS):  
Dr Mun Woo – Data officer, Glider data QA/QC  
Ben Hollings - Glider mission control and communications  
Ruth Gongora-Mesas – Administrative assistant  
One glider technician to be appointed

**Milestones – completed, current period and remaining period of project**

<b>Activity</b>	<b>Responsible Organisation(s)</b>	<b>Duration (months)</b>	<b>Start</b>	<b>Finish</b>
<b>Expected to be completed by 30 June 2008</b>				
Full complement of gliders available for deployment	UWA	6	01/01/08	30/06/08
Full complement of gliders staff/technicians employed	UWA	4	01/03/08	30/06/08
Initial deployment of Slocum glider off Western Australia	UWA/ WAIMOS	2	01/03/08	30/04/08
Initial deployment of Slocum glider off South Australia	UWA/ SAIMOS	2	01/03/08	30/04/08
Initial deployment of Seaglider off Tasmania	UWA/ Bluewater	1	01/06/08	30/06/08
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
deployments of Seaglider and Slocum gliders off Western Australia	UWA/ WAIMOS	12	01/07/08	30/06/09
deployments of Seaglider and Slocum gliders off South Australia	UWA/ SAIMOS	12	01/07/08	30/04/09
deployments of Seaglider off Tasmania	UWA/ Bluewater	12	01/07/08	30/06/09
deployments of Seaglider and Slocum gliders off New South Wales	UWA/NSW	12	01/07/08	30/06/09
<b>During the remaining term of IMOS (July 2009 to June 2011)</b>				
deployments of Seaglider and Slocum gliders off Western Australia	UWA/ WAIMOS	12	01/07/09	30/06/11
deployments of Seaglider and Slocum gliders off South Australia	UWA/ SAIMOS	12	01/07/09	30/04/11
deployments of Seaglider off Tasmania	UWA/ Bluewater	12	01/07/09	30/06/11
deployments of Seaglider and Slocum gliders off New South Wales	UWA/ Bluewater	12	01/07/09	30/06/11

## **A.5 - Autonomous Underwater Vehicle Facility (Facility Leader: Stefan Williams)**

### **Status of the Project**

- *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*

We have operated the AUV on two major cruises in 2007. A series of trials were undertaken in collaboration with scientist from AIMS to assess benthic habitats off the Ningaloo Reef, WA in May. These trials were aimed at evaluating the effectiveness of using an AUV for conducting biodiversity assessment in waters beyond diver depths. The particular focus of these deployments was on documenting sponge habitats in 40m to 80m depths and in exploring canyons in depths up to 250m. The AUV was also part of a three week research cruise in September aboard the R/V Southern Surveyor documenting drowned shelf edge reefs at multiple sites in four areas along the Great Barrier Reef. This collaborative cruise included participants from the University of Sydney, James Cook University, CSIRO, Oxford, the University of Edinburgh and Fugro Seafloor Survey. We were able to document relic reefs up to 20k years old formed during previous ice ages when sea levels were up to 100m lower than today. The study of these structures may yield insights regarding the impact on the GBR of potential future sea level changes.

Using IMOS funding, we have added a Wetlabs EcoPuck to measure chlorophyll-a, CDOM and scattering (red) to the vehicle's sensor suite. This was included in the sensor suite on the Great Barrier Reef cruise. In addition, Sydney University Major Equipment funds have been used to add a multibeam sonar and we have ordered an Inertial Measurement Unit to improve the vehicle's navigation systems.

During the two major cruises undertaken in 2007 we have identified a pair of additional sensors that will complement the vehicle's existing sensor suite. We would like to consider a new Obstacle Avoidance Sonar. The current OAS is a narrow beam device and has had difficulty identifying vertical faces when the vehicle approaches at an oblique angle. We are currently exploring options for an improved OAS and would like to use some of the funds allocated for sensors towards the purchase of a new OAS. We have also experienced difficulties with the vehicle's GPS receiver. We had packaged a receiver in a dome mounted externally to the vehicle. We wish to replace this with a more streamlined, lighter GPS antenna to improve our ability to geo-reference the vehicle models. Finally, we have had requests to add a sensor to measure O<sub>2</sub> concentrations have sought quotes for this.

We have hired a technical officer to support the operations, maintenance and data management activities for the IMOS AUV Facility. In addition to logistical planning for AUV cruises, this technical officer will liaise with eMII to make the AUV data available to the wider community.

- *Outlook for future years:*

Our outlook for the future appears good. We anticipate being able to fulfil our commitment of on the order of four major cruises per year to service the requirements

for benthic habitat mapping around the country. One of our primary goals over the next few months will be to raise awareness in the marine science community of the availability of the AUV Facility and to solicit further proposals for use of this infrastructure. An on-going call for proposals will look to fulfil cruise opportunities in the latter half of 2008 and throughout 2009.

### **Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*

The vehicle will be operated to fulfil cruise objectives proposed by the marine science community. We anticipate being able to meet the requirements of this program during the period July 2008 to June 2009 as outlined in the initial business plan. At present we have 4 proposals from South Australia which will be addressed in the first half of 2008 possibly as two trips. Further deployments will depend on the proposals received, but we would anticipate operating in NSW, Queensland and WA in addition to SA during this year.

### **Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*

We have had a good response to our current work with the AUV. We had an appearance on Channel 10 news in WA as well as a radio interview with ABC in SA talking about the Ningaloo cruise with AIMS. The outcomes of the Ningaloo cruise have also been featured in *Marine Scientist* (No. 21, 2007). The more recent cruise aboard the Southern Surveyor attracted funding from National Geographic who have first right of refusal to cover the outcomes of the expedition for the general public.

We anticipate that the media interest in our work will be on-going and that successful cruises will result many opportunities to promote IMOS both nationally and internationally. We will also continue to promote the work of IMOS, and the IMOS AUV Facility in particular, at national and international conferences and through journal publications.

### **Access and pricing**

- *Describe the expected nature and level of usage of the infrastructure:*

As outlined in the original business plan, we anticipate being able to support on the order of four cruises funded using IMOS funds. We will also include a number of additional sensors to further improve the quality and breadth of data collected with the vehicle. The AUV will be used for targeted benthic habitat mapping at sites around the country.

- *(if applicable) Describe the intended processes to decide access and pricing for merit-based research:*

Access to the AUV Facility will be decided based on an on-going call for proposals. Proposals will be reviewed by the AUV Facility Scientific Advisory Committee which will judge the scientific merit of proposals received from the scientific community. The proposals will be based on scientific merit, strength of the team, integration with IMOS objectives and thoroughness of the proposal.

## **Financial and Human Resources**

- *Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan):*

As outlined in the ABP Budget Details spreadsheet, we have received significant commitments of in-kind contributions from organizations requesting access to the AUV Facility. While travel and logistical costs are covered by the IMOS AUV Facility, it is the responsibility of the nominating organizations to provide ship time to support deployments. This represents a substantial in-kind investment in this facility.

- *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*

We have recently hired one technical officer (1.0 FTE) to help manage the AUV Facility. This TO will be responsible for integration of additional sensors, organizing logistical considerations required to support deployments and the management of data streams produced by the facility. This position has been funded for 2 years as part of the funding of the IMOS AUV Facility.

## **Milestones – completed, current period and remaining period of project**

- *Installation and commissioning of instruments / infrastructure*
  - Have integrated additional fluorometer as per initial ABP
- *Staffing targets*
  - Met – one additional staff member employed.
- *Nature and level of usage of infrastructure*
  - Have undertaken 2 significant cruises in 2007. Given the delays in the availability of funding, this is in line with anticipated level of infrastructure usage
- *Financial targets*
  - Financial targets have slipped in line with the delays associated with securing funding. However, we are now on track with sensor purchases proceeding and a technical officer employed. Costs for logistical support to facilitate deployment of the AUV have been in line with anticipated budgets.
- *Levels of co-investment*
  - Co-investment is commensurate with the anticipated levels outlined in the original ABP.
- *Promotional activities*
  - Promotional opportunities are in line with initial milestones. We anticipate having continuing opportunities to promote IMOS and the work of the AUV Facility at domestic and international conferences, in journal publications and in print and other media.

<b>Activity</b>	<b>Responsible Organisation(s)</b>	<b>Duration (months)</b>	<b>Start</b>	<b>Finish</b>
<b>Expected to be completed by 30 June 2008</b>				
Deployments in SA	ACFR/SARDI	1	Mar, 08	Apr, 08
Integration of additional sensors (O2, Obstacle Avoidance, GPS)	ACFR	2	Mar, 08	May, 08
Deployments in SA	ACFR/SARDI	1	May, 08	June, 08
Data delivery	ACFR/eMII	4	Mar, 08	June,08
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Deployments in NSW * to be confirmed	ACFR	0.5	July, 08	July, 08
Deployments in Qld * to be confirmed	ACFR	1	Aug, 08	
Deployments in WA * to be confirmed	ACFR	1	Oct, 08	Nov, 08

## **A.6 - Australian National Mooring Network (Facility Leader: Simon Allen)**

### **A.6.a Queensland and Northern Australia (Sub-Facility Leader: Craig Steinberg)**

#### **Status of the Project**

- *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*

#### **Equipment Ordering**

The 2006/07 capital items were ordered in March 2007 and were delivered between July and September 2007. The 2007/08 orders were commenced in December 2007 and will be finalised in February and March 2008 subject to design finalisation.

#### **Deployments**

60 days of AIMS Research Vessel & charter time was granted for 2007/08.

Initial deployment of 8 current meter moorings were made in September and October 2007. Their servicing and redeployment will occur in May and June 2008.

#### **GBRMPA Permit**

GBRMPA permit G0724634.1 was applied for in July 2007 and granted in October 2007 and is valid until 30 Sep 2010. Variations to the permit will be required as the moorings are upgraded to real-time and designs are finalised.

#### **Design**

Meetings were held through 2007 for National Mooring Network designs and a Moorings Data Management meeting convened by Lindsay Pender and was held at UNSW in February 2008. QA/QC systems and metadata systems under development

- *Outlook for future years:*

We plan to upgrade the mooring capability as instrumentation is commissioned and real-time communications are tested.

Focus will move to implementing and reviewing QA/QC procedures and user friendly web delivery.

#### **Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*

8 GBROOS moorings serviced every 6 months and delivering high quality data streams. Deploy real-time National Reference Mooring near Yongala Wreck (off Cape Bowling Green).

#### **Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*

GBROOS seminar by Bainbridge at ICRS in Florida, July 2008

### **Access and pricing**

- *Describe the expected nature and level of usage of the infrastructure:*  
We expect the data to be used in near real time operationally by BoM, CSIRO and NOAA and available to all users through eMII.
- *(if applicable) Describe the intended processes to decide access and pricing for merit-based research:*  
The data will be made freely available through eMII or AIMS.
- *(if applicable) Describe the intended processes to decide access and pricing for other than merit based processes:*  
A data agreement may be necessary in order to identify the user and application of the data.

### **Financial and Human Resources**

- *Please refer to the spreadsheet “ABP Budget Details” and complete the details for your Facility / sub-Facility. Only need to complete the estimated expenditure details (in green) plus advise further if any large discrepancies (greater \$100,000) between the approved budget and current estimates.*  
No change from the approved budget
- *Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan):*  
We plan to meet or better the current levels of co-investment. A third long term mooring near Heron Island will be contributed to IMOS GBROOS.
- *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*  
Snr Experimental Scientist Craig Steinberg 10% co-investment in-kind  
  
Pool of Oceanographic Technicians and Engineering Workshops 200% EFT 50% NCRIS, 50% in-kind  
Experimental Scientist Felicity McAllister 50% NCRIS  
Experimental Scientist Severine Choukroun 100% NCRIS  
AIMS Data Centre 25% co-investment in-kind

**Milestones – completed, current period and remaining period of project**

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
<b>Expected to be completed by 30 June 2008</b>				
Mooring design and purchase	AIMS	18	01/1/07	30/6/08
GBRMPA Permit	AIMS	4	01/7/07	30/10/07
Deploy initial GBROOS array	AIMS	1	01/9/07	30/10/07
Service and upgrade GBROOS array	AIMS	2	01/5/08	30/6/08
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Produce near real-time data streams from the NRM Yongala station	AIMS	12	01/7/08	30/6/09
Service and upgrade GBROOS array every 6 months	AIMS	12	01/7/08	30/6/09
Mooring design and purchasing	AIMS	1	01/7/08	30/6/09
Purchase and deploy Darwin NRM	AIMS	12	01/7/08	30/6/09
Monthly water sampling of Yongala mooring	AIMS	12	01/7/08	30/6/09
Negotiate GBRMPA permit variations	AIMS	4	01/7/08	30/10/09
<b>During the remaining term of IMOS (July 2009 to June 2011)</b>				
Produce near real-time data streams from the NRM Yongala station	AIMS	24	01/7/09	30/6/11
Service and upgrade GBROOS array every 6 months	AIMS	24	01/7/09	30/6/11
Web delivery and Product development	AIMS	24	01/7/09	30/6/11
Produce near real-time data streams from the NRM Yongala station	AIMS	24	01/7/09	30/6/11
Monthly water sampling of Yongala NRM mooring	AIMS	24	01/7/09	30/6/11
Monthly water sampling of Darwin NRM mooring	AIMS	24	01/7/09	30/6/11
Negotiate GBRMPA permit 2010-2013	AIMS	9	30/9/10	30/6/11

## **A.6.b New South Wales (Sub-Facility Leader: Moninya Roughan)**

### **Status of the Project**

- *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*  
Highlights: Logistical challenges regarding combining the expertise and interests of our collaborators were overcome. NSW IMOS has a clear vision of where it is headed and how it will proceed, which has resulted in the drafting of our NSW IMOS Scientific White Paper and the NSW IMOS Mooring Sub Facility Development and Management Plan. We are ready to call for a tender to deploy our first moorings.
- *Outlook for future years:*  
We feel that we are well placed now to begin to order instrumentation and to commence deployment in the next few months. By June 2009, we will have 4 of our 5 moorings deployed and operating.

### **Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*  
By the end of June 2009, all of our coastal moorings will have been deployed. We will have at least 12 months of hydrographic sampling along our National Reference Transect.

### **Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*  
Suthers to visit Coffs Harbour National Marine Science Centre to promote IMOS Activities Feb 2008  
Roughan to attend Science Meets Parliament Canberra March 2008  
Presentations by Suthers and Roughan at the AMSA 2007 Conference.

### **Financial and Human Resources**

- *Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan):*  
The majority of our co-investment is from data that will be shared with us. Unfortunately with the delay in establishing EMII, this data has not been received.
- *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*

NSW IMOS has employed a financial officer (Mark Scognamiglio) 100% FTE as a co-investment from SIMS. The moorings team has subcontracted various experts from MHL and OFS on an as needed basis.

**Milestones – completed, current period and remaining period of project**

<b>Activity</b>	<b>Responsible Organisation(s)</b>	<b>Duration (months)</b>	<b>Start</b>	<b>Finish</b>
<b>Expected to be completed by 30 June 2008</b>				
Deploy PH 100m Mooring	SIMS	36 +	March 08	?
Deploy PH 140m Mooring	SIMS	36 +	April 08	?
Commence Hydrographic Sampling along the PH National Ref Transect	SIMS/DECC	36 +	April 08	?
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Deploy CH 70m Mooring	SIMS	30+	July 08	?
Deploy CH 100m Mooring	SIMS	30+	July 08	?
<b>During the remaining term of IMOS (July 2009 to June 2011)</b>				
Deploy JB 140m Mooring	SIMS	24 +	July 09	?

## **A.6.c Southern Australia (Sub-Facility Leader: John Middleton)**

### **Status of the Project**

- *Difficulties:*
  - a) Delays in contract between SARDI (SA Govt) and IMOS Office (U Tas) have led to delays in equipment purchase
  - b) Delays in ordering equipment due to procedural requirements of S.A. Government: the levels of projected expenditure for 2007-2008 by SARDI are high (>\$200K) and necessitated the development of detailed Acquisition Plans (asking for waive of tender), Supply and Service contracts (involving the S.A. Crown Solicitor and equipment suppliers) and Purchase Recommendation Forms (detailing all of the previous procurement activities).
  - c) Delays in specification by CSIRO of the equipment needed for the reference station.
- *Highlights:*
  - a) Procurement: Waive of tender obtained from the S.A. Government Accredited Procurement Unit obtained for equipment October 18 2007. Supply contracts with Underwater Video Systems and Imbros obtained January 3<sup>rd</sup> 2008. Orders for around \$700,000 placed by February 1<sup>st</sup> 2008. Equipment for one shelf mooring now obtained which will be deployed at the SAIMOS Reference station on February 12<sup>th</sup> 2008.
  - b) Staff Appointments: Drs John Luick and Charles James appointed 50% SAIMOS in June 2007. Dr Sophie Leterme appointed 40% SAIMOS February 1<sup>st</sup> 2008. Dr Laurent Seuront (senior Biological Oceanographer) appointed 50% SARDI/Flinders to assist with SAIMOS – has already designed SAIMOS biochemical sampling/survey plan that will augment mooring data. In addition, Flinders School of Biological Sciences have made their senior School Manager (Louise Renfrey) available to SAIMOS on a 0.1-0.2FTE basis. Dr Peter Petrusivics has also volunteered his time (0.1FTE) to assisting with satellite imagery for the cruises.
  - c) Capacity Building - Shakedown Cruises: Luick and James assisted A.I.M.S. in the deployment of moorings in the GBR (December 2007). Luick, James, Middleton, Leterme and the RV Ngerin crew successfully deployed a shelf mooring off Adelaide (Jan 2008). CTD, Niskin and Bongo net samples taken.
  - d) SAIMOS IT: The SAIMOS linux systems (for data validation) and ftp web server (for data supply) are now on-line.
  - e) First Cruise Scheduled Feb 11-15<sup>th</sup>.
  - f) Middleton has been proactive in bringing the Victorian EPA (Randall Lee) and Marine Aquaculture and Fisheries Systems at Queenscliff (Terry Walker) into SAIMOS. This connection is expected to strengthen through state government policies on cross-service provision.
- *Outlook for future years:*

The commitment by SARDI and Flinders University to SAIMOS has been excellent. The staff appointed to SAIMOS, with salary support from these agencies, means we have been able to attract personnel who are both excellent at research and who have very good

track records in ship-based field programs. The Ngerin crew also have an excellent track record in mooring deployments on the shelf, despite using a vessel designed for work in the Gulfs. The purchase of equipment is to be staggered over the coming years as capacity is built and replacements needed. We aim to have 4-6 moorings in place by end of 2008. The outlook is very good.

### **Promotion**

- Contact lists have been compiled for all fishing associations and environmental groups for the region. These will be visited, and a presentation on SAIMOS given with the aims of a) giving these groups a sense of “ownership” of SAIMOS data and b) to ensure all mooring sites are acceptable to the fishing associations. This has been budgeted for and will be an annual occurrence.
- Presentations will also be given at various state government agencies.
- A presentation is planned for the next SCOR WG 129 Deep Ocean Exchange with the Shelf workshop to be held in Johannesburg South Africa in October 2008.

### **Access and pricing**

- *Describe the expected nature and level of usage of the infrastructure:*

The mooring data streams and associated field sampling data will be available to all via eMII.

Usage of the data by the broader S.A. Marine Science community will take time. Most biological researchers have necessarily been restricted to coastal and estuarine work due to lack of resources for ship-based shelf work. Nonetheless, the SARDI/Flinders Oceanography group (who are building the data streams) will be actively analysing the data as they become available.

### **Financial and Human Resources**

- *Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan):* No deviations from levels of co-investment as per Funding Agreement.

- *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*

Dr John Luick 0.5FTE IMOS, 0.5FTE SARDI

Dr Charles James 0.5FTE IMOS, 0.5FTE SARDI

Dr Sophie Leterme 0.4FTE IMOS, 0.6FTE Flinders University

All in-kind salary contributions are being met as per the Funding Agreement.

**Milestones – completed, current period and remaining period of project**

<b>Activity</b>	<b>Responsible Organisation(s)</b>	<b>Duration (months)</b>	<b>Start</b>	<b>Finish</b>
<b>Expected to be completed by 30 June 2008</b>				
Employ staff and train at CSIRO: 1.3FTE staff employed as per plan; staff trained at A.I.M.S; staff will be further trained at CSIRO in March when reference mooring is deployed by CSIRO.	SARDI	12	July 2007	ongoing
Purchase and install reference station and slope moorings off Kangaroo Is: Purchases of slope and shelf moorings made and equipment to arrive in March 2008; reference station equipment purchase delayed until CSIRO provide final equipment list. SARDI mooring to be deployed at reference station site to get data streams started.	SARDI	6	January 2008	June 2008
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Purchase remainder of mooring equipment, configure and install: We now plan to defer the purchase of one shelf mooring until 2009/2010 and one until 2010/2011 to ensure capital is available for replacement moorings and other mooring items	SARDI	12	July 2008	June 2009
<b>During the remaining term of IMOS (July 2009 to June 2011)</b>				
Continue operational delivery of mooring data:	SARDI	24	July 2009	July 2011

**A.6.d Western Australia**  
**A6.f National Reference Stations Analysis and Coordination**  
**A6.g Satellite Ocean Colour Calibration / Validation**  
**(Sub-Facility Leaders: (6.d&f Simon Allen; 6g Vittorio Brando)**

**Status of the Project**

- *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*  
The Australian National Moorings Network is a capability building project, finding appropriate leadership personnel proved difficult, but the role of Ocean Sensors Deployment Team Leader was filled by Tim Lynch on 07 January, we are now rapidly building the rest of the technical team for both the ANMN and the SOTS, these are combined positions building a critical mass in moorings excellence and building on the small CSIRO moorings team. Sensors and the majority of components for the all 3 of the reference stations to be deployed in WA and Tasmania have been ordered and it is expected to deploy the Maria reference station in March. All sensor components of the WA thermistor and BGC moorings have been ordered and will be on site by April. A data handling workshop for all mooring sub-facilities and coordinated by Lindsay Pender is scheduled for February 11-12 this year.

For the Satellite Ocean Colour Calibration / Validation sub-facility, planning was disrupted due to the north-Queensland floods, which have meant that the sub-facility leader has headed up there to gain valuable insight into flood plumes. On the positive side, equipment will all be purchased in the 2008-09 year; and an opportunity has arisen in that the sub-facility has been granted access to investigate installing equipment on the 5km jetty in Lucinda, which if undertaken, will far improve the monitoring in that area.

- *Outlook for future years:*  
Despite the arrival of funds to CSIRO only in September 2007 most FY 2007/8 milestones will be met, if later in the year than first envisaged. The outlook for future years is good with the capacity built, the operating budgets appear ballpark and operations achievable within those envelopes.

**Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*  
The Final reference station at Dampier will be purchased early in the 2008/9 FY and deployed before the end of the 2008 Calendar Year. The thermistor chains for WA will be deployed early in this FY. At this point all planned permanent infrastructure will be in place and regular servicing and sampling will continue. Dependent on the capital remaining, the rate of loss, and the maturity of the technology in conjunction with the other moorings sub-facilities a profiling mooring may be installed at Maria to assess the viability of this technology.

**Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*  
AMSA 2008 – July - Christchurch NZ probably as part of a co-ordinated IMOS session. CSIRO will assist with publicity throughout the year as data becomes publicly available through web delivery.

### **Access and pricing**

- *Describe the expected nature and level of usage of the infrastructure:*  
From the AMSA and IMOS questionnaires it is clear that the data from the mooring network will be used by a broad spectrum of the Marine Community, both from a research perspective, but also more operationally. Through 2008/9 we will build on the operational use aspects at the state government and regional council level to seek additional co-investment where there is continuous operational use. The data will be provided as per EMII principles, free access, but registration required.

### **Financial and Human Resources**

- *Please refer to the spreadsheet “ABP Budget Details” and complete the details for your Facility / sub-Facility. Only need to complete the estimated expenditure details (in green) plus advise further if any large discrepancies (greater \$100,000) between the approved budget and current estimates.*  
Due to no funds being available in 2006/7 and the slow nature of the recruitment, it is proposed to transfer the 2006/7 budget into the 2008/9 budget and report against this modified budget. This primarily affects the analysis and central coordination function. Where the 2008/9 budget will change from \$665K to \$885K, but the total over the 5 years for this function remain the same.
- *Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan):*  
In the WA element there will be an increase in in-kind contributions as WA fisheries are proposing to provide vessel time for the deployment of moorings over a wider area than was initially foreseen.
- *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*  
Within CMAR economies of scale have been achieved by combining positions from within the SOTS and ANMN facilities, together with CMAR moorings positions, this has led to the ability to offer longer term (including indefinite) appointments, this has been key to attracting high quality applicants. In WA for example a full time position is currently open, partially CMAR funded and partially IMOS. The team developed will be in line with the financial constraints placed on CMAR by the IMOS budgets.

**Milestones – completed, current period and remaining period of project**

<b>Activity</b>	<b>Responsible Organisation(s)</b>	<b>Duration (months)</b>	<b>Start</b>	<b>Finish</b>
<b>Expected to be completed by 30 June 2008</b>				
National Moorings Coordinator appointed	CSIRO			
National Reference Station Design completed	CSIRO			
Deploy Maria National Reference Station & commence enhanced sampling	CSIRO			01 Mar
Procure initial components of amalgamated colour Reference station – Lucinda Jetty				30 Jun
Deploy Rottnest Reference Station – commence enhanced sampling				01 Jun
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Deploy Dampier & Esperance NRS commence sampling				01.12.08
Continue operational maintenance of stations				
Deploy remainder of WA array (vessel schedule dependent)				

## **A.6.e Acoustic Observatories (Sub-Facility Leader: Rob McCauley)**

### **Status of the Project**

○ *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*

Sub-facility development has been progressing as expected. The Centre for Marine Science and Technology (CMST) are developing new capabilities in the sea noise loggers, which in particular include:

- 1) Two programmed sampling regimes: one optimised for nearly continuous sampling of low frequency signals propagated in the deep sound channel over long distances and another one for sampling of local broadband biological signals;
- 2) Replacement of conventional hard drives used for data storage in the current models with solid-state hard drives of large capacity in the upgraded models, which will substantially reduce the power consumption of hardware and, consequently, increase the time of autonomous operation.

DSTO funded a pilot deployment of a grid of the current CMST-DSTO sea noise loggers in the Perth Canyon. The primary aim of this deployment was to develop data recording protocols suitable for IMOS. This test has been completed, with three loggers deployed on the northern rim of the Canyon and successfully recovered in mid 2007. The data recovered by these noise loggers were classified as “restricted” by DSTO and are not available for public release, although outputs of all biological data extracted from the sea noise are available. The data has been so far used to define the clock synchronisation techniques (see below) and animal tracking algorithms (pygmy blue whales primarily).

The problem of clock synchronisation in the noise loggers installed separately in an array on the seafloor still exists, which is essential for accurate location of underwater noise sources. The quartz clocks currently available on the market, including those used in the existing model of acoustic loggers, have slightly different temperature drifts and stability insufficient for accurate source tracking. Current models of atomic clocks have a satisfactory accuracy, but consume too much power for remote battery-powered systems. This problem will be dealt with by using one acoustic release which is modified to ping at 7.5 kHz, once per day for 30 minutes at a 20-s ping interval. Each logger is programmed to sample for 60 s at 20 kHz over this ping interval. The resulting pings received on the loggers can be used to synchronise all receivers to a relative time (i.e. assuming one logger clock as the master and adjust all others to this). Two appropriately modified acoustic releases from ORE (CARTS’s) have been ordered.

The next deployment for long-term sea noise recordings in the Perth Canyon within the IMOS project is planned to commence in February 2008 with one logger to be deployed on the 430-490-m deep plateau north of the canyon axis. Another three sea noise loggers are being manufactured and will be installed to create an array of acoustic receivers in this area by mid 2008. All components for manufacturing the sea noise loggers have been ordered, so that these new loggers are expected to be ready for deployment in the Perth Canyon by this time. The loggers will be recovered in late 2008 in order to retrieve sea noise data and deploy the array of loggers for the next period of observation

- *Outlook for future year*

A grid of four sea noise loggers are under construction to be deployed somewhere along the SA-Vic coastline in the second half of 2008. Two deployment locations are favoured, off Portland in Victoria or off Kangaroo Island. The priorities for a deployment site is that: it needs to be near the edge of the continental shelf in order to pick up deep sound channel signals; the moorings should be deployed in an area free of trawling activity; and the site should be relatively easily accessible. The funding for deployment of the acoustic observatories was removed from the Curtin budget and passed over to the mooring facility in the original agreement. We have been advised that the Kangaroo Island option is that preferred by the mooring facility as it makes use of the SAIMOS vessel and its staff. We have yet to firm up a location where the vessel will be operating along the shelf break off Kangaroo Island or if there are any locations here that are known to be free of trawling activity. Curtin has deployed sea noise loggers off Portland and we have a location near the shelf edge known to be free of trawl activity. The shelf break near Kangaroo Island is much further offshore than out of Portland, where the site is only a few hours steaming.

To date, apart from the Curtin interests, we have two interested parties in sea noise records from along the SA-Vic coastline. Cath Kemper from the South Australian Museum is keen for a noise logger to be deployed off Kangaroo Island in an attempt to detect pygmy right whale calls. Peter Gill from Deakin University is keen to deploy a noise logger off Portland to act as a yearly census on pygmy blue whales in the area. Hence in mid 2008 when the moorings are nearer completion we will need to define an exact deployment location.

In mid 2008 we will begin ordering the parts for sea noise loggers and moorings for the NSW node passive acoustic observatory. We have yet to be advised of any potential locations where other moorings will be deployed in NSW.

### **Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*

Another four sea noise loggers of the upgraded version will be manufactured during the first three months of the 2008/2009 financial year and provided to SAIMOS for the first deployment either west of Kangaroo Island or on the continental shelf off Portland by the end of 2008.

The network of sea noise loggers in the Perth Canyon will be recovered for data retrieval in late 2008 and then redeployed for the next period of acoustic recordings. The data collected in the Perth Canyon will be transferred to the eMarine Information Centre.

We expect data to come on stream from the IMOS acoustic observatories in mid 2008 (single logger Perth Canyon) then multiple logger data sets from late 2008. In 2009 we will begin applying for funding for data analysis.

### **Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*

The majority of people involved in passive acoustic observations of marine animals in Australia participate in this project and hence they will be directly informed about any

progress and activity within the project. For international promotion, information about the project, including technical characteristics of the acoustic observatories, planned locations and time periods of their deployment will be available from the CMST website. The design of acoustic observatories and their operation planned within the IMOS project will be discussed with potential stakeholders from Europe and America at the Acoustics'08 International Conference organized by the European Acoustics Association and the Acoustical Society of America in Paris in July 2008. At least one Journal paper from the Perth Canyon work up until mid 2008 (including data from the 2007 DSTO funded and IMOS deployment) is in preparation.

In a competitive international bid through an RFP from the Joint Industry Program (Oil and Gas Producers association), the CMST has applied for funding to review passive acoustic observatories. If this is successful we will showcase the IMOS facilities. If we are not successful in this application then the successful parties are obliged to discuss the worldwide use of passive acoustic observatories, hence we will ensure that the IMOS facility and hardware developed at Curtin are included.

### **Access and pricing**

- *Describe the expected nature and level of usage of the infrastructure:*

The first IMOS acoustic observatory will be collecting sea noise data in 2008. These data will be used in different research projects aimed to study the population and migration patterns of blue whales, fish abundance, and various physical phenomena (e.g. sub-sea earthquakes and volcano activity as potential tsunamigenic events) in the ocean that generate underwater noise. The second IMOS acoustic observatory will be deployed in SA as part SAIMOS in late 2008. The data obtained from this observatory will be used by several research groups in SA, WA, and NSW to study the abundance and migration patterns of various whale species and to carry on remote acoustic observation of the ice disintegration processes in Antarctica.

- *(if applicable) Describe the intended processes to decide access and pricing for merit-based research:*

The raw data collected from the IMOS acoustic observatories will be forwarded to the eMarine Information Centre for public access. The sea noise recordings will be analysed and systematized according to objectives of individual research projects that the participants of the IMOS acoustic project will be conducting beyond the IMOS scope. These systematized data will also be available for other merit-based research projects within certain time period after data retrieval, which will be subject to objectives and terms of individual projects for which the data are requested. In particular, the systematized data will be used for the Australian Antarctic Science project (AAS project 2527) conducted by Curtin University. If any additional processing or analysis of the IMOS sea noise data is needed for a merit-based research project, pricing will be determined based on the specific character of data analysis required.

- *(if applicable) Describe the intended processes to decide access and pricing for other than merit based processes:*

The IMOS sea noise data will also be available for other purposes, including applied research and commercial projects conducted by other parties. Access to the data and pricing will be determined based on the specific character of data preparation (selection, systematization, filtration, etc.) required for such projects.

## Financial and Human Resources

- *Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan):*

Co-investments to this sub-facility are expected to be as initially planned (see the budget details), except for cash co-investment from DSTO in 2008/2009 and the subsequent years, which should be known after final approval of the DSTO budget for the coming fiscal year (this usually happens at the end of the current fiscal year).

- *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*

The cost of manufacturing the sea noise loggers includes the cost of labour needed to plan, assemble, program, test and maintain the loggers. CMST has employed an eminently qualified research engineer to lead this job, a qualified technician to provide all technical assistance, and a research administrator to manage all paperwork related to production of the loggers. According to the sub-facility implementation plan, the twelve sea noise loggers are to be manufactured within the time period from September 2007 to September 2009, when the last observatory is to be prepared for deployment in late 2009 as part of NSW IMOS. The percentage of staff time and salary needed to manufacture the 12 loggers during 24 month are as follows:

1. Research Engineer:  $(\$68,988 \text{ p.a. @ } 0.8 \text{ FTE} + 42\% \text{ on-cost}) \times 2 \text{ years} = \$156,741$   
(i.e. \$6,531 per month);
2. Research Technician:  $(\$55,863 \text{ p.a. @ } 0.4 \text{ FTE} + 42\% \text{ on-cost}) \times 2 \text{ years} = \$63,460$   
(i.e. \$2,644 per month);
3. Research Administrator:  $(\$49,338 \text{ p.a. @ } 0.25 \text{ FTE} + 42\% \text{ on-cost}) \times 2 \text{ years} =$   
\$35,030 (i.e. \$1,460 per month);

The total amount of funds needed to cover the labour cost in the 2008/2009 financial year (10 months labour time) is expected to be \$106,346.

Curtin University (CMST) provides research and technical facilities (laboratories, instrumentation, communication, transportation, etc.) as in-kind support for the project. The staff time of the two projects co-CIs (Rob McCauley and Alexander Gavrilo), which is not covered from the NCRIS funds, is currently approximately 0.2 FTE each and is considered as in-kind support in the following amount:

A/Prof:  $(\$111,658 \text{ p.a. @ } 0.2 \text{ FTE} + 42\% \text{ on-cost}) \times 2 \text{ persons} = \$63,422 \text{ p.a.}$

The total in-kind contribution to the project by Curtin University, including the cost of facilities and labour time not funded from the NCRIS budget is currently estimated as \$90,000 per annum.

**Milestones – completed, current period and remaining period of project**

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
<b>Expected to be completed by 30 June 2008</b>				
Employing staff needed for manufacturing acoustic loggers	Curtin Uni (CMST)	10	09/2007	06/2008
Order hardware components for WAIMOS and SAIMOS acoustic observatory.	Curtin Uni (CMST)	7	9/2007	04/2007
Development of the upgraded version of loggers and laboratory test	Curtin Uni (CMST)	9	07/2007	03/2008
Deployment of one test logger in Perth Canyon	Curtin Uni (CMST)	1	02/2008	02/2008
Manufacturing all loggers for WAIMOS acoustic observatory	Curtin Uni (CMST)	4	01/2008	05/2008
Deployment of all loggers of WAIMOS acoustic observatory	Curtin Uni (CMST)	1	05/2008	05/2008
Development of website with IMOS acoustic observatory sub-facility info and metadata (based at CMST website)	Curtin Uni (CMST)	2	04/2008	06/2008
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Employing staff needed for manufacturing acoustic loggers	Curtin Uni (CMST)	12	07/2008	06/2009
Manufacturing loggers for SAIMOS acoustic observatory	Curtin Uni (CMST)	4	07/2008	09/2008
Recovery of WAIMOS observatory and data retrieval	Curtin Uni (CMST)	2	11/2008	12/2008
Deployment of SAIMOS acoustic observatory	Curtin Uni & SARDI	1	11/2008	12/2008
Redeployment of WAIMOS observatory	Curtin Uni (CMST)	1	01/2009	02/2009
Preliminary analysis and systematisation of WAIMOS data	CMST and other research groups within this project	3	01/2009	03/2009
Presentation of IMOS acoustic observatories at Acoustics'08 conference	Curtin Uni (CMST)	1	07/2008	07/2008
WAIMOS data processing and analysis as part of current research projects	CMST and other research groups within this project	5	02/2009	06/2009
Updating IMOS acoustic observatory website with new metadata from the first WAIMOS deployment	Curtin Uni (CMST)	2	03/2008	04/2008
Order hardware components for NSW IMOS acoustic observatory	Curtin Uni (CMST)	2	05/2009	06/2009

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
<b>During the remaining term of IMOS (July 2009 to June 2011)</b>				
Employing staff needed to complete manufacturing acoustic loggers	Curtin Uni (CMST)	3	07/2009	09/2009
Manufacturing loggers for NSW IMOS acoustic observatory	Curtin Uni (CMST)	2	07/2009	09/2009
Deployment of NSW IMOS acoustic observatory	SIMS and CMST	2	11/2009	12/2009
Recovery of SAIMOS observatory and data retrieval	SARDI & CMST	1	12/2009	01/2010
Recovery of WAIMOS observatory and data retrieval	CMST	1	02/2010	02/2010
Preliminary analysis and systematisation of WAIMOS and SAIMOS sea noise data	CMST and other research groups within this project	4	01/2010	04/2010
Redeployment of WAIMOS and SAIMOS observatories	SARDI & CMST	2	03/2010	04/2010
WAIMOS and SAIMOS sea noise data processing and analysis as part of current research projects	CMST, SARDI and other research groups within this project	12	07/2009	06/2010
Recovery of NSW IMOS observatory and data retrieval	SIMS & CMST	1	11/2010	12/2010
Recovery of WAIMOS and SAIMOS observatories and data retrieval	SARDI & CMST	1	01/2011	02/2011
WAIMOS, SAIMOS and NSW IMOS sea noise data processing and analysis as part of current research projects	CMST, SARDI, SIMS and other research groups within this project	24	07/2009	06/2011
Regular updating IMOS acoustic observatory website with new metadata from all WAIMOS, SAIMOS and NSW IMOS deployments	Curtin Uni (CMST)	24	07/2009	06/2011

### **Confidential Material**

As DSTO funded the 2007 Perth Canyon deployment, their security regulations insisted that the data collected under their funding be classified as restricted. This will not occur in IMOS funded deployments. We have an arrangement with Navy and DSTO on informing them of our sea noise deployment activities.

## **A.7 - Australian Coastal Ocean Radar Network (Facility Leader: Mal Heron)**

### **Status of the Project**

- *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*

#### **Highlights:**

The full installation in the GBR (stations at Tannum Sands and Lady Elliot Island) were installed and operational at 31 December 2007 with data being preserved for future archiving. The data can be very good, but there are times when radio interference degrades our measurements.

Sites have been identified and surveyed for the installations in SA and WA and approvals from landowners and local governments is proceeding well.

#### **Difficulties:**

1. We applied, on 7 September 2007, to the Australian Communications and Media Authority for frequency allocations in the 8.0 - 9.5 MHz band for the WERA radars South Australia (Kangaroo Island and the Eyre Peninsula) and also in the same band for the WERA radars in Western Australia (Leighton Beach and Guilderton); and in the 4.3 - 5.4 MHz band for the CODAR SeaSondes at Leighton Beach, Seabird and Cervantes. We have made contact with ACMA in the intervening period, but the absence of questions or feedback lead us to anticipate that there may be significant delays in getting these licences. This would adversely impact on our implementation schedule. The licences for the GBR radars took 18 months gestation.

2. The structure for ACORN within JCU is being reviewed because of some operational issues. This will improve the efficiency and ensure that the in-kind support is available.

- *Outlook for future years:*

The experience of installing the first of the ACORN systems and getting it working has been significant for the ACORN staff. The program is now nearly 6 months behind the original schedule, due mainly to the delay in initial funding, but also because of delays in negotiating access to Lady Elliot Island. In future we will conduct the search for suitable sites earlier than originally planned so that we can commence the site approvals and radio licensing processes earlier.

Subject to ACMA's response, we anticipate that the schedule for all initial ACORN installations will rollout 6 months behind the original Plan.

### **Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*

WERA in SA at Kangaroo Island and Eyre Peninsula installed by 30 Sep 08 and operating reliably (archivable data) by 31 Dec 08.

WERA in WA at Leighton Beach and Guilderton installed by 30 Sep 08 and operating reliably (archivable data) by 31 Dec 08

CODAR SeaSonde in WA at Leighton Beach, Seabird and Cervantes installed and operating reliably (archivable data) by 31 Dec 08.

Site selection for WERA at Coffs Harbour completed prior to 1 July 08 and applications for approvals from landowners, local bodies and ACMA lodged by 30 Sep 08.

Site selection for CODAR SeaSonde at Bonney Coast (SA/VIC) completed prior to 1 July 08 and applications for approvals from landowners, local bodies and ACMA lodged by 30 Sep 08.

Ordering and installation of WERA at Coffs Harbour by 30 Jun 08 and operating reliably (archivable data) by 31 Dec 2009.

Ordering and installation of CODAR SeaSonde at Bonney Coast by 30 Jun 08 and operating reliably (archivable data) by 31 Dec 2009.

### **Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*

At Gladstone (near to the Tannum Sands radar site) we have established a close link to the Gladstone Observer, which enables us to disseminate information about the radar system to the regional community. This has helped us to establish good relations with the community, and we think this has helped us to maintain a record of no vandalism or graffiti on the facility which is sitting on a well-used beach. We will work with local newspapers at future sites to promote ACORN in the areas which host the radar stations.

We will continue to present review papers at national and international conferences to promote the use of the data archive emanating from ACORN.

### **Access and pricing**

- *Describe the expected nature and level of usage of the infrastructure:*

Experience over the period Jun 07 - Dec 07 indicates that data production will run ahead of data archiving in the initial period when an HF radar comes on line. We concentrate on getting the radars performing properly (calibration, validation etc) and then we have to deal with the quality assurance before we can open the archive for general access. The GBR system has been producing archivable data since 1 Jan 08, but the quality control procedures and archiving protocols are not yet complete. Thus there will be an unforeseen delay in making the archived data available to users.

### **Financial and Human Resources**

- *Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan):*

New co-investment: The Queensland Department of State Development has allocated \$300,000 for research support. Negotiations are proceeding to use these funds for research which will improve the quality of the data archive. For example there is a research question about how many spectra, collected every ten minutes, can be

combined to improve the quality of the directional wave analysis. An allied question is to ask what the area of integration should be for optimum results.

- *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*

Mal Heron Director, ACORN 0.5FTE NCRIS \$75,508; 0.25FTE Portmap In-kind \$37704

Sarah Searson Tech 1.0FTE NCRIS \$69,528

Arnstein Prytz Contract NCRIS \$95,000

New Tech Position 1.0FTE NCRIS \$80,000

SARDI Tech 0.1 FTE In-kind \$12,000

Flinders Tech 1.0 FTE In-kind \$12,000

The original plan included a 0.5FTE administration position within ACORN. Because salaries are higher than originally estimated we have delayed this appointment and Sarah Searson is picking up that workload.

**Milestones – completed, current period and remaining period of project**

The initial milestones for ACORN in the IMOS funding agreement are as follows:

## 7. Australian Coastal Ocean Radar Network

Summary of Implementation Strategy (commencing early 2007 to June 2011)

Activity No	Activity	Proposal Party	Duration (months)	Start	Finish
1	Purchase 1x Long Range WERA Purchase 1x Medium Range WERA Purchase WERA spares kit Purchase and install Wave software on GBR radar Develop data protocols	ACORN Centre	6 months	January 2007	June 2007
2	Install Long Range WERA and Medium Range WERA Systems Develop protocols and test, training	ACORN Centre Host Node	6 months	July 2007	Dec2007
3	Organise Workshop/Symposium to promulgate ACORN capabilities and services;	ACORN Centre	1 week, 2007	Opportunistically national	attached to a conference
4	Purchase 1x Long Range CODAR Purchase 1x Medium Range CODAR Purchase Single CODAR Station Purchase CODAR spares kit Purchase SA Radar System Develop Data Protocols	ACORN Centre SAIMOS	6months	Jan 2008	June 2008
5	Install Long Range CODAR; Medium Range CODAR; and SA Radar System Develop and test data protocols; training	ACORN Centre SAIMOS Host Nodes	6 months	July 2008	Dec 2008
6	Relocate WERA radars Maintain network; Data quality assurance; training	ACORN Centre Host Node	6 months	Jan 2009	June 2009
7	Relocate CODAR Radars Maintain network; Data quality assurance; training	ACORN Centre Host Nodes	6 months	July 2009	Dec 2009
8	Relocate WERA radars Maintain network; Data quality assurance; training	ACORN Centre Host Node	6 months	Jan 2010	June 2010
9	Relocate CODAR Radars Maintain network; Data quality assurance; training	ACORN Centre Host Nodes	6 months	July 2010	Dec 2010
10	Relocate WERA radars Maintain network; Data quality assurance; training	ACORN Centre Host Node	6 months	Jan 2011	June 2011

This does not include the GBR system and the SARDI system, for which the capital is in-kind. Item 1 refers to WERA systems in WA and in Coffs Harbour; item 4 refers to a CODAR pair plus a single CODAR station approved for WA; and the CODAR pair approved for the Bonney Coast SA/VIC. While the capital items are all listed, there has been re-scheduling due to delays in commencement and also due to deployment decisions made subsequent to the initial plan. These changes are reflected in the attached table.

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
<b>Expected to be completed by 30 June 2008</b>				
Wave analysis software for GBR	ACORN			Nov 07
WERA for WA ordered	ACORN			Mar 08

CODAR SeaSonde for WA ordered (pair plus single station)	ACORN			Mar 08
WERA for SARDI ordered	ACORN/SARDI			Mar 08
Site survey for WERA at Coffs NSW	ACORN/NSW?			May 08
Site survey for CODAR SeaSonde at Bonney (SA/VIC)	ACORN/SARDI			May 08
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
WERA for WA installed and operating	ACORN			Dec 08
WERA for SARDI installed and operating	ACORN/SARDI			Dec 08
CODAR SeaSonde (3 stations) for WA installed and operating	ACORN			Dec 08
Order WERA for Coffs NSW	ACORN/NSW?			Feb 09
Order CODAR SeaSonde at Bonney SA/VIC	ACORN/SARDI			Feb 09
<b>During the remaining term of IMOS (July 2009 to June 2011)</b>				
Install WERA for Coffs NSW; installed and operating	ACORN/NSW?			Dec 09
Install CODAR SeaSonde at Bonney SA/VIC; installed and operating	ACORN/SARDI			Dec 09
Maintain system	ACORN			Jun 11
Assist users	ACORN			Jun 11

## **A.8 - Australian Acoustic Tagging and Monitoring System (Facility Leader: Rob Harcourt)**

### **Status of the Project**

- *Highlights, difficulties and breakthroughs for period January 2007 to June 2008*
  - Purchase and receipt of 215 Vemco VR2W receiver units, 100 temperature loggers, and one active tracking system
  - Successful submission and awarding of applications for the 25 VR2W mobile receiver pool.
  - AATAMS Acoustic Telemetry Workshop held at Sydney Institute of Marine Science (SIMS) during November 2007
  - AATAMS TO Dr. Charlie Huveneers attended the Ocean Tracking Network (OTN) database management workshop in Dalhousie Canada and while there visited the Vemco head office.
  - Formulation of the OTN Bass Strait Gates & Rottnest Island Deployment Plan
  - OTN has been delayed and subsequently AATAMS has been moved on the OTN schedule for deployment of the OTN receivers. This should now take place in early 2009.
  - Seven AATAMS Scientific meetings held during 2007/2008 financial year to date, including teleconferences with OTN, SAIMOS, PirVic & WA
  - Deployment of 70 receivers off Southwest Australia with the collaboration of CSIRO MAR
  - 96 receivers were deployed off Ningaloo Reef with the help of CSIRO (Russ Babcock and Richard Pillans) and AIMS (Mark Meekan). Receivers were deployed as three curtains of about 10 receivers, three arrays of 6/6/50 receivers and 4 hotspots of one receiver.
  - AATAMS TO presented at the Oceania Chondrichthyan Society Conference
  - AATAMS scientific advisory committee member Prof Iain Suthers presented on AATAMS at Australian Marine Sciences Association Meeting
- *Outlook for future years:*
  - Completion of Ningaloo Reef Deployment in July 2008
  - Commencement of East Coast deployment in 2008
  - Deployment of the South Australian curtain in 2008
  - Commencement of servicing and data retrieval of Ningaloo Reef receivers in 2008
  - Commencement of servicing and data retrieval of East Coast receivers in 2008/2009
  - Allocation and deployment of OTN receivers in 2008/2009
  - Continued deployment of the mobile receiver pool
  - Possibility of a second AATAMS workshop and meeting of user pool in 2009
  - Development of AATAMS database and IP agreements with user groups and eMII

### **Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*
  - Completion of Ningaloo Reef Deployment
  - Deployment of the South Australian curtain
  - Commencement of East Coast Deployment
  - Commencement of servicing and data retrieval of Ningaloo Reef receivers
  - Allocation and deployment of OTN receivers
  - Uploading of data to eMII portal

### **Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*
  - Presentation at Biologging Conference in Monterey, California Sep 1-5, 2008
  - Article in *Waves* magazine
  - Further promotion through POST & OTN
  - SIMS and IMOS websites
  - Proposal to hold the AATAMS Workshop annually

### **Access and pricing**

- *Describe the expected nature and level of usage of the infrastructure:*

Infrastructure is being used in a variety of ways. There are currently in Australia 103 researchers across 34 Institutions registered with AATAMS. As of June 2007 they were conducting 52 projects on 57 different animal species. Nationally there are 677 receivers deployed to which AATAMS receivers will add 330. 25 have been deployed as part of the floating pool and 100 receivers have been deployed as of 5 Feb 2008 off Ningaloo. South Australia, Eastern Australia and OTN curtains will be deployed in due course value adding to the current usage.
- *(if applicable) Describe the intended processes to decide access and pricing for merit-based research:*
  - All data collected from IMOS equipment will be quality controlled by AATAMS and then freely available on e-MII
  - AATAMS will work with e-MII, VEMCO and OTN to develop web access database and data handling protocols at SIMS - Target June 2008
  - Data sharing from non-IMOS equipment will be negotiated with user groups for access to data on non-IMOS acoustic receivers
  - Deployment Plan is a long term strategy arrived at by consensus at the AATAMS Scientific Committee
  - Applications to access acoustic curtains will be reviewed by AATAMS Scientific Committee

### **Financial and Human Resources**

- *Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan):*
  - Increased co-investment from CSIRO Alistair Hobday in terms of logistical support for southwest deployment of mooring lines.

- Increased co-investment (more ship days at \$14,000 /day) from AIMS for deployment of Ningaloo Reef Curtains
- *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*
  - A 1.0FTE technical officer has been employed since May 2007. This position will be engaged for the entire duration of IMOS. The TO position is funded 100% by NCRIS funding.

**Milestones – completed, current period and remaining period of project**

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
<b>Expected to be completed by 30 June 2008</b>				
Employment of a technical officer	AATAMS	49	05/07	06/11
Purchase 215 receivers and ready for deployment	AATAMS	7	09/07	04/08
Purchase other equipment to facilitate deployment of receivers	AATAMS	7	09/07	04/08
Confirm time frame of access to OTN co-investment	AATAMS			
Commence deployment of Ningaloo Reef Receivers	AATAMS/AIMS	3	01/08	03/08
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Completion of Ningaloo Reef Deployments	AATAMS/ AIMS	1	07/08	07/08
Completion of East Coast Deployments	AATAMS	4	03/08	06/08
Servicing and data retrieval of Ningaloo Reef Deployments	AIMS/WAMSI	42	01/08	06/11
Servicing and data retrieval of East Coast Deployments	AATAMS	36	06/08	06/11
Continued Deployment of mobile receiver pool	AATAMS	43	12/07	06/11
Upload of Data to eMII	AATAMS	42	01/08	06/11
User access of Data from eMII portal	eMII	42	01/08	06/11
Deployment of SAIMOS receivers	SAIMOS	1	04/08	04/08
<b>During the remaining term of IMOS (July 2009 to June 2011)</b>				
Completion of OTN deployment	AATAMS/ WA Fisheries/PIRVIC	12	07/08	07/09
Data retrieval and receiver servicing of West Coast Deployments	WA Fisheries	24	06/09	06/11
Data retrieval and receiver servicing of East Coast Deployment	AATAMS	24	06/09	06/11
Continued Deployment of mobile receiver pool	AATAMS	43	12/07	06/11
Upload of Data to eMII	AATAMS	42	01/08	06/11
User access of Data from eMII portal	eMII	42	01/08	06/11

## **A.9 - Facility for Automated Intelligent Monitoring of Marine Systems (Facility Leader: Scott Bainbridge)**

### **Status of the Project**

- *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*
  - Successful completion of field trials on Heron and One-Tree Islands which verifies the basic communication design of the project;
  - Davies Reef over-the-horizon microwave successfully deployed and moved to operational status;
  - Granting of all permits for the project clearing the way for the project to being able to deploy equipment where required;
  - Successful deployment of test systems off AIMS over the summer period including the development of simple data management systems;
  - Additional funding for back-bone links received from the University of Queensland and work progressing on the Heron Island and One-Tree Islands links with AARNet;
  - All staff employed and working on the project;
  - Designs for all equipment and deployment designs completed, first major deployment set for June 1-15<sup>th</sup> at Heron and One-Tree Islands;
  - Potential collaborations underway between FAIMMS and CSIRO ICT, FAIMMS and the University of Queensland and FAIMMS and the San Diego Super Computer (SDSC) center to test deployment of equipment and data systems;
  - First test data available.
  
- *Outlook for future years:*
  - Validation of initial designs has been completed and so there are no major impediments to the planned deployment of equipment;
  - Initial field work shows that the deployment schedule is realistic and should be achievable;
  - A commercial data management package is being trailed that potentially will decrease the level of work required in this area and which may provide a template for other users;
  - Good engagement with the science community with the initial work generating a lot of interest both nationally and internationally;
  - A number of key collaborations are being forged that will extend the work of FAIMMS and increase the value of the project;

### **Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*
  - First deployment of sensors at Rib Reef due by April 2008 and first major deployment at Heron and One-Tree Islands scheduled for June 1-15<sup>th</sup>;
  - Microwave back-bone link to Heron Island will be operational by November 2008, Telstra NextG coverage will be used until the link is in place;
  - Site visit to Orpheus Island completed, microwave link to Orpheus commissioned in late 2008;

- Myrmidon Reef and Davies Reef units deployed in late 2008, early 2009;
- Orpheus Island deployment in early 2009;
- Lizard Island site visit by mid 2009;
- First live data available to eMII/IMOS by July 2008 with subsequent stations coming on-line as the deployments are completed;
- Data Management systems completed by end 2008 including metadata integration with eMII/BlueNet and data being made available to the eMII systems.

**Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*
  - Paper on GBROOS to be presented at the International Coral Reef Society conference in July 2008;
  - Paper on FAIMMS to be presented to the Coral Reef Ecological Observing Network meeting in late 2008 / early 2009;
  - Paper on FAIMMS to be presented to the Australian Coral Reef Society and/or the Australian Marine Sciences Association meetings in late 2008 / early 2009.

**Access and pricing**

- *Describe the expected nature and level of usage of the infrastructure:*
  - Data will be freely available via the FAIMMS web site or via eMII and via a number of other (free) subscription based services (such as e-mails, ‘widgets’, RSS feeds, etc);
  - A number of collaborations are currently underway to allow other organizations to utilize the infrastructure, currently these include CSIRO ICT and the University of Queensland;
  - The daily data will be used by a number of groups from the Bureau of Meteorology, GBRMPA and others;

**Financial and Human Resources**

- *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*
  - FAIMMS Project Manager, FTE 80%, project life, AIMS In-Kind;
  - FAIMMS Instrument Tech, FTE 100%, project life, NCRIS/State Gov.;
  - FAIMMS Comms and Data Tech, FTE 100%, project life, NCRIS/State Gov.;
  - FAIMMS Financial Manager, FTE 10%, project life, AIMS In-Kind;
  - FAIMMS Workshop Manager, FTE 10%, project life, AIMS In-Kind.

**Milestones – completed, current period and remaining period of project**

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
<b>Expected to be completed by 30 June 2008</b>				
Employment of staff, setting up of office	AIMS	4	Sept 07	Dec 07
Site Visit to Heron and One-Tree Islands	AIMS	1	Sept 07	Sept 07
Design and testing of equipment	AIMS	4	Dec 07	Mar 08

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
Deployment of Sensor Network at Rib Reef	AIMS	1	April 08	April 08
Deployment of sensor network at Heron & One-Tree Islands	AIMS	2	May 08	June 08
Data Management Systems	AIMS/eMII	3	Feb 08	Apr 08
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Presentation at the ICRS conference in Florida	AIMS	1	July 08	July 08
Data Presentation & Integration Systems	AIMS/eMII	6	July 08	Dec 08
Moreton Bay deployment	AIMS/UQ	2	July 2008	Aug 08
Orpheus Island site visit	AIMS	1	Sept 08	Sept 08
Davies Reef Deployment	AIMS	1	Sept 08	Sept 08
Lizard Island Site Visit	AIMS	1	Nov 2008	Nov 08
Heron Island microwave link	AIMS/UQ/AARnet	3	June 2008	Sept 08
Lizard Island deployment	AIMS	1	Mar 09	Mar 09
Maintenance of Equipment	AIMS	2	Mar 09	May 09
<b>During the remaining term of IMOS (July 2009 to June 2011)</b>				
Second generation data management systems	AIMS	6	Apr 09	Sept 09
Maintenance of Equipment	AIMS	2	Sept 09	Oct 09
Roll out of second generation sensor at Heron Island	AIMS/Others	2	Mar 10	Apr 10
Maintenance of Equipment	AIMS	2	Mar 10	Apr 2010
Maintenance of Equipment	AIMS	2	Sept 10	Oct 10
Maintenance of Equipment	AIMS	2	Mar 11	Apr 11

## **A.10 - electronic Marine Information Infrastructure (Facility Leader: Craig Johnson)**

### **Status of the Project**

#### **o *Highlights, difficulties and breakthroughs for period January 2007 to June 2008***

##### *Highlights*

MEST: Development of the Metadata Entry & Search Tool (MEST) has been a major achievement, not only in handling metadata but also in providing an immediate web-services solution as an interim measure to address delays in delivery of the Oceans Portal. Notably, the MEST has been adopted by the Office of Spatial Data Management (OSDM), which is charged with implementing the Australian Government Policy on Spatial Data Access and Pricing.

The MEST has been specifically tailored for use in the marine community, incorporating a range of functionality of general applicability within IMOS. The MEST incorporates a range of features including standards-based IP functionality, and the capacity to describe datasets, documents, instruments, platforms and web-services. Its development involved identifying parallel software development activities with other parties, and thus has provided important opportunities for cross-fertilisation, and sharing of expertise in the spatial data management community, both within and outside of IMOS.

Needs analysis: Following completion of the first stage of a needs analysis in early 2007, further resources were dedicated to additional exploration of datastream characteristics, processing, details of existing standards and quality control procedures, and perceived data management needs. This provided a basis for determining needs for training and support, development of standards and guidelines, and software development and enhancement. Concurrently, eMII convened a 2-day workshop for IMOS facility Data Facilitators which provided an overview of data management issues, the eMII support strategy and support tools, together with further exploration of facilities' needs. In addition to awareness-raising, a major outcome of this workshop was an increased understanding of facilities' needs, and a better sense of the staffing profile needed for eMII.

Outreach: Beyond the needs analysis, outreach to several facilities has commenced. The main purpose of this outreach has been to more closely identify issues relevant to each datastream, as well as conducting training and support in use of the MEST. Support includes assistance in copying and modifying the "sample records" as a means of readily creating data-specific records and deployments, data upload and transfer solutions, and data and metadata standards.

Standards and sample records: Work on standards and common work-practice has enabled formulating the draft guidelines which underpin conformance, as set out in the IMOS contract with each facility. The AODCJF Data Standards Working Group was quite active early in 2007 but less effective in late 2007, reflecting a slowed impetus within the AODCJF generally. Nonetheless, eMII staff have created a summary of data-types, data-processing and data-standards for ocean data, and have commenced development of reference documents for each instrument type. Good progress has also been made in developing sample records for each facility, platform, instrument and anticipated dataset. By July 2008,

it is expected that sample records will exist for all platforms, moorings and instruments to be deployed.

We anticipate completing further work prior to 30 Jun 2008 as follows:

- MEST development:
  - improved interlinking between related records;
  - more sample records for data types and instruments;
  - improvement of Web Map Services (WMS), including writing of procedures for AODN hosts to ensure inclusion of legends and linking back to metadata.
- Complete outreach activities across all facilities as outlined above.
- Complete generic guidelines for facilities of workflows / practices.
- Complete generic guidelines for hosting nodes of workflows and service standards.
- Conduct a workshop for facilities on using the MEST and related workflows.
- Gap analysis of facilities wrt workflow practice in exposing data.
- Convene further meetings of the Standards Working Group, and continue towards consensus decisions about data and metadata standards.
- Establish eMII help desk and commence formalised on-ground assistance to facilities.
- Prioritise assistance to facilities for 2008-09.

#### *Difficulties*

The most significant difficulty has been in recruitment of staff to eMII. Several short-term appointments have been made, but this does not provide a suitable long term solution. Several senior positions in eMII haven't yet been filled, despite considerable effort to redress this. We anticipate that this issue will be largely rectified by the end of this financial year given that an appointment to the position of Systems Architect was made in June 2007, and offers have been made for the positions of Director, Executive Officer and Administrative Assistant. We expect to complete appointment of an Outreach and Training Officer by May 2008, and several appointments to fulfil programming and Project Officer roles are also expected to be made shortly.

Other issues that have affected progress include dependencies of eMII on a raft of partners, contractual shortfalls, communication difficulties and, given the dual role of the Acting Director of eMII, increased staff shortages in the BlueNet Project Office.

Work on the legal agreements underpinning hosting has not progressed satisfactorily, due both to insufficient staff in the eMII/BlueNet Office, and a lack of engagement within the AODCJF. Nonetheless, several models of agreements have been developed and reviewed, with the most recent yet to be reviewed by the community. Individual hosting arrangements have been negotiated as an interim measure.

The Oceans Portal (now being developed by AODCJF under the leadership of CSIRO) requires further development if it is to meet an adequate level of functionality. It is still uncertain when the Portal will be made available to the hosting-community, and for public release. Testing of harvesting by the Portal has commenced, and efforts are currently focused on improving search functionality. Complementary arrangements (largely through the MEST) have been made to deliver data if the necessary functionality of the Oceans

Portal is not realised in time to handle IMOS data streams.

○ ***Outlook for future years***

Intended outcomes and performance capacity of eMII includes:

- Effective data flow.
- Data are discoverable and accessible.
- Refinement of workflows to meet the changing capacity of hosts and infrastructure.
- Automation of processes wherever possible.
- Effective support is delivered to facilities through ongoing needs analysis, prioritization, communication, outreach and promotion.
- Appropriate incorporation and integration of standards, community practices, and appropriate links with related initiatives.
- Effective tools to optimise use of IMOS data.
- Interoperability with other relevant systems and data.

**Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009*

Our infrastructure fulfils two interlinked components:

- delivery of an integrated data management framework; and
- delivery of data discovery, access, integration and re-use solutions.

These solutions will be implemented iteratively, initially addressing the immediate and generic needs of established dataflows, collection of mandatory metadata, archiving, storage and access. eMII will scale up in effort, as staff are recruited, to ensure that data management services meet the data collection and data flow schedules of each datastream. This includes a strong “support and user-needs responsiveness” focus, and the activities underpinning this. A high priority currently is to provide a robust help desk service, together with a concerted effort to conduct MEST training across the Facilities.

Stage 1: As raw and processed data begins to be collected, ensure that data will be stored, described and discoverable using agreed and conformal standards established by eMII in consultation with stakeholders. Data hosting activities will need to be clearly communicated to eMII for this to work effectively, and effort from eMII won't be sufficient in itself.

Stage 2: More effectively addresses the range of use-cases related to versioning, and realtime data storage and access. This stage will commence in parallel with Stage 1 but, since it is more complex, it will take longer to deliver than Stage 1.

Stage 3: This stage entails identifying, prioritising, and commencing work on data product development, implementation, integration into the infrastructure, and promotion. This work has already commenced, but needs to continue.

**Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009*

Promotion will focus initially on linking our infrastructure, and the data delivered by it, with related initiatives elsewhere. The eMII website will be expanded to better inform visitors of eMII's activities and act as a first point access to tools for metadata and data upload and discovery, and be directly accessible from the IMOS site.

In terms of further promotion outside of IMOS, presentations will be given at eResearch and domain-specific conferences, both national and international, and it is intended that journal articles will be published in domain-specific publications. Additional PR activities will include a regular newsletter and occasional announcements sent to marine science newsgroups and related fora.

Within the IMOS community, mailing lists for various IMOS data-handling groups and the newsletter will ensure that all people directly involved with IMOS are delivered updates of eMII activities.

### **Access and pricing**

#### ○ *Expected nature and level of usage of the infrastructure*

Elements of the AODN infrastructure are still being developed, and therefore workflows and practices are essentially in transition. eMII is just beginning to promote the core components currently operational (i.e. the MEST and data management practices within the AODN hosts), so we expect usage to increase from this point.

Overall use of the eMII existing and enhanced infrastructure will increase rapidly as data flows are bedded-down, metadata samples are refined to meet various discovery and delivery needs, training and general outreach is scaled up, as content becomes available seamlessly, and as the infrastructure is more broadly promoted.

Use of the infrastructure for discovery and access by other NCRIS users as well as initiatives overseas, will increase with a greater promotional effort, and with the creation of direct links between and with these other systems (a process which eMII has commenced).

Overall usage of the AODN infrastructure is dependent on several factors, including:

- Completion of the Oceans Portal to be fully functional within Phase-1 development scoped.
- Enhancements of the system to meet users' needs, and effective PR and outreach to alert users to these enhancements. The iterative nature of expanding services and interconnections between various data delivery options will increase use of the infrastructure and the data. Effective PR and outreach to notify users of these enhancements will be critical;
- Community agreement and adoption of common delivery and storage solutions; and most importantly ...
- Critical mass of data content. This is contingent on data from sources other than IMOS also being made available.

#### ○ *(if applicable) Describe the intended processes to decide access and pricing for other than merit based processes:*

All data will be openly available to all parties, whether they are involved in IMOS or not, and can be used freely, subject to provision of due acknowledgement of the data owner, and provenance of that data. This will explicitly include the use of this data for commercial ventures.

**Financial and Human Resources**

- Please refer to the spreadsheet “ABP Budget Details” and complete the details for your Facility / sub-Facility. Only need to complete the estimated expenditure details (in green) plus advise further if any large discrepancies (greater \$100,000) between the approved budget and current estimates.

Details of anticipated expenditure in 2007/08

Office setup	\$54,340
Travel-accomm	\$60,000
Workshops	\$50,000
Office: operational costs	\$25,000
Staff	\$535,300
Total	\$724,640

Anticipated expenditure for 2008/0

Office setup	\$8,000
Travel-accomm	\$60,000
Workshops	\$25,000
Office: operational costs	\$40,000
Staff	\$1,382,300
Total	\$1,515,300

- Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan)

We anticipate involvement in a NeAT Program initiative (through the Platforms for Collaboration), commencing April 2008, for 2 years.

- Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind])

STAFF salaries/loadings/oncosts (expected until Jun.09)	Source		FTE
Director	NCRIS	Cash	1.0
Assistant Director	NCRIS	Cash	1.0
Exec Officer	NCRIS	Cash	1.0
Systems Architect	NCRIS	Cash	1.0
Programmers x 2 (core infrastructure)	NCRIS	Cash	2.0
Outreach Officer	NCRIS	Cash	1.0
Admin Assistant	NCRIS	Cash	1.0
Project Officers / Programmers (up to 5)	NCRIS	Cash	5.0
total			<b>13.0</b>

### Milestones – completed, current period and remaining period of project

Activity	Responsible Organisation	Duration (months)	Start	Finish
Establishment of eMII Office/ staff recruitment	eMII Office	17 months	2007-02	2008-06*
Employment of other eMII staff members associated with particular data streams	eMII Office		2007-04	2008-07
Data hosting, archiving and workflows – iteratively identify, refine, define, communicate and support workflows to address [immediate, transition-stage and longer-term] capture, storage, description and delivery of data	eMII Office	Ongoing		
<ul style="list-style-type: none"> <li>Generic guidelines for IMOS Facilities –First draft discussed/ tested (to meet timelines of each datastream)</li> </ul>	eMII Office	Ongoing		2008-03
<ul style="list-style-type: none"> <li>Generic guidelines for hosting nodes: –Complete first draft for discussion/testing; and negotiation of workflows and service standards</li> </ul>	eMII Office	Ongoing		2008-04
<ul style="list-style-type: none"> <li>Workshop on workflows / MEST with Facilities</li> </ul>				2008-04
<ul style="list-style-type: none"> <li>Web-tools, information; Outreach; Direct liaison with each Facility, and hosts</li> <li>Dissemination of guidelines and related information</li> <li>Monitor and review timelines for transition stages; test feasibility, and review uptake/adoption.</li> </ul>	eMII Office	Ongoing		
Facilitation of successful archiving and recovery of data from Investment Areas. <ul style="list-style-type: none"> <li>Phase1 (initial data) – centralised upload/store (completed)</li> <li>Phase2 (versions of data, and changes in stakeholder capacity)</li> </ul> <i>Longterm overarching solution not yet finalised, and will continue into 2009 (to provide a streamlined solution for versioning, etc.).</i>	eMII Office	Ongoing 12 mnths	2007-07 2009-07	2008-06 2010-01
MEST development <u>MEST - SUMMARY [interim] solutions completed by Jul08:</u> <ul style="list-style-type: none"> <li>ISO and OGC stds-compliance developed (for describing datasets, services, instruments and deployments; and for linking between resources). Improvement of MEST interface and options in editing/ linking. WebMap functionality, incl. sample of Instrument deployment and sensor details; “Remote Searching”; IP management, and permissions management improvement [completed]; File upload and file download improvement [Stage1] to address immediate workflows; and improved usage statistics gathered on download;</li> <li>Support for rollout of versions of the MEST including bundling of software, for rollout to AODN hosts; [ongoing with new versions]</li> </ul> <u>SUMMARY MEST activities for completion by Jul09:</u> Some highlights include: Improved User-Interface; Automation of metadata creation and update where feasible; Further integration of lookup tables and links to tools; Improved logging of data use (improve this for the range of emerging use-cases: technical, design); Establish harvesting regimes; Incorporation of machine-to-machine automated transfer processes.	eMII Office	Ongoing	2007-01  2008-07	2008-07  2009-07
Integration of the MEST with the Oceans Portal	eMII Office / CMAR	5 months	2008-06	2008-10

Activity	Responsible Organisation	Duration (months)	Start	Finish
Refinement of the MEST and related infrastructure -designed and streamlined for each IMOS datastream.	eMII Office	Ongoing	2008-02	2009-12
Deployment of and integration of the IMOS data outputs into the Marine Catalogue and the Oceans Portal, and the MEST.	eMII Office	Ongoing	2007-10	2010
Legal: <ul style="list-style-type: none"> <li>Development of agreements underpinning data management/archiving of data by members of the AODCJF</li> <li>IP issues</li> </ul>	eMII Office		2007-01 2007-01	2008-08 2010-01
Standards: establish and promote of adoption of standards for data, dataflows and data collection descriptions				
<ul style="list-style-type: none"> <li>Development/improvement of sample records, in the MEST <i>Comment: Currently are for describing a specific deployment and related datasets, but will eventually be for models, products, and so on.</i> <ul style="list-style-type: none"> <li>Core of sample records for data types, data collection, instruments and deployment;</li> <li>Expand range of sample records to cover needs; and iteratively improve content/model;</li> </ul> </li> </ul>	eMII Office	Ongoing	2007-06	2008-06 2010-06
<ul style="list-style-type: none"> <li>Establish / maintain technical reference groups</li> <li>Liaison with and support for Facilities</li> </ul>	eMII Office	Ongoing		
Needs analysis: (including group and individual surveying, liaising, via workshops, discussion-lists, meetings, etc), and iterative response	eMII Office	Ongoing	200703	201106
Formalise support for Investment Areas through planning, governance, outreach, tools, and infrastructure <ul style="list-style-type: none"> <li>Establish Help desk (end May08) and related support</li> <li>Prioritise assistance/support to facilities (end June08)</li> <li>Training [one-to-one and group training]</li> <li>Other tools: e.g. prompt-sheets and the Excel tool, for ease of metadata collection.</li> </ul>	eMII Office	ongoing		
Communications strategy <ul style="list-style-type: none"> <li>Develop improved communications strategy, and commence implementation</li> </ul>	eMII Office	ongoing	200802	200810
<u>Tool and interface (web-tool) development; and integration</u> of data, tools and products with the AODN infrastructure, and with other access-points and systems, as appropriate	eMII Office	Ongoing	200809	201106
<ul style="list-style-type: none"> <li>Authentication and access</li> </ul>	eMII Office	ongoing		
<ul style="list-style-type: none"> <li>Data integration and data product development <ul style="list-style-type: none"> <li>Product- planning and development</li> <li>Initial product development (commenced by Oct.2008)</li> </ul> </li> </ul>	eMII Office	ongoing	200710 200810	2001106 200907
Monitor, QC, review adequacy of, and improve processes; Standards developed and adopted; Hosting practice and implementation; Dataflow; Versioning; Discovery; Usage; as well as Support (tools, services and structures) provided by eMII.	eMII Office	Ongoing	200706	201106

## **A.11 – Satellite Remote Sensing (Facility Leader: Peter Turner)**

### **A.11.a Australian Satellite SST L2P Products (Sub-Facility Leader: Helen Beggs)**

#### **Status of the Project**

○ *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*

Highlights:

- BoM: Employed Justin Freeman (Scientific Programmer) on 8 Oct 2007 and Ruslan Verein as IMOS Marine Observations Support Scientist on 21 Nov 2007.
- AVHRR stitching code is now running in test mode – expect to run operationally April 2008.
- Code has been completed to write MTSAT-1R and AVHRR data as GHRSSST-PP format L2P files.
- MTSAT-1R SST L2P reprocessing system in experimental mode.
- Match-up Database done
- Metadata records: Code done. Interfaces with GHRSSST-PP L2P writer.
- Production of real-time, high-resolution maps of SST from 7 groundstations is on track. Trial MTSAT-1R and HRPT AAVHRR single sensor L3P SST files (not mosaic) should be available to AO-DAAC via Cherax by June 2008. Should be available operationally by Sep 2008. Sample MTSAT-1R L2P and AVHRR L3P files all ready provided to Peter Turner for AO-DAAC testing.

Difficulties:

- Due to lack of cooling capacity in BoM HPCCC we are unable to install any new IT hardware at BoM in HPCCC in 2008. Therefore we may not be able to spend all the \$41K for IT equipment by June 2008. We would prefer to delay the purchase of on-line data storage media to FY08/09. This is not expected to impact milestones or deliverables.

○ *Outlook for future years:*

We expect to supply the AO-DAAC with L2P and L3P SST files from HRPT AVHRR, MTSAT-1R and other AVHRR-type SST sensors to be launched on future satellites. The HRPT AVHRR SST files will be produced separately as both as a bulk (~ 1m depth) and skin (~ 10 micron depth) sea surface temperature.

#### **Research infrastructure**

○ *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*

- Expect to supply experimental HRPT AVHRR skin SST L2P/L3P files to the AO-DAAC
- Produce operational, RT, maps of SST from multiple satellites (HRPT AVHRR SST1m L3P from NOAA-17 and NOAA-18 satellites)

- Produce reprocessed maps of SST (L3P) back to 1 June 2005 (MTSAT-1R SSTskin and AVHRR L3P SST1m)

### **Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*
- BoM: Beggs and Freeman to present IMOS 11a work at 9<sup>th</sup> GODAE High Resolution Sea Surface Temperature Pilot Project (GHRSSST-PP) Science Team Meeting, France, June 2008.
- Sept 2008: 14<sup>th</sup> Australian Remote Sensing and Photogrammetry Conference, Darwin
- Feb 2009: AMOS 2009 Meeting, Melbourne

### **Access and pricing**

- *Describe the expected nature and level of usage of the infrastructure:*
  - The BLUElink Ocean Forecasting Australia Project (at the BoM) will use the new satellite SST products in real-time for research towards an improved regional SST analysis system and assimilate them into the ocean forecast system.
  - GBRMPA will use the composite AVHRR SST data in real-time for Reef Watch (coral bleaching prediction)
  - The AVHRR SST products will be supplied in real-time to the GHRSSST-PP Global Data Assembly Centre, hosted by JPL's PO.DAAC. From here, they will be available to researchers around the globe for real-time assimilation into SST analysis systems, ocean models and for climate research.
- *(if applicable) Describe the intended processes to decide access and pricing for merit-based research:*  
The data will be made freely available in real-time through the IMOS AO-DAAC and the GHRSSST-PP Global Data Assembly Centre (hosted by JPL's PO.DAAC)

### **Financial and Human Resources**

No significant change from the approved budget

- *Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan):*  
As Justin Freeman was employed later than expected due to the late signing of the IMOS Heads of Agreement, the co-investment from BoM for the overheads of housing Dr Freeman is reduced in FY06/07 and FY07/08. However, co-investment of BoM personnel time has exceeded original estimates.
- *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*  
**NCRIS funded:**  
Justin Freeman (Scientific Programmer): 1.0 FTE from 8 Oct 2007 to Jun 2011  
Ruslan Verein (Marine Observations Support Scientist): 1.0 FTE from 21 Nov 2007 to 31 Dec 2007, 0.5 FTE from 1 Jan 2008 to 31 June 2008

**BoM in kind co-investment:**

Helen Beggs 0.15 FTE over year  
 Leon Majewski 0.4 FTE over year  
 Mike Willmott 8 days  
 Anthony Rea 1 day  
 Brenda Coutinho 0.5 days  
 Peter Dexter 2 days  
 Margaret Hughes 2 days

**Milestones – completed, current period and remaining period of project**

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
<b>Expected to be completed by 30 June 2008</b>				
Convert CMAR's AVHRR stitching code to local RDAC systems.	BoM/CMAR	15	Mar 07	Jun 08
Convert BoM's SST processing system to produce stitched (swath and gridded) Level 2 SST products from HRPT AVHRR raw data received by AIMS in Townsville as well as the Bureau receiving stations in Darwin, Perth and Melbourne.	BoM	6	Jan 08	Jun 08
Write code to calculate the Single Sensor Error Statistics (bias and standard deviation per pixel) required for a GHRSSST-PP L2P product.	BoM	6	Jan 08	Jun 08
Write code to produce the GHRSSST-PP L2P files with all mandatory auxiliary data fields	BoM	9	Oct 07	Jun 08
Write code to generate the GHRSSST-PP L2P MMR FR metadata records	BoM	2	Dec 07	Jan 08
Technical officer appointed at Bureau of Meteorology	BoM	8	Mar 07	Oct 07
Analysis software tested and able to run operationally at Bureau of Meteorology	BoM	11	Jul 07	Jun 08
Production of real-time, high resolution maps of SST from seven ground stations	BoM	11	Jul 07	Jun 08
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Ongoing supervision, data management, documentation and quality control	BoM	12	Jul 08	Jun 09
Develop system to generate trial real-time regional skin SST AVHRR L2P files	BoM	12	Jul 08	Jun 09

<b>Activity</b>	<b>Responsible Organisation(s)</b>	<b>Duration (months)</b>	<b>Start</b>	<b>Finish</b>
Supply real-time operational HRPT AVHRR SST L2P/L3P files to GHRSSST-PP/AO-DAAC which are of comparable accuracy to the GAC AVHRR L2P product (produced by NAVOCEANO)	BoM	6	Jul 08	Dec 08
Supply reprocessed MTSAT-1R L3P and AVHRR L3P back to 1 Jun 2005 to AO-DAAC	BoM	12	Jul 08	Jun 09
<b>During the remaining term of IMOS (July 2009 to June 2011)</b>				
Ongoing supervision, data management, documentation and quality control.	BoM	24	Jul 09	Jun 11
Reprocess archived AVHRR raw data from NOAA satellites to L2P SST	BoM	24	Jul 09	Jun 11
Develop operational system to generate real-time regional skin AVHRR SST L2P files		12	Jul 09	Jun 10

## **A.11.b Australian Ocean Distributed Archive and Access Centre (Sub-Facility Leader: Peter Turner)**

### **Status of the Project**

#### Overall Design

The design of the AO-DAAC has solidified over the last six months. The software system has been designed to automatically catalogue data products which are made available using OPeNDAP ([www.opendap.org](http://www.opendap.org)) server technology. The DAAC will provide access to data in a number of ways to support differing user applications. At the highest level the DAAC will return a data volume (latitude, longitude and time) to the user.

The DAAC will have nodes in Perth, Melbourne and Canberra. Plans are well developed to deploy servers at these sites and produce the marine satellite products to populate the servers. The intent is to have a pilot system working by June 2008.

#### Software Development

The DAAC is designed around OPeNDAP data servers. The data on these servers will be automatically catalogued using a modified version of the TPAC OPeNDAP data crawler. Once populated the catalogue will be used to determine which data files, and which part of the files contain the data that satisfy a user query. This information will then be used to assemble the data and deliver it to the user. The system is designed in a layered manner allowing for user data access at a range of levels.

Approximately 3 months of work have gone into upgrading the TPAC OPeNDAP data crawler and developing a web services client for the crawler database. The crawler database is now Postgresql instead of Mysql and the crawler can retrieve latitude, longitude and time bounds from crawled files. Some very limited data sets have been crawled to prove the code works. Pauline Mak from the University of Tasmania made the modifications to include Postgresql. Glen Smith and Chris Jackett have modified the TPAC crawler to read data spatial bounding information into the database. These changes also allow aliasing metadata names to ISO19115 standard names.

Development of the web services client is underway and scheduled for completion in another month. The aggregator design is still being considered, but coding is expected to begin to provide a test application in time for the completion of the web services client. We are intending to use an existing user GUI interface which will be compatible with the AO-DAAC website.

#### Planning and Deployment

The two initial data contributors will be the Bureau of Meteorology and iVEC. In Perth WA. Curtin University, WASTAC and iVEC have agreed to put Australia wide MODIS marine datasets online via an OPeNDAP Hyrax server in exchange for some financial support to purchase on line storage. It is likely that iVEC will be the first AO-DAAC node. Unfortunately the original arrangement to provide extra storage at the Bureau of Meteorology in Melbourne has had to be reconsidered because power and heating problems in the Bureau computer facility has meant no more hardware can be added. We

are looking at alternative sites for such a deployment. It appears that due to lower cost and increasing storage and performance we can purchase two Sun server X4500 units to support the serving of the Bureau L3P and MODIS ocean product. These Sun units provide around 40 Terabytes of storage each as well as the ability to serve (and possibly even process) the data using OPeNDAP Hyrax in a single low power 4u rack unit. This gives us the opportunity to deploy the AO-DAAC as a “DAAC in a box”. Sun X4500s will be deployed in Canberra and Melbourne..

### Meetings

An AO-DAAC meeting was held in Canberra over two days from July 10 to July 11. On the first day a number of speakers from Curtin University, University of Tasmania, Geoscience Australia, the Australian Bureau of Meteorology and CSIRO covered a wide range of issues pertaining to the establishment of the AO-DAAC. On the second day a group of technical people and users set-out how the AO-DAAC was going to work and what requirements data providers had to adhere to be part of the DAAC.

This information has gone into AO-DAAC documentation.

An AO-DAAC website has been established ([www.eoc.csiro.au/aodaac](http://www.eoc.csiro.au/aodaac)) to facilitate communication and document storage.

Edward King, Matt Paget, Peter Turner and Pauline Mak attended a 4 day workshop on OPeNDAP at the Bureau of Meteorology. Peter Turner gave a presentation at the WA Marine and Coastal Data Management Seminar held in Perth WA on October 25.

Consultation with Andrew Rohl from iVEC and Peter Fearn from Curtin University led to the planning for the establishment of a WA node for the AO-DAAC. Arrangements are underway to purchase extra online storage and move MODIS data from WASTAC onto the iVEC storage systems. We are working towards a fast track agreement to achieve this.

#### ○ *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*

##### Future Outlook

The basic structure for the DAAC should be complete by June 2008. We have in place and honours project to look at database search optimization. We will need to provide monitoring tools for the system. We will need to include access control. We will need to increase the number of data products available. We also need to maintain and improve hardware resources. We will need to establish a committee to coordinate the operation of the DAAC between contributing agencies.

The development team now has some momentum and we would like to reorganize the funding to bring a large part of the 09/10 budget into 08/09 and complete the system earlier.

### **Research infrastructure**

#### ○ *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*

A pilot DAAC should be operating by June 2008. There could still be unforeseen problems delaying this slightly but we are confident that the strategy adopted will work.

### Promotion

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*

No specific plans for promotion have been developed as we are primarily concerned with delivering the AO-DAAC. Once we have a portal available we will inform the various marine communities around Australia and promote the system through conference presentations and seminars. Some promotion has already been achieved through conference presentation, meetings and seminars.

### Access and pricing

- *Describe the expected nature and level of usage of the infrastructure:* We do not know the level of usage expected. We will need to introduce access logging to assess the usage. We feel that the usage will be small initially and increase as people become aware of the data and the ways of accessing the data increase.
- *(if applicable) Describe the intended processes to decide access and pricing for merit-based research:* Data will be freely available in general. Some data suppliers may place restrictions on their data.

### Financial and Human Resources

There should be no large discrepancies. We elected to employ Chris Jackett at a cost of approximately \$6K to speed up the software development effort.

- *Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan):*

We are looking to funding through other schemes in 2008/2009 to keep the momentum going. Levels of funding for 2008/2009 will not be sufficient to make the DAAC fully operational.

- *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*

As at 6<sup>th</sup> of February 2008:

### Core Software Development Team

<i>Name</i>	<i>Organisation</i>	<i>NCRIS</i>	<i>In-kind estimates</i>	<i>Comments</i>
<i>Peter Turner</i>	<i>CSIRO</i>	<i>0.4FTE</i>	<i>\$78K in terms of computing and overheads support for all CSIRO staff</i>	<i>Project leader and software architect</i>
<i>Edward King</i>	<i>CSIRO</i>	<i>0.3FTE</i>		<i>OPeNDAP server and aggregator and web portal</i>
<i>Matt Paget</i>	<i>CSIRO</i>	<i>0.3FTE</i>		<i>OPeNDAP</i>

<i>Name</i>	<i>Organisation</i>	<i>NCRIS</i>	<i>In-kind estimates</i>	<i>Comments</i>
				<i>server and aggregator</i>
<i>Glen Smith</i>	<i>CSIRO</i>	<i>0.3FTE (est)</i>		<i>TPAC crawler modification</i>
<i>Ken Suber</i>	<i>CSIRO</i>	<i>0.2FTE</i>		<i>GUI and TPAC crawler</i>
<i>Chris Jackett</i>	<i>CSIRO</i>	<i>2 months at 1 FTE</i>		<i>TPAC Crawler modification</i>
<i>Pauline Mak</i>	<i>Uni of Tasmania</i>	<i>\$10,000</i>	<i>\$7000+</i>	<i>Web services client Software</i>
<i>Leon Majewski</i>	<i>Bureau of Meteorology</i>		<i>1 week at 1 FTE (estimate)</i>	<i>System design input</i>

*Deployment and Contributors (note the contributions are estimated only)*

<i>Name</i>	<i>Organisation</i>	<i>NCRIS Funds</i>	<i>In-kind</i>	<i>comments</i>
<i>David Griersmith</i>	<i>Bureau of Meteorology</i>	<i>\$40K *</i>		<i>Just resumed position</i>
<i>Anthony Rea</i>	<i>Bureau of Meteorology</i>		<i>4 days + travel</i>	<i>Meetings and discussions</i>
<i>Helen Beggs</i>	<i>Bureau of Meteorology</i>		<i>1 day</i>	<i>Meetings and discussion</i>
<i>Adam Lewis</i>	<i>Geoscience Australia</i>		<i>1 day</i>	<i>Meetings</i>
<i>Shanti Reddy</i>	<i>Geoscience Australia</i>	<i>\$40K *</i>	<i>3 days</i>	<i>Meetings</i>
<i>Lesley Wyborne</i>	<i>GeoScience Australia</i>		<i>2 days</i>	<i>Meeting and presentation</i>
<i>Simon Oliver</i>	<i>GeoScience Australia</i>		<i>2 days</i>	<i>Meeting</i>
<i>Peter Fearn</i>	<i>Curtin Uni</i>		<i>7 days</i>	<i>WA rep, meetings and discussions</i>
<i>Andrew Rohl</i>	<i>iVEC WA</i>		<i>1 day + travel</i>	<i>Meetings and discussion</i>

\* Purchase of sun X4500 48TB file server may be through these organizations or CSIRO. We are still working out the best way forward.

**Milestones – completed, current period and remaining period of project**

<b>Activity</b>	<b>Responsible Organisation(s)</b>	<b>Duration (months)</b>	<b>Start</b>	<b>Finish</b>
<b>Expected to be completed by 30 June 2008</b>				
Software design Documentation	CSIRO	12 months	Jul07	Jun08
Completion of AO-DAAC pilot software	CSIRO	7 months	Nov07	Jun08
Limited deployment of data and DAAC	CSIRO, BoM, GA, Curtin Uni	3 months	Apr08	Jun08
Development website	CSIRO	1 month	Oct07	
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Software enhancement and development of operational systems	CSIRO, BoM, GA, Curtin Uni and iVEC	12 months	July 08	June 09
Promotion	CSIRO			
Deployment of new datasets	CSIRO, BoM, iVEC			
Enhancement of user interface	CSIRO, eMII	6 months	Jan 09	June 09

## **A.11.c.i Upgrade Hobart Ground Station (Sub-Facility Leader: Stuart Barr)**

### **Status of the Project**

- *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*  
The sub-contract has been reviewed and executed. Initial validation of the high priority items for replacement has been performed. The first purchase orders for new hardware (for ingest cards) have been issued as has a request for tender for a replacement demodulator (the highest priced item of those identified for replacement).
- *Outlook for future years:*  
It is anticipated that the hardware for the upgrade will be acquired this financial year and much of this will also be installed. However, some items may not be installed until next financial year. It is also likely that remedial painting of the structure may not be initiated until next summer.

### **Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*  
This work is an upgrade to replace dated hardware at significant risk of failure, however, the system is already operational. Installation and commissioning of new hardware will be performed in a way to minimize down-time.

### **Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*  
The Hobart ground station has its own web page ([www.terss.org.au](http://www.terss.org.au)); is publicised on Geoscience Australia's web page and its contribution to the national remote sensing archive is acknowledged in regular international meetings of groundstation operators and conferences.

### **Access and pricing**

- *Describe the expected nature and level of usage of the infrastructure:*  
Many data from the Hobart antenna are available for free download via the Internet or, in the case of ERS-2 low bit-rate data, by application to the European Space Agency. These data are downloaded by a number of regular users, including CSIRO, as well as providing a feed for the Bureau of Meteorology and GA's *Sentinel* system.

### **Financial and Human Resources**

- *Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan):*  
The co-investment in this project comprises: the labour to identify the needs; design modifications to the system; specify requirements; prepare purchase documentation; install, commission and test the new hardware. No significant change to that originally proposed is envisaged at this time.

- *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*

Co-investment includes: infrastructure engineer 0.15 FTE; maintenance technician 0.1 FTE; systems support engineer 0.05 FTE; project leader 0.05 FTE

**Milestones – completed, current period and remaining period of project**

**MILESTONES**

<b>Activity</b>	<b>Responsible Organisation(s)</b>	<b>Duration (months)</b>	<b>Start</b>	<b>Finish</b>
<b>Expected to be completed by 30 June 2008</b>				
Purchase and install replacement hardware for TERSS satellite ground station to maintain core research reception infrastructure	GA/BoM/CSIR O	15	Mar 07	June 08

## **A.11.c.ii Upgrade Townsville Ground Station (Sub-Facility Leader: Craig Steinberg)**

### **Status of the Project**

- *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*  
Station order and delivery - The order has been placed with ES&S for a SATRAX700 MODIS Dual L-X Band Ground Station System including the installation and commissioning services provided by them. The total amount for this order is \$308,500.00. Ten percent of this amount is payable upon order with 70% on delivery and 20% on commissioning.

The order was placed on the 22<sup>nd</sup> of June and delivery was scheduled for the 22<sup>nd</sup> of October 2007 as per the revised delivery period of 120 days (up from 90 days). The antenna, receiving electronics and acquisition workstation was delivered early January. As at February 6, we are still awaiting the processing and visualization workstation. The L band option is also yet to be delivered due to development delays by the manufacturer.

Due to the monsoonal rains in January the installation on the roof will not occur until February. Engineering plans and a quote were requested in July 2007. The contract for installation of the roof top mounting frame was negotiated and fabricated in December 2007.

We are hoping the commissioning by ES&S will be undertaken in March 2008 and will undergo further training in June/July with ES&S in July.

ACMA licence application - BoM have provided advice and a sample of their ACMA licence application for their station in Darwin. Additional information was needed due to the inclusion of the L-band capability. The application was submitted in July 2007 and approved in January 2008.

- *Outlook for future years:*  
We plan to be fully operational by July 2008 and the focus will be on QA, QC and timely data delivery.

### **Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*  
Expect to be fully operational by July 2008 and delivering data in near-real time to AO-DAAC. We plan to participate in discussions to coordinate satellite pass reception with other regional reception facilities. The aim is to minimise the loss of potential data due to clashes of concurrent satellite overpasses.

### **Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*  
Media release to launch the X band station July-December 2008 subject to agreement

with IMOS. GBROOS seminar by Bainbridge at ICRS in Florida, July 2008

**Access and pricing**

- *Describe the expected nature and level of usage of the infrastructure:*  
We expect the data to be used in near real time operationally by BoM, CSIRO and NOAA and available to all users through the AO-DAAC.
- *(if applicable) Describe the intended processes to decide access and pricing for merit-based research:*  
The data will be made freely available through AO-DAAC or AIMS.
- *(if applicable) Describe the intended processes to decide access and pricing for other than merit based processes:*  
The data will be made freely available through AO-DAAC or AIMS.  
A data agreement may be necessary in order to identify the user and application of the data.

**Financial and Human Resources**

No change from the approved budget

- *Describe the expected level and nature of co-investment (in particular, any new or reduced co-investments since the last business plan):*  
We plan to meet or better the current levels of co-investment. We also plan to keep the original L band station running in order to minimise data loss in the case of concurrent satellite overpasses.
- *Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):*  
Mike Mahoney 50% NCIS + 15% co-investment in-kind  
Craig Steinberg 5% co-investment in-kind  
AIMS Data Centre 10% co-investment in-kind

**Milestones – completed, current period and remaining period of project**

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
<b>Expected to be completed by 30 June 2008</b>				
ACMA Licensing	AIMS	1	Jul07	Jan08
Installation of X band receiving station	AIMS	1	Feb07	Feb08
Commissioning of X band receiving station	AIMS	4	Mar08	Mar08
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Produce near real-time data streams from the X band station	AIMS	12	Jul08	Jun09
Upgrade from X to dual L and X band	AIMS	6	Jul08	Dec08
Media release to launch X band operations	AIMS	1	Jul08	Dec09
<b>During the remaining term of IMOS (July 2009 to June 2011)</b>				
Produce near real-time data streams from the X band station	AIMS	24	01/7/09	Jun11

## **A.12 – IMOS Office (Facility Leader: Gary Meyers)**

### **Status of the Project**

- *Highlights, difficulties and breakthroughs for period January 2007 to June 2008:*  
This period saw the implementation of the IMOS Office at the University of Tasmania, and employment of the office staff (Director (.5 FTE); Executive Officer (1.0 FTE) and Executive Assistant (1.0 FTE). We employed a casual to focus on the development of the website (<http://www.imos.org.au>), which went on-line in January 2008 (prior to that had used a temporary website). In addition, the IMOS Office renewed the agreement in February 2008 with CSIRO to provide technical support to the IMOS facilities (original had been signed in early 2007, to cover the period up to sign-off on the IMOS documentation).

The Director, Executive Officer and/or Executive Assistant visited each of the IMOS Nodes during the period, and met with many of the staff involved with IMOS. These meetings assisted with the set-up of IMOS nationally and ensured the office staff had an understanding of the needs within each of the regions.

Three issues of the IMOS newsletter “Marine Matters” have been released, with a further issue due for release during the period. These newsletters feature articles on some of the IMOS facilities - see [http://imos.org.au/marine\\_matters.html](http://imos.org.au/marine_matters.html).

During the initial period of IMOS the Board and each of the committees were formed and held initial meetings (as reported in the 2006/07 Annual Progress Report). In addition, the first “Call for Proposals for Access to IMOS Infrastructure” closed in November 2007, and 13 proposals (out of the 15 received) were accepted into this ABP (included in the relevant Facility plans).

The IMOS Office completed the negotiations to enter into the sub-contracts with the Operators in November 2007, and all Operators have now received funding to cover initial operating costs (capital expenses are paid once equipment is received). Also in November 2007, the IMOS Office received advice from DEST (now DIISR) that all requirements to submit the 2007/08 Annual Business Plan and the 2006/07 Annual Progress Report have been completed.

The major unresolved difficulties as we near the end of the current period are the staffing to the eMII facility, and the management of the ACORN facility.

- *Outlook for future years:*  
During 2008/09 the IMOS Office should be able to step away from the set-up focus of the initial period, and be able to spend more time on the development of IMOS. We are currently working on a Communications Plan, which will see more focus on this important aspect of IMOS’s work, and intend to appoint a Communications and Marketing Manager to implement the plan. We expect all facilities will be functioning and data will be available, so a key requirement for the year is also to see

that the data being delivered meets the needs of the IMOS users – this will be via questionnaires at the AMSA and IMOS annual conferences and node meetings. The IMOS Users Workshop will be held in November 2008.

The mid-term review occurs in early 2009, so a major focus will be on ensuring that we have done the work to ensure the review is exceptional. Also, work will commence on addressing the options to sustain IMOS into the longer term.

Interest earnings will be a key source of funding for this, along with using those funds to address other strategic aims within IMOS (eg appointment of Communications Manager, taking up opportunities to further develop existing facilities or inclusion of new facilities). Decisions on the use of interest funds will be made by the Board as the amounts are earned (initial estimate is total interest of \$1.5-\$1.7 million).

The Advisory Board will continue to meet at least twice a year (to approve the Annual Business Plan and the Annual Progress Report), and at other times if necessary to address significant issues arising. The Chair of the Advisory Board continues to be a valuable mentor to the IMOS Director, and is always willing to promote IMOS in various fora.

### **Research infrastructure**

- *Expected progress with implementation and operation of the research infrastructure during July 2008 to June 2009:*  
Not applicable

### **Promotion**

- *Expected activities for promotion nationally and internationally during July 2008 to June 2009:*  
Nationally, IMOS intends to release at least 4 issues of Marine Matters during the reporting period. The IMOS Office will work with the Nodes to ensure a major meeting of interested parties is held within each of the Nodes. IMOS will endeavour to gain representation at major meetings with parliamentarians (eg National Science Week, Science Meets Parliament) to ensure the aims of IMOS are known by policy makers.

Internationally, the Director and senior staff will continue to attend relevant international meetings and ensure that the achievements of IMOS are made known. . As mentioned in the section ‘*Outlook for future years*’ we are currently finalising our Communications Plan, and intend to appoint a Communications and Marketing Manager, whose key role will be the promotion of IMOS.

### **Access and pricing**

- *(if applicable) Describe the intended processes to decide access and pricing for merit-based research:*  
The IMOS Office will work with the facilities to ensure fair processes are agreed for access and that pricing for merit-based (and other than merit-based) research abides

by the IMOS principles.

**Financial and Human Resources**

- o Outline the staffing positions, including FTE percent, duration and funding source (NCRIS, or co-investment [cash or in-kind]):

Name/position	FTE %	NCRIS	Cash Co-invest (enter organisation)	In-kind Co-invest (enter organisation)
Gary Meyers, Director	50	Yes		
Jo Neilson, Exec Officer	100	Yes		
Marian McGowen, Exec Assistant	100	Yes		
TBA, Communications & Marketing Manager	100	Yes		
Katy Hill, Communications Assist	20	Yes		
Technical Assistance, CSIRO	70	Yes		
Various	100			UTAS
Various	100			CSIRO

**Milestones – completed, current period and remaining period of project**

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
<b>Expected to be completed by 30 June 2008</b>				
Establish IMOS Office	UTAS	4	Jan07	Apr07
IMOS#1 - hold 1 <sup>st</sup> meeting IMOS Node & Facility Leaders	IMOS Office	1	Jan07	Feb07
Advisory Board - appoint	UTAS	3	Mar07	May07
Formalise structure of Nodes and committees	IMOS Office	4	Mar07	Jun07
Enter into sub-contracts with Operators	UTAS/IMOS Office	7	May07	Nov07
Submit 2007/08 Annual Business Plan	IMOS Office	4	Feb07	May07
Advisory Board – hold 1 <sup>st</sup> meeting	IMOS Office	1	May07	May07
Submit 2006/07 Annual Progress Report	IMOS Office	3	Jul07	Sep07
Advisory Board – hold 2 <sup>nd</sup> meeting	IMOS Office	1	Sep07	Sep07
Call for Proposals to access IMOS Infrastructure	IMOS Office	5	Oct07	Feb08
Submit 2008/09 Annual Business Plan	IMOS Office	3	Jan08	Mar08
IMOS#2 – hold 2 <sup>nd</sup> meeting IMOS Node & Facility Leaders	IMOS Office	1	Feb08	Feb08
Advisory Board – hold 3 <sup>rd</sup> meeting	IMOS Office	1	Mar08	Mar08
<b>During the period of the Annual Business Plan (July 2008 to June 2009)</b>				
Submit 2007/08 Annual Progress Report	IMOS Office	3	Jul08	Sep08
Advisory Board – hold 4 <sup>th</sup> meeting	IMOS Office	1	Sep08	Sep08

Activity	Responsible Organisation(s)	Duration (months)	Start	Finish
Submit 2009/10 Annual Business Plan	IMOS Office	3	Jan09	Mar09
IMOS#3 – hold 3 <sup>rd</sup> meeting IMOS Node & Facility Leaders	IMOS Office	1	Feb09	Feb09
Advisory Board – hold 5 <sup>th</sup> meeting	IMOS Office	1	Mar09	Mar09
<b>During the remaining term of IMOS (July 2009 to March 2012)</b>				
Submit 2008/09 Annual Progress Report	IMOS Office	3	Jul09	Sep09
Advisory Board – hold 6 <sup>th</sup> meeting	IMOS Office	1	Sep09	Sep09
Submit 2010/11 Annual Business Plan	IMOS Office	3	Jan10	Mar10
IMOS#4 – hold 4 <sup>th</sup> meeting IMOS Node & Facility Leaders	IMOS Office	1	Feb10	Feb10
Advisory Board – hold 7 <sup>th</sup> meeting	IMOS Office	1	Mar10	Mar10
Submit 2009/10 Annual Progress Report	IMOS Office	3	Jul10	Sep10
Advisory Board – hold 8 <sup>th</sup> meeting	IMOS Office	1	Sep10	Sep10
Submit 2010/11 Annual Progress Report	IMOS Office	3	Apr11	Sep11
Advisory Board – hold 9 <sup>th</sup> meeting	IMOS Office	1	Jun11	Jun11
Finalise requirements under IMOS Funding Agreement	UTAS	6	Oct11	Mar12

## ATTACHMENT B

### BUDGET and FINANCIAL TABLES

**Table 1: Anticipated receipt and expenditure of NCRIS Funds**

	Past (a) (Jul06-Jun08)	ABP Period (Jul08-Jun09)	Future (Jul09-Jun11)	Total (Jul06-Jun11)
Expected Funds beginning of period	0	<b>11,238,690</b>	4,693,544	0
Expected Income during the period				
NCRIS	23,977,000	<b>9,656,000</b>	16,367,000	50,000,000
interest	1,011,123	<b>424,121</b>	157,616	1,592,860
	<u>24,988,123</u>	<u><b>10,080,121</b></u>	16,524,616	51,592,860
Expected Expenditure (Note 1&2)	<u>13,749,433</u>	<u><b>16,625,267</b></u>	21,218,160	51,592,860
Expected Funds end of period (c)	<u>11,238,690</u>	<u><b>4,693,544</b></u>	0	0

**NOTES:**

1. Expected Expenditure by Facility

Argo	884,000	<b>1,600,000</b>	3,270,000	5,754,000
SOOP	994,445	<b>1,519,860</b>	1,628,695	4,143,000
SOTS	1,315,000	<b>1,142,000</b>	1,443,000	3,900,000
ANFOG	1,710,000	<b>1,030,000</b>	1,460,000	4,200,000
AUV	150,000	<b>175,000</b>	75,000	400,000
ANMN	4,435,925	<b>4,526,456</b>	5,830,619	14,793,000
ACORN	1,070,349	<b>3,087,651</b>	1,302,000	5,460,000
AATAMS	643,149	<b>654,000</b>	442,851	1,740,000
FAIMMS	461,150	<b>630,000</b>	658,850	1,750,000
eMII	724,640	<b>1,515,300</b>	2,630,060	4,870,000
SRS	899,073	<b>395,000</b>	470,927	1,765,000
IMOS Office (b)	461,702	<b>350,000</b>	2,006,159	2,817,861
	<u>13,749,433</u>	<u><b>16,625,267</b></u>	21,218,161	51,592,860

2. Expected Expenditure by Operator

AIMS	1,770,000	<b>1,469,000</b>	1,822,000	5,061,000
BOM	965,518	<b>913,860</b>	730,622	2,610,000
CSIRO	3,313,000	<b>5,574,000</b>	7,740,000	16,627,000
CUT	195,000	<b>215,000</b>	295,000	705,000
GA	185,000	<b>15,000</b>	0	200,000
JCU	1,070,349	<b>3,087,651</b>	1,302,000	5,460,000
SARDI	1,319,000	<b>553,000</b>	962,000	2,834,000
SIMS	1,513,224	<b>1,632,456</b>	1,383,320	4,529,000
UWA	1,710,000	<b>1,030,000</b>	1,460,000	4,200,000
UTAS (b)	1,708,342	<b>2,135,300</b>	5,523,219	9,366,861
	<u>13,749,433</u>	<u><b>16,625,267</b></u>	21,218,161	51,592,860

(a) Includes anticipated Interest and Expenditure from 1 March 2008 to 30 Jun 2008.

(b) Future (2009-11) Expenditure figures for IMOS Office and UTAS include anticipated interest earnings not yet allocated to Facilities / Operators.

(c) The 2008/09 unspent balance of \$4.6m includes anticipated interest earnings to June 2008 of \$1.4m; plus a portion (circa 50% or \$4.8m) of the NCRIS funds advanced in 08/09 for the period Jul-Dec09.

**Table 2: Summary of all IMOS Facilities**

	<b>Original Budget</b>	Actual Jul06- Jun07	Estimate Jul07- Jun08	Estimate Jul08- Jun09	Estimate Jul09- Jun11	<b>Total Estimated Expenses</b>	Variance	
<b>DEST NCRIS Funding</b>								
1	Argo	5,754,000	0	884,000	1,600,000	3,270,000	5,754,000	0
2	SOOP	4,143,000	93,280	901,165	1,519,860	1,628,695	4,143,000	0
3	SOTS	3,900,000	0	1,315,000	1,142,000	1,443,000	3,900,000	0
4	ANFOG	4,200,000	77,768	1,632,232	1,030,000	1,460,000	4,200,000	0
5	AUV	400,000	0	150,000	175,000	75,000	400,000	0
6	ANMN	14,794,000	51,850	4,384,075	4,526,456	5,831,619	14,794,000	0
7	ACORN	5,460,000	70,349	1,000,000	3,087,651	1,302,000	5,460,000	0
8	AATAMS	1,740,000	6,864	636,285	654,000	442,851	1,740,000	0
9	FAIMMS	1,749,000	1,150	460,000	630,000	657,850	1,749,000	0
10	eMII	4,870,000	84,422	640,218	1,515,300	2,630,060	4,870,000	0
11	SRS	1,765,000	0	899,073	395,000	470,927	1,765,000	0
12	Office	1,225,000	161,702	300,000	350,000	413,298	1,225,000	0
		<b>50,000,000</b>	<b>547,385</b>	<b>13,202,048</b>	<b>16,625,267</b>	<b>19,625,300</b>	<b>50,000,000</b>	<b>0</b>
<b>Cash Co-investment</b>								
1	Argo	2,271,000	930,000	845,333	292,000	600,000	2,667,333	396,333
2	SOOP	4,785,000	739,210	834,000	760,000	1,440,000	3,773,210	-1,011,790
3	SOTS	602,000	230,397	108,000	108,000	108,000	554,397	-47,603
4	ANFOG	0	0	0	0	0	0	0
5	AUV	115,000	115,000	30,000	0	0	145,000	30,000
6	ANMN	4,292,000	79,000	970,000	670,000	890,000	2,609,000	-1,683,000
7	ACORN	550,000	0	536,000	10,000	20,000	566,000	16,000
8	AATAMS	1,250,000	0	0	1,250,000	0	1,250,000	0
9	FAIMMS	1,750,000	0	710,000	476,000	564,000	1,750,000	0
10	eMII	0	0	0	0	0	0	0
11	SRS	0	0	0	0	0	0	0
12	Office	1,250,000	198,000	263,000	263,000	526,000	1,250,000	0
		<b>16,865,000</b>	<b>2,291,607</b>	<b>4,296,333</b>	<b>3,829,000</b>	<b>4,148,000</b>	<b>14,564,940</b>	<b>-2,300,060</b>
<b>In-kind Co-investment</b>								
1	Argo	2,100,000	728,703	630,000	632,000	135,000	2,125,703	25,703
2	SOOP	4,746,000	821,381	991,404	953,854	1,865,990	4,632,629	-113,371
3	SOTS	1,389,000	367,103	795,000	132,000	220,000	1,514,103	125,103
4	ANFOG	721,000	21,410	248,590	144,000	307,000	721,000	0
5	AUV	1,014,000	745,000	239,000	81,000	0	1,065,000	51,000
6	ANMN	4,808,000	122,865	1,419,745	1,608,000	3,156,000	6,306,610	1,498,610
7	ACORN	1,698,000	801,500	246,000	265,000	530,000	1,842,500	144,500
8	AATAMS	1,261,000	0	120,000	423,000	313,000	856,000	-405,000
9	FAIMMS	2,297,000	23,059	500,000	750,000	1,960,000	3,233,059	936,059
10	eMII	1,884,000	86,991	479,000	469,000	852,000	1,886,991	2,991
11	SRS	2,032,000	98,603	630,996	609,864	487,730	1,827,193	-204,807
12	Office	695,000	143,746	200,000	200,000	377,833	921,579	226,579
		<b>24,645,000</b>	<b>3,960,361</b>	<b>6,499,735</b>	<b>6,267,718</b>	<b>10,204,553</b>	<b>26,932,367</b>	<b>2,287,367</b>
	<b>TOTALS</b>	<b>91,510,000</b>	<b>6,799,353</b>	<b>23,998,116</b>	<b>26,721,985</b>	<b>33,977,853</b>	<b>91,497,307</b>	<b>-12,692</b>

**Note:** Explanation of the Variance column is provided in the Co-investment by Organisation table

**Table 3: Co-investment by Organisation (Cash and In-kind)**

Organisation	Type	ABP				Total (Jul06- Jun11)	Original Budget	Variation	Notes
		Past (a) (Jul06- Jun08)	Period (Jul08- Jun09)	Future (Jul09- Jun11)					
ACCSP	In-kind	2,138,998	<b>1,180,000</b>	1,360,000	<b>4,678,998</b>	<b>4,735,000</b>	-56,002	a	
ACECRC	Cash	1,181,940	<b>188,000</b>	188,000	<b>1,557,940</b>	<b>1,626,000</b>	-68,060	a	
ACECRC	In-kind	207,902	<b>72,000</b>	75,000	<b>354,902</b>	<b>300,000</b>	54,902	a	
ACECRC/									
AGAD	In-kind	340,000			<b>340,000</b>	<b>340,000</b>	0		
AGAD	Cash				<b>0</b>	<b>311,000</b>	-311,000	b	
AGAD	In-kind	215,000	<b>106,000</b>	212,000	<b>533,000</b>	<b>520,000</b>	13,000	b	
AIMS	Cash	50,000			<b>50,000</b>	<b>50,000</b>	0		
AIMS	In-kind	1,709,678	<b>1,317,718</b>	2,547,560	<b>5,574,956</b>	<b>4,259,000</b>	1,315,956	c	
AODCJF	In-kind	48,423	<b>15,000</b>	30,000	<b>93,423</b>	<b>95,000</b>	-1,577	a	
BOM	Cash	624,000	<b>146,000</b>	292,000	<b>1,062,000</b>	<b>670,000</b>	392,000	d	
BOM	In-kind	587,963	<b>378,000</b>	500,160	<b>1,466,123</b>	<b>1,630,000</b>	-163,877	d	
CSIRO	Cash	537,000	<b>192,000</b>	400,000	<b>1,129,000</b>	<b>1,151,000</b>	-22,000	e	
CSIRO	In-kind	564,848	<b>370,000</b>	374,000	<b>1,308,848</b>	<b>1,168,000</b>	140,848	e	
CUT	In-kind	164,460	<b>138,000</b>	124,000	<b>426,460</b>	<b>346,000</b>	80,460	a	
DECC	In-kind	20,000	<b>20,000</b>	40,000	<b>80,000</b>	<b>80,000</b>	0		
DED	Cash	211,000	<b>138,000</b>	276,000	<b>625,000</b>	<b>625,000</b>	0		
DPI	In-kind		<b>303,000</b>	213,000	<b>516,000</b>	<b>516,000</b>	0		
DSTO	Cash	149,000			<b>149,000</b>	<b>350,000</b>	-201,000	f	
DSTO	In-kind	100,000			<b>100,000</b>	<b>100,000</b>	0		
FlindersUni	Cash	10,000	<b>5,000</b>	10,000	<b>25,000</b>	<b>25,000</b>	0		
FlindersUni	In-kind	86,000	<b>132,000</b>	266,000	<b>484,000</b>	<b>484,000</b>	0		
GA	In-kind	75,500	<b>50,000</b>	25,000	<b>150,500</b>	<b>193,000</b>	-42,500	a	
ISSNIP	In-kind	50,000	<b>50,000</b>	50,000	<b>150,000</b>	<b>150,000</b>	0		
JCU	In-kind	902,500	<b>225,000</b>	448,000	<b>1,575,500</b>	<b>1,581,000</b>	-5,500	a	
MHL	Cash				<b>0</b>	<b>740,000</b>	-740,000	g	
MHL	In-kind	192,000	<b>192,000</b>	384,000	<b>768,000</b>	<b>94,000</b>	674,000	g	
MNF	In-kind	501,000	<b>4,000</b>	8,000	<b>513,000</b>	<b>517,000</b>	-4,000	a	
OTN	Cash		<b>1,250,000</b>		<b>1,250,000</b>	<b>1,250,000</b>	0		
PortMap	In-kind	65,000			<b>65,000</b>		65,000	a	
QCIF	In-kind	50,000	<b>100,000</b>	360,000	<b>510,000</b>	<b>540,000</b>	-30,000	a	
RAN	Cash	848,000	<b>384,000</b>	768,000	<b>2,000,000</b>	<b>2,650,000</b>	-650,000	h	
RAN	In-kind	90,000	<b>10,000</b>	10,000	<b>110,000</b>	<b>50,000</b>	60,000	h	
SAGovt	Cash	516,000			<b>516,000</b>	<b>500,000</b>	16,000	a	
SARDI	Cash	10,000	<b>5,000</b>	10,000	<b>25,000</b>	<b>25,000</b>	0		
SARDI	In-kind	286,000	<b>194,000</b>	388,000	<b>868,000</b>	<b>1,209,000</b>	-341,000	i	
SDTI	Cash	1,610,000	<b>1,146,000</b>	1,454,000	<b>4,210,000</b>	<b>4,212,000</b>	-2,000	a	
SIMS	Cash	95,000			<b>95,000</b>	<b>65,000</b>	30,000	a	
SIMS	In-kind	726,890	<b>180,000</b>	170,000	<b>1,076,890</b>	<b>1,148,000</b>	-71,110	a	
SIO	Cash	496,000	<b>250,000</b>	500,000	<b>1,246,000</b>	<b>1,250,000</b>	-4,000	a	
SW	Cash				<b>0</b>	<b>740,000</b>	-740,000	j	
SW	In-kind	150,000	<b>150,000</b>	300,000	<b>600,000</b>		600,000	j	
TMN	In-kind	50,000	<b>300,000</b>	850,000	<b>1,200,000</b>	<b>1,225,000</b>	-25,000	a	
TPAC	In-kind	104,568	<b>50,000</b>	100,000	<b>254,568</b>	<b>250,000</b>	4,568	a	
UTAS	Cash	250,000	<b>125,000</b>	250,000	<b>625,000</b>	<b>625,000</b>	0		
UTAS	In-kind	763,367	<b>586,000</b>	1,063,833	<b>2,413,200</b>	<b>2,394,000</b>	19,200	a	
UWA	In-kind	270,000	<b>144,000</b>	307,000	<b>721,000</b>	<b>721,000</b>	0		
<b>TOTALS</b>		<b>17,048,037</b>	<b>10,095,718</b>	<b>14,353,553</b>	<b>41,497,308</b>	<b>41,510,000</b>	<b>-12,692</b>		

Notes to Table 3:

<b>Notes</b>	<b>Amount</b>	<b>Reason for variation</b>
a	-38,619	Eighteen minor variations individually <\$100,000 each
b	-298,000	AGAD - support for SOOP is cash not in-kind; plus recorded as \$100k for 08/09, 09/10 & 10/11 - should be \$1k pa
c	1,314,956	AIMS - Main increases are ANMN \$275k addnl long-term Heron Is. Mooring; \$991k FAIMMS manager addnl salary co-invest; \$66k addnl co-invest SRS
d	228,123	BOM - main increases are \$346k addnl Argo floats; \$41k addnl for SOOP; \$53k addnl for SOTS; and \$212k less for SRS due to office restructure (nil impact)
e	118,848	CSIRO - main increase is \$226k for support of the IMOS Office (not previously included)
f	-201,000	DSTO - for ANMN, awaiting final approval of budget for 08/09 (expected Jun08), and expected to be at least at original level promised
g	-66,000	MHL - will not be able to make up permanent difference in unused ship time 07/08 due to delayed start (adjust forward schedule to deliver as planned)
h	-590,000	RAN - original estimate for SOOP was circa \$150k pa over-estimated for 08-11; however this accounting error does not impact on planned delivery of the facility
i	-341,000	SARDI - advised additional in-kind for ACORN \$77k; also ship time worth \$416k was initially duplicated between ANMN & AATAMS (no impact on delivery)
j	-140,000	SW - will not be able to make up permanent difference in unused ship time 07/08 due to delayed start (adjust forward schedule to deliver as planned)
total	<u><u>-12,692</u></u>	

**Note:** Detailed budgets for each Facility are available in Attachment E.

## DRAFT COMMUNICATIONS PLAN (January 2008 to June 2009)

### 1. Brief background to IMOS

On 22 May 2007, the Integrated Marine Observing System (IMOS) entered into an agreement with the Australian Government, under the National Collaborative Research Infrastructure Strategy (NCRIS), to implement a \$94 million nation-wide collaborative program designed to observe the oceans around Australia, including the coastal oceans and the 'bluewater' open oceans, until June 2011. IMOS will provide data to support research on many of the critical marine issues facing Australia, including climate change and sustainability of ecosystems.

### 2. Purpose of the Communication Plan

The purpose of the communication plan is outline the communication activities necessary to engage and understand the needs of IMOS users and researchers, to ensure that business planning takes into account these needs and operational factors and communicates with stakeholders external to the IMOS community the benefits and longer plans and issues surrounding a sustainable marine observing system.

### 3. Introduction

Communication is essential to meeting the IMOS Principles, these being:

- **Service** - IMOS is a national system and will provide a service that broadly supports marine research to maximise the contributions of R&D to economic development, national security, social wellbeing and environmental sustainability.
- **Data-streams** - IMOS data will be delivered freely, openly, in a timely manner, preferably in near real time. Success will be measured in terms of the quality and quantity of data that IMOS delivers, the number of users and the quality of research-results produced with IMOS data.
- **Integration** - IMOS will deploy a nationally coordinated, multi-platform system to take advantage of the synergies between instruments, and to provide a comprehensive description of the ocean, as a contribution to national and international programs.
- **Sustainability** - The real value of IMOS will only emerge if systematic, repeated data collection continues for a long time to see the full range of climate variation and change. Sustained streams of data are integrally related to conservation and sustainable development of the marine environment.

Without effective communication, the marine community and stakeholders including funding bodies may not receive vital information, which will ultimately affect awareness and adoption of IMOS outputs and its sustainability.

## 4. About the Communication Plan

Implementation of this eighteen month communication plan for IMOS will allow us to set preliminary goals to establish effective two-way communication, establish a strong corporate culture and reputation, build a meaningful rapport and ensure ongoing commitment and support by all participants and other stakeholders.

The plan provides strategies which will foster improved collaboration, deliver knowledge and build and maintain IMOS activities. The plan also provides a clear framework for communication activities by guiding decision making, ensuring effective resource use and encouraging the participation of co-investors and staff. Lastly, the plan aims to provide the framework to deliver and aid the adoption of key messages and results of IMOS. For the next eighteen months of IMOS operations, it has been identified that establishing effective communications with stakeholders, particularly its participants is the number one priority. Linked to this plan, the strategy to ensure IMOS continues past June 2011 will be an agenda item at the March 2008 Advisory Board meeting.

## 5. Target Audiences

IMOS brings together the interests of a range of stakeholder groups both external and internal. These include staff, government, industry, research providers, industry participants and media. To ensure the differing nature and requirements of each group are achieved, five key target audiences have been identified:

- A. Operators and co-investors** – Provide regular and on-going updates to those organisations who contribute resources to IMOS (both cash and in-kind), about the IMOS activities to increase the profile and create recognition. This will act as a catalyst for regular information exchange and progress updates with the aim of developing strong internal relationships.
- B. Management, staff and students** – Keep the IMOS Board and all IMOS Committees, cash and in-kind funded staff, plus researchers and students working in IMOS related arenas, informed of the activities happening in IMOS and of the project progress. It is also important to recognise this group's significant contributions that have made IMOS successful.
- C. Other stakeholders** – The group covers all other key parties who are important to the success and future of IMOS, and includes DIISR, NCRIS Committee and HEEF, other commonwealth and state government departments, politicians, regional interest groups, international ocean observing organisations, educators, and lobby groups. Given the change in the Commonwealth Government, there is a particular need to ensure awareness and support from the Ministers of Environment Water, Heritage and the Arts and the Minister for Climate Change. IMOS needs to create awareness of its activities and may need to customise for specific sectors / stakeholders to increase the understanding of IMOS activities. This should ultimately achieve wide-spread use of the IMOS infrastructure and data streams.

**D. Media** – Create an awareness of IMOS and aid in the delivery of key messages to the general public. Communication with the media will increase targeted understanding of the research and public benefits of a sustained Australian-based marine observing system.

**E. Community** – Create and increase awareness of IMOS. Communication with the community about the benefits of IMOS will come from related extensions and media activities.

## **6. Communications activities for the period of this Plan**

The attached Table records the key communications-related activities planned for IMOS for the period of this plan.

## **7. Status of this plan**

The plan will be circulated to IMOS Nodes and facility leaders in early 2008 for comment. An amended plan will then be provided to the Advisory Board for its 18 March 2008 meeting, for discussion and approval.

## Key Communications activities for the period January 2008 to June 2009

Action	Audience	Timing	Outputs	Expected Outcomes	Responsibility	Budget (per annum)
<b>Staffing</b>						
Appoint a senior communications / networking manager	A B	September 2008	Development and implementation of the IMOS communications activities	Increased profile of IMOS	Director	Circa \$100,000
Appoint casual staff	A B C D E	On-going	Assist with day-to-day activities	Allow manager to focus on strategic items	Executive Officer	Circa \$20,000
<b>Website</b>						
Development of the new IMOS external website	A B C D E	January 2008	Up-to-date easily useable and maintained website	Increased profile of IMOS	Executive Officer / casual communications staff	\$15,000
Determine needs and develop internal IMOS website	A B	December 2008	Efficient communication tools for the key internal parties to IMOS	Improved internal communications	Communications Manager	\$15,000
<b>Policies, Procedures and Plans</b>						
Implement this plan	A B	June 2009	As listed in this plan	As listed in this plan	Executive Officer / Communications Manager	
Develop the next plan	A B	March 2009	Detailed planning for the 2009/10 year	On-going high-profile for IMOS	Communications Manager	
<b>Networking</b>						
Meet with key IMOS stakeholders	A B C	June 2009	Understanding of the key requirements of each stakeholder and what IMOS needs to do to meet these – this includes working with the Node managers to ensure regional issues are addressed	Improved communications with stakeholders	Executive Officer / Communications Manager	\$30,000
Annual planning meeting of IMOS	A B	February 2008 & 2009	Understanding of communications needs to ensure IMOS aims are met	Agreement on the key areas to concentrate on	Director	\$40,000 (times 2)

<b>Action</b>	<b>Audience</b>	<b>Timing</b>	<b>Outputs</b>	<b>Expected Outcomes</b>	<b>Responsibility</b>	<b>Budget (per annum)</b>
Link IMOS Plan to Communications Plans for the Operators	A B	December 2008	Understanding of communications plans for the Operators and how IMOS plans can link in	Agreement on the key areas to concentrate on	Communications Manager	
<b>Events and publicity</b>						
Identify relevant national and international conferences	A B C D E	On-going	Ensure IMOS is represented at national and international fora	Increased profile of IMOS	Director / Executive Assistant	
Plan a media strategy	C D E	On-going	Ensure IMOS achievements and expertise is well known	Increased profile of IMOS	Director / Executive Assistant	
Plan IMOS events in each Node and Canberra	A B C D E	March 2009	Targeted events for each region	Increased profile of IMOS	Director / Executive Assistant / Node leaders	
Marine Matters	A B C D E	On-going	Produce at least 4 issues each year	Increased profile of IMOS	Communications Manager	\$10,000
Annual user survey	A B C D E	December 2008	Targeted surveys to each key audience	Understanding of how successful IMOS is in meetings its goals	Communications Manager	\$2,000
Meetings with politicians and key influencers	C	On-going	Inform policy makers of IMOS; ensure IMOS presence at key forums (eg Science meets Parliament)	Awareness of IMOS and need for on-going funding	Director	
Facility fact sheets developed	C D E	December 2008	Concise summaries of the aims and achievements of each facility	Increased profile of IMOS	Communications Manager	\$2,000

## ATTACHMENT D

### Summary of Successful Proposals to access IMOS Infrastructure (subject to provision of additional information in some cases and to review in 2009)

	Facility	Title of proposal	Name of Lead Proposer	Affiliations	Infrastructure
1	AATAMS	Bass Strait acoustic curtains	Terry Walker	MAFFRI / EPA Victoria	2 AATAMS curtains
2	AUV	Marine archaeology in SA waters	Mark Staniforth	Archaeology, Flinders University	AUV use for 7 days
3	AUV	Habitat mapping of the St Joseph Banks Island group	Dr Sue Murray-Jones	SA DEH	AUV use for 2 cruises (2008 & 2009)
4	AUV	Benthic ecology of du Couedic Canyon	Dr David Currie	SARDI	AUV use for 5 days
5	AUV	Effectiveness of GABMP in protecting benthic biodiversity from the impacts of demersal trawling	Dr Tim Ward	SARDI	AUV use for 5 days
6	ANFOG	Exploring hydrography & fluorescence in the EAC, its eddy field & the Tasman Front	Mark Baird / Iain Suthers	UNSW / SIMS	1 Seaglider 1 Slocum Glider
7	ANFOG	Boundary & shelf currents : exchange with the shelves of SA & Victoria	Jochen Kaempf	Flinders University	1 Seaglider 1 Slocum Gliders
8	ANFOG	Monitoring the EAC with gliders	Ken Ridgway	CSIRO	1 Seaglider
9	ANFOG	Deployment of ocean gliders in WA as part of WAIMOS	Chari Pattiaratchi	UWA	Extend deployment of 1 Slocum and 2 Seagliders
10	ACORN	Waves and surface currents on the shelf & slope of SE Australia	Moninya Roughan	UNSW / SIMS	1 WERA array
11	ACORN	Boundary, shelf currents & exchange off the Bonney Coast : HF ocean radar	John Middleton	SARDI	1 CODAR array
12	ACORN	Deployment of HF radar systems in SW Australia as part of WAIMOS	Chari Pattiaratchi	UWA	Extend deployment of WERA and CODAR
13	SOOP	Instrumented Bass Strait crossing	Randall Lee	EPA Victoria	Incorporate into IMOS
14	ANMN	Calibration and validation of satellite altimeters in the Australian region	Richard Coleman	UTAS	Purchase of additional pressure gauge and ship deployment costs

Facility / Sub-Facility	Operator	Type	Organisation	Original Budget	Actual Expenses Jul06-Jun07	Estimate Expenses Jul07 - Jun08	Estimate Expenses Jul08-Jun09	Estimate Expenses Jul09-Jun11	Total Estimated Expenses	Variance
<b>01 Argo Australia</b>										
	CSIRO	Cash NCRIS	DEST	5,754,000		884,000	1,600,000	3,270,000	5,754,000	0
		Cash NCRIS Total		5,754,000	0	884,000	1,600,000	3,270,000	5,754,000	0
		Co-Inv Cash	ACECRC	620,000	370,000	228,333	0	0	598,333	-21,667
			BoM	500,000	280,000	280,000	100,000	200,000	860,000	360,000
			CSIRO	1,151,000	200,000	337,000	192,000	400,000	1,129,000	-22,000
			RAN	0	80,000	0	0	0	80,000	80,000
		Co-Inv Cash Total		2,271,000	930,000	845,333	292,000	600,000	2,667,333	396,333
		Co-Inv Inkind	ACCSP	1,500,000	477,871	500,000	500,000	0	1,477,871	-22,129
			ACECRC	300,000	85,000	70,000	72,000	75,000	302,000	2,000
			BoM	250,000	85,832	50,000	50,000	50,000	235,832	-14,168
			RAN	50,000	80,000	10,000	10,000	10,000	110,000	60,000
		Co-Inv Inkind Total		2,100,000	728,703	630,000	632,000	135,000	2,125,703	25,703
	CSIRO Total			10,125,000	1,658,703	2,359,333	2,524,000	4,005,000	10,547,036	422,036
<b>2 Ships of Opportunity</b>										
2a Multidisciplinary Underway Network	CSIRO	Cash NCRIS	DEST	3,194,000		630,000	1,271,000	1,293,000	3,194,000	0
		Cash NCRIS Total		3,194,000	0	630,000	1,271,000	1,293,000	3,194,000	0
		Co-Inv Cash	ACECRC	404,000	91,210	154,000	80,000	80,000	405,210	1,210
			BoM	170,000	18,000	46,000	46,000	92,000	202,000	32,000
			RAN	2,650,000	384,000	384,000	384,000	768,000	1,920,000	-730,000
			SIO	1,250,000	246,000	250,000	250,000	500,000	1,246,000	-4,000
		Co-Inv Cash Total		4,474,000	739,210	834,000	760,000	1,440,000	3,773,210	-700,790
		Co-Inv Inkind	ACCSP	3,235,000	481,127	680,000	680,000	1,360,000	3,201,127	-33,873
			AGAD	520,000	100,000	105,000	105,000	210,000	520,000	0
			CSIRO	100,000	100,068	0	0	0	100,068	68
		Co-Inv Inkind Total		3,855,000	681,195	785,000	785,000	1,570,000	3,821,195	-33,805
	CSIRO Total			11,523,000	1,420,405	2,249,000	2,816,000	4,303,000	10,788,405	-734,595
2b Sensors on Tropical Research Vessels	AIMS	Cash NCRIS	DEST	250,000	74,405	45,595	42,000	88,000	250,000	0
		Cash NCRIS Total		250,000	74,405	45,595	42,000	88,000	250,000	0
		Co-Inv Inkind	AIMS	350,000	18,126	99,173	67,114	137,530	321,943	-28,057
		Co-Inv Inkind Total		350,000	18,126	99,173	67,114	137,530	321,943	-28,057
	AIMS Total			600,000	92,531	144,768	109,114	225,530	571,943	-28,057

Facility / Sub-Facility	Operator	Type	Organisation	Original Budget	Actual Expenses Jul06-Jun07	Estimate Expenses Jul07-Jun08	Estimate Expenses Jul08-Jun09	Estimate Expenses Jul09-Jun11	Total Estimated Expenses	Variance
2c Sea Surface Temperature Sensors	BoM	Cash NCRIS	DEST	400,000	18,875	141,833	140,000	99,292	400,000	0
		Cash NCRIS Total		400,000	18,875	141,833	140,000	99,292	400,000	0
		Co-Inv Inkind	AIMS	90,000	78,260		11,740		90,000	0
			BoM	200,000	21,000	65,540	47,000	66,460	200,000	0
			CSIRO	70,000					0	-70,000
		Co-Inv Inkind Total		360,000	99,260	65,540	58,740	66,460	290,000	-70,000
<b>BOM Total</b>				<b>760,000</b>	<b>118,135</b>	<b>207,373</b>	<b>198,740</b>	<b>165,752</b>	<b>690,000</b>	<b>-70,000</b>
2d Research Vessel Real Time Air-Sea Flux	BoM	Cash NCRIS	DEST	299,000		83,737	66,860	148,403	299,000	0
		Cash NCRIS Total		299,000	0	83,737	66,860	148,403	299,000	0
		Co-Inv Cash	AGAD	311,000					0	-311,000
		Co-Inv Cash Total		311,000	0	0	0	0	0	-311,000
		Co-Inv Inkind	AGAD	0		10,000	1,000	2,000	13,000	13,000
			BoM	159,000	22,800	25,691	38,000	82,000	168,491	9,491
			MNF	22,000		6,000	4,000	8,000	18,000	-4,000
		Co-Inv Inkind Total		181,000	22,800	41,691	43,000	92,000	199,491	18,491
<b>BOM Total</b>				<b>791,000</b>	<b>22,800</b>	<b>125,428</b>	<b>109,860</b>	<b>240,403</b>	<b>498,491</b>	<b>-292,509</b>
			Cash NCRIS	4,143,000	93,280	901,165	1,519,860	1,628,695	4,143,000	0
			Co-inv Cash	4,785,000	739,210	834,000	760,000	1,440,000	3,773,210	-1,011,790
			Co-inv In-kind	4,746,000	821,381	991,404	953,854	1,865,990	4,632,629	-113,371
			SOOP Total	13,674,000	1,653,871	2,726,569	3,233,714	4,934,685	12,548,839	-1,125,161
<b>3 Southern Ocean Automated Time Series Observations</b>										
	BoM	Cash NCRIS	DEST	1,307,000		547,000	594,000	166,000	1,307,000	0
		Cash NCRIS Total		1,307,000	0	547,000	594,000	166,000	1,307,000	0
		Co-Inv Inkind	BoM	120,000	22,800	28,000	30,000	92,000	172,800	52,800
		Co-Inv Inkind Total		120,000	22,800	28,000	30,000	92,000	172,800	52,800
	<b>BoM Total</b>			<b>1,427,000</b>	<b>22,800</b>	<b>575,000</b>	<b>624,000</b>	<b>258,000</b>	<b>1,479,800</b>	<b>52,800</b>
	CSIRO	Cash NCRIS	DEST	914,000		246,000	278,000	390,000	914,000	0
		Cash NCRIS Total		914,000	0	246,000	278,000	390,000	914,000	0
		Co-Inv Inkind	CSIRO	274,000	70,201	70,000	70,000	64,000	274,201	201
		Co-Inv Inkind Total		274,000	70,201	70,000	70,000	64,000	274,201	201
	<b>CSIRO Total</b>			<b>1,188,000</b>	<b>70,201</b>	<b>316,000</b>	<b>348,000</b>	<b>454,000</b>	<b>1,188,201</b>	<b>201</b>

Facility / Sub-Facility	Operator	Type	Organisation	Original Budget	Actual Expenses Jul06-Jun07	Estimate Expenses Jul07 - Jun08	Estimate Expenses Jul08-Jun09	Estimate Expenses Jul09-Jun11	Total Estimated Expenses	Variance
	UTAS	Cash NCRIS	DEST	1,679,000		522,000	270,000	887,000	1,679,000	0
		Cash NCRIS Total		1,679,000	0	522,000	270,000	887,000	1,679,000	0
		Co-Inv Cash	ACECRC	602,000	230,397	108,000	108,000	108,000	554,397	-47,603
		Co-Inv Cash Total		602,000	230,397	108,000	108,000	108,000	554,397	-47,603
		Co-Inv Inkind	ACECRC	0	52,902				52,902	52,902
			ACECRC/AGA	340,000	170,000	170,000			340,000	0
			MNF	495,000		495,000			495,000	0
			UTAS	160,000	51,200	32,000	32,000	64,000	179,200	19,200
		Co-Inv Inkind Total		995,000	274,102	697,000	32,000	64,000	1,067,102	72,102
	UTAS Total			3,276,000	504,499	1,327,000	410,000	1,059,000	3,300,499	24,499
		Cash NCRIS		3,900,000	0	1,315,000	1,142,000	1,443,000	3,900,000	0
		Co-inv Cash		602,000	230,397	108,000	108,000	108,000	554,397	-47,603
		Co-inv In-kind		1,389,000	367,103	795,000	132,000	220,000	1,514,103	125,103
		SOTS Total		5,891,000	597,500	2,218,000	1,382,000	1,771,000	5,968,500	77,500
<b>4 Australian National Facility for Ocean Gliders</b>										
	UWA	Cash NCRIS	DEST	4,200,000	77,768	1,632,232	1,030,000	1,460,000	4,200,000	0
		Cash NCRIS Total		4,200,000	77,768	1,632,232	1,030,000	1,460,000	4,200,000	0
		Co-Inv Inkind	UWA	721,000	21,410	248,590	144,000	307,000	721,000	0
		Co-Inv Inkind Total		721,000	21,410	248,590	144,000	307,000	721,000	0
	UWA Total			4,921,000	99,178	1,880,822	1,174,000	1,767,000	4,921,000	0
<b>5 Autonomous Underwater Vehicle Facility</b>										
	SIMS	Cash NCRIS	DEST	400,000		150,000	175,000	75,000	400,000	0
		Cash NCRIS Total		400,000	0	150,000	175,000	75,000	400,000	0
		Co-Inv Cash	AIMS	50,000	50,000				50,000	0
			SIMS	65,000	65,000	30,000			95,000	30,000
		Co-Inv Cash Total		115,000	115,000	30,000	0	0	145,000	30,000
		Co-Inv Inkind	AIMS	120,000	120,000				120,000	0
			CSIRO	68,000		68,000			68,000	0
			DSTO	100,000	50,000	50,000			100,000	0
			JCU	8,000					0	-8,000
			SIMS	718,000	575,000	81,000	81,000		737,000	19,000
			SARDI	0		40,000			40,000	40,000
		Co-Inv Inkind Total		1,014,000	745,000	239,000	81,000	0	1,065,000	51,000
	SIMS Total			1,529,000	860,000	419,000	256,000	75,000	1,610,000	81,000

Facility / Sub-Facility	Operator	Type	Organisation	Original Budget	Actual Expenses Jul06-Jun07	Estimate Expenses Jul07 - Jun08	Estimate Expenses Jul08-Jun09	Estimate Expenses Jul09-Jun11	Total Estimated Expenses	Variance
<b>6 Australian National Mooring Network</b>										
6a Queensland and Northern Australia	AIMS	Cash NCRIS	DEST	2,684,000	51,850	900,000	750,000	982,150	2,684,000	0
		Cash NCRIS Total		2,684,000	51,850	900,000	750,000	982,150	2,684,000	0
		Co-Inv Cash	SDTI	2,462,000		900,000	670,000	890,000	2,460,000	-2,000
		Co-Inv Cash Total		2,462,000	0	900,000	670,000	890,000	2,460,000	-2,000
		Co-Inv Inkind	AIMS	2,592,000	17,261	650,000	720,000	1,480,000	2,867,261	275,261
		Co-Inv Inkind Total		2,592,000	17,261	650,000	720,000	1,480,000	2,867,261	275,261
	AIMS Total			7,738,000	69,111	2,450,000	2,140,000	3,352,150	8,011,261	273,261
6b NSW	SIMS	Cash NCRIS	DEST	2,389,000		720,075	803,456	865,469	2,389,000	0
		Cash NCRIS Total		2,389,000	0	720,075	803,456	865,469	2,389,000	0
		Co-Inv Cash	SW / MHL	1,480,000		0	0	0	0	-1,480,000
		Co-Inv Cash Total		1,480,000	0	0	0	0	0	-1,480,000
		Co-Inv Inkind	DECC	80,000		20,000	20,000	40,000	80,000	0
			MHL	0		192,000	192,000	384,000	768,000	768,000
			MHL / DECC	94,000		0	0	0	0	-94,000
			SIMS	430,000	14,144	56,745	100,000	170,000	340,889	-89,111
			SW	0		150,000	150,000	300,000	600,000	600,000
		Co-Inv Inkind Total		604,000	14,144	418,745	462,000	894,000	1,788,889	1,184,889
	SIMS Total			4,473,000	14,144	1,138,820	1,265,456	1,759,469	4,177,889	-295,111
6c Southern Australia	SARDI	Cash NCRIS	DEST	2,834,000		1,319,000	553,000	962,000	2,834,000	0
		Cash NCRIS Total		2,834,000	0	1,319,000	553,000	962,000	2,834,000	0
		Co-Inv Inkind	Flinders Uni	422,000		62,000	120,000	240,000	422,000	0
			SARDI	730,000	41,000	149,000	166,000	332,000	688,000	-42,000
		Co-Inv Inkind Total		1,152,000	41,000	211,000	286,000	572,000	1,110,000	-42,000
	SARDI Total			3,986,000	41,000	1,530,000	839,000	1,534,000	3,944,000	-42,000
6d Western Australia	CSIRO	Cash NCRIS	DEST	1,987,000		700,000	810,000	477,000	1,987,000	0
		Cash NCRIS Total		1,987,000	0	700,000	810,000	477,000	1,987,000	0
		Co-Inv Inkind	CSIRO	130,000		30,000	30,000	70,000	130,000	0
		Co-Inv Inkind Total		130,000	0	30,000	30,000	70,000	130,000	0
	CSIRO Total			2,117,000	0	730,000	840,000	547,000	2,117,000	0

Facility / Sub-Facility	Operator	Type	Organisation	Original Budget	Actual Expenses Jul06-Jun07	Estimate Expenses Jul07-Jun08	Estimate Expenses Jul08-Jun09	Estimate Expenses Jul09-Jun11	Total Estimated Expenses	Variance
6e Acoustic Observatories	Curtin	Cash NCRIS	DEST	705,000		195,000	215,000	295,000	705,000	0
		Cash NCRIS Total		705,000	0	195,000	215,000	295,000	705,000	0
		Co-Inv Cash	DSTO	350,000	79,000	70,000			149,000	-201,000
		Co-Inv Cash Total		350,000	79,000	70,000	0	0	149,000	-201,000
		Co-Inv Inkind	CUT	250,000	50,460	90,000	90,000	100,000	330,460	80,460
		Co-Inv Inkind Total		250,000	50,460	90,000	90,000	100,000	330,460	80,460
	Curtin Total			1,305,000	129,460	355,000	305,000	395,000	1,184,460	-120,540
6f National Reference Stations Analysis & C	CSIRO	Cash NCRIS	DEST	3,635,000		550,000	875,000	2,210,000	3,635,000	0
		Cash NCRIS Total		3,635,000	0	550,000	875,000	2,210,000	3,635,000	0
		Co-Inv Inkind	CSIRO	80,000		20,000	20,000	40,000	80,000	0
		Co-Inv Inkind Total		80,000	0	20,000	20,000	40,000	80,000	0
	CSIRO Total			3,715,000	0	570,000	895,000	2,250,000	3,715,000	0
6g Satellite Ocean Colour Calibration/Valida	CSIRO	Cash NCRIS	DEST	560,000		0	520,000	40,000	560,000	0
		Cash NCRIS Total		560,000	0	0	520,000	40,000	560,000	0
	CSIRO Total			560,000	0	0	520,000	40,000	560,000	0
		Cash NCRIS		14,794,000	51,850	4,384,075	4,526,456	5,831,619	14,794,000	0
		Co-inv Cash		4,292,000	79,000	970,000	670,000	890,000	2,609,000	-1,683,000
		Co-inv In-kind		4,808,000	122,865	1,419,745	1,608,000	3,156,000	6,306,610	1,498,610
		ANMF Total		23,894,000	253,715	6,773,820	6,804,456	9,877,619	23,709,610	-184,390
<b>7 Australian Coastal Ocean Radar Network</b>										
	JCU	Cash NCRIS	DEST	5,460,000	70,349	1,000,000	3,087,651	1,302,000	5,460,000	0
		Cash NCRIS Total		5,460,000	70,349	1,000,000	3,087,651	1,302,000	5,460,000	0
		Co-Inv Cash	Flinders Uni	25,000		10,000	5,000	10,000	25,000	0
		Co-Inv Cash	SARDI	25,000		10,000	5,000	10,000	25,000	0
		Co-Inv Cash Total		50,000	0	20,000	10,000	20,000	50,000	0
		Co-Inv Inkind	JCU	1,573,000	696,500	206,000	225,000	448,000	1,575,500	2,500
		Co-Inv Inkind	PortMap P/L	0	65,000				65,000	65,000
		Co-Inv Inkind Total		1,573,000	761,500	206,000	225,000	448,000	1,640,500	67,500
	JCU Total			7,083,000	831,849	1,226,000	3,322,651	1,770,000	7,150,500	67,500
	SARDI	Co-Inv Cash	SA Govt	500,000		516,000			516,000	16,000
		Co-Inv Cash Total		500,000	0	516,000	0	0	516,000	16,000
		Co-Inv Inkind	Flinders Uni	62,000	12,000	12,000	12,000	26,000	62,000	0
		Co-Inv Inkind	SARDI	63,000	28,000	28,000	28,000	56,000	140,000	77,000
		Co-Inv Inkind Total		125,000	40,000	40,000	40,000	82,000	202,000	77,000
	SARDI Total			625,000	40,000	556,000	40,000	82,000	718,000	93,000

Facility / Sub-Facility	Operator	Type	Organisation	Original Budget	Actual Expenses Jul06-Jun07	Estimate Expenses Jul07 - Jun08	Estimate Expenses Jul08-Jun09	Estimate Expenses Jul09-Jun11	Total Estimated Expenses	Variance
			Cash NCRIS	5,460,000	70,349	1,000,000	3,087,651	1,302,000	5,460,000	0
			Co-inv Cash	550,000	0	536,000	10,000	20,000	566,000	16,000
			Co-inv In-kind	1,698,000	801,500	246,000	265,000	530,000	1,842,500	144,500
			<b>ANMF Total</b>	<b>7,708,000</b>	<b>871,849</b>	<b>1,782,000</b>	<b>3,362,651</b>	<b>1,852,000</b>	<b>7,868,500</b>	<b>160,500</b>
<b>8 Australian Acoustic Tagging and Monitoring System</b>										
	SIMS	Cash NCRIS	DEST	1,740,000	6,864	636,285	654,000	442,851	1,740,000	0
		Cash NCRIS Total		1,740,000	6,864	636,285	654,000	442,851	1,740,000	0
		Co-Inv Cash	OTN	1,250,000		0	1,250,000	0	1,250,000	0
		Co-Inv Cash Total		1,250,000	0	0	1,250,000	0	1,250,000	0
		Co-Inv Inkind	AIMS	329,000		120,000	120,000	100,000	340,000	11,000
			DPI	516,000		0	303,000	213,000	516,000	0
			SARDI	416,000					0	-416,000
		Co-Inv Inkind Total		1,261,000	0	120,000	423,000	313,000	856,000	-405,000
	SIMS Total			4,251,000	6,864	756,285	2,327,000	755,851	3,846,000	-405,000
<b>9 Facility for Automated Intelligent Monitoring of Marine Systems</b>										
	AIMS	Cash NCRIS	DEST	1,749,000	1,150	460,000	630,000	657,850	1,749,000	0
		Cash NCRIS Total		1,749,000	1,150	460,000	630,000	657,850	1,749,000	0
		Co-Inv Cash	SDTI	1,750,000		710,000	476,000	564,000	1,750,000	0
		Co-Inv Cash Total		1,750,000	0	710,000	476,000	564,000	1,750,000	0
		Co-Inv Inkind	AIMS	382,000	23,059	350,000	300,000	700,000	1,373,059	991,059
			ISSNIP	150,000		50,000	50,000	50,000	150,000	0
			QCIF	540,000		50,000	100,000	360,000	510,000	-30,000
			TMN	1,225,000		50,000	300,000	850,000	1,200,000	-25,000
		Co-Inv Inkind Total		2,297,000	23,059	500,000	750,000	1,960,000	3,233,059	936,059
	AIMS Total			5,796,000	24,209	1,670,000	1,856,000	3,181,850	6,732,059	936,059

Facility / Sub-Facility	Operator	Type	Organisation	Original Budget	Actual Expenses Jul06-Jun07	Estimate Expenses Jul07 - Jun08	Estimate Expenses Jul08-Jun09	Estimate Expenses Jul09-Jun11	Total Estimated Expenses	Variance
<b>10 eMarine Information Infrastructure</b>										
	Operator	Type	Organisation	Original Budget	Actual Jul06-Jun07	Estimate Expenses Jul07 - Jun08	Estimate Expenses Jul08-Jun09	Estimate Expenses Jul09-Jun11	Total Estimated Expenses	Variance
	UTAS	Cash NCRIS	DEST	4,870,000	84,422	640,218	1,515,300	2,630,060	4,870,000	0
		Cash NCRIS Total		4,870,000	84,422	640,218	1,515,300	2,630,060	4,870,000	0
		Co-Inv Inkind	AODCJF	95,000	23,423	25,000	15,000	30,000	93,423	-1,577
			TPAC	250,000	54,568	50,000	50,000	100,000	254,568	4,568
			UTAS	1,539,000	9,000	404,000	404,000	722,000	1,539,000	0
		Co-Inv Inkind Total		1,884,000	86,991	479,000	469,000	852,000	1,886,991	2,991
	UTAS Total			6,754,000	171,413	1,119,218	1,984,300	3,482,060	6,756,991	2,991
<b>11 Satellite Remote Sensing</b>										
11a Australian Satellite SST L2P Products	BoM	Cash NCRIS	DEST	604,000		174,073	113,000	316,927	604,000	0
		Cash NCRIS Total		604,000	0	174,073	113,000	316,927	604,000	0
		Co-Inv Inkind	BoM	409,000	38,000	143,300	83,000	144,700	409,000	0
		Co-Inv Inkind Total		409,000	38,000	143,300	83,000	144,700	409,000	0
	BoM Total			1,013,000	38,000	317,373	196,000	461,627	1,013,000	0
11b Australian Ocean Remote Sensing Data	CSIRO	Cash NCRIS	DEST	583,000		303,000	220,000	60,000	583,000	0
		Cash NCRIS Total		583,000	0	303,000	220,000	60,000	583,000	0
		Co-Inv Inkind	AIMS	96,000		24,000	48,000	24,000	96,000	0
			BoM	492,000	5,400	79,600	130,000	65,000	280,000	-212,000
			CSIRO	430,000	30,545	99,455	200,000	100,000	430,000	0
			CUT	96,000		24,000	48,000	24,000	96,000	0
			GA	115,000	15,000	25,000	50,000	25,000	115,000	0
		Co-Inv Inkind Total		1,229,000	50,945	252,055	476,000	238,000	1,017,000	-212,000
	CSIRO Total			1,812,000	50,945	555,055	696,000	298,000	1,600,000	-212,000
11c Upgrade Hobart Ground Station	GA	Cash NCRIS	DEST	200,000		185,000	15,000		200,000	0
		Cash NCRIS Total		200,000	0	185,000	15,000	0	200,000	0
		Co-Inv Inkind	CSIRO	16,000					0	-16,000
			GA	78,000	7,500	28,000			35,500	-42,500
		Co-Inv Inkind Total		94,000	7,500	28,000	0	0	35,500	-58,500
	GA Total			294,000	7,500	213,000	15,000	0	235,500	-58,500

Facility / Sub-Facility	Operator	Type	Organisation	Original Budget	Actual Expenses Jul06-Jun07	Estimate Expenses Jul07 - Jun08	Estimate Expenses Jul08-Jun09	Estimate Expenses Jul09-Jun11	Total Estimated Expenses	Variance
11c Upgrade Townsville Ground Station	AIMS	Cash NCRIS	DEST	378,000		237,000	47,000	94,000	378,000	0
		Cash NCRIS Total		378,000	0	237,000	47,000	94,000	378,000	0
		Co-Inv Inkind	AIMS	300,000	2,158	207,641	50,864	105,030	365,693	65,693
		Co-Inv Inkind Total		300,000	2,158	207,641	50,864	105,030	365,693	65,693
	AIMS Total			678,000	2,158	444,641	97,864	199,030	743,693	65,693
		Cash NCRIS		1,765,000	0	899,073	395,000	470,927	1,765,000	0
		Co-inv In-kind		2,032,000	98,603	630,996	609,864	487,730	1,827,193	-204,807
		ANMF Total		3,797,000	98,603	1,530,069	1,004,864	958,657	3,592,193	-204,807
<b>12 IMOS Office</b>										
	UTAS	Cash NCRIS	DEST	1,225,000	161,702	300,000	350,000	413,298	1,225,000	0
		Cash NCRIS Total		1,225,000	161,702	300,000	350,000	413,298	1,225,000	0
		Co-Inv Cash	DED	625,000	73,000	138,000	138,000	276,000	625,000	0
			UTAS	625,000	125,000	125,000	125,000	250,000	625,000	0
		Co-Inv Cash Total		1,250,000	198,000	263,000	263,000	526,000	1,250,000	0
		Co-Inv Inkind	CSIRO	0	26,579	50,000	50,000	100,000	226,579	226,579
			UTAS	695,000	117,167	150,000	150,000	277,833	695,000	0
		Co-Inv Inkind Total		695,000	143,746	200,000	200,000	377,833	921,579	226,579
	UTAS Total			3,170,000	503,448	763,000	813,000	1,317,131	3,396,579	226,579
<b>TOTALS</b>										
		Cash NCRIS		50,000,000	547,385	13,202,048	16,625,267	19,625,300	50,000,000	0
		Co-Inv Cash		16,865,000	2,291,607	4,296,333	3,829,000	4,148,000	14,564,940	-2,300,060
		Co-Inv Inkind		24,645,000	3,960,361	6,499,735	6,267,718	10,204,553	26,932,367	2,287,367
				91,510,000	6,799,353	23,998,116	26,721,985	33,977,853	91,497,307	-12,693

## ATTACHMENT F

### LIST OF ACRONYMS

<b>Acronym</b>	<b>Full Title</b>
AAD	Australian Antarctic Division
AARNet	Australian Academic and Research Network
AAS	Australian Antarctic Science
AATAMS	Australian Acoustic Tagging and Monitoring System (Facility 8)
ACCSP	Australian Climate Change Science Programme
ACECRC	Antarctic Climate and Ecosystems Collaborative Research Centre
ACFR	Australian Centre for Field Robotics
ACMA	Australian Communications and Media Authority
ACORN	Australian Coastal Ocean Radar Network (Facility 7)
ADCP	Acoustic Doppler Current Profiler
ADMT	Argo Data Management Team -International
ADO	Australian Defence Organisation
AGAD	Australian Government Antarctic Division
AIMS	Australian Institute of Marine Science
AMOS	Australian Meteorology and Oceanography Society
AMSA	Australian Marine Sciences Association
ANFOG	Australian National Facility for Ocean Gliders (Facility 4)
ANMN	Australian National Mooring Network (Facility 6)
ANZLIC	The Spatial Information Council of Australia and New Zealand
AODC	Australian Ocean Data Centre
AODCJF	Australian Ocean Data Centre Joint Facility
AODN	Australian Ocean Data Network
AO-DAAC	Australian Ocean [Remote Sensing Data] Distributed Archive and Access Centre
APEX	Autonomous Profiling Explorer Argo Floats
ARC	Australian Research Council
Argo	Argo Australia (Facility 1)
AusCPR	Australian Continuous Plankton Recorder
AUV	Autonomous Underwater Vehicle Facility (Facility 5)
AVHRR	Advanced Very High Resolution Radiometer
AVOF	Australian Volunteer Observing Fleet
AWS	automatic weather stations
Bluewater	Bluewater and Climate Node
BMRC	Bureau of Meteorology Research Centre
BoM	Bureau of Meteorology
CART	Coastal Acoustic Release Transponder
CDOM	dissolved organic matter
Chl	Chlorophyll
CMAR	CSIRO Marine and Atmospheric Research

<b>Acronym</b>	<b>Full Title</b>
CMST	The Centre for Marine Science and Technology (based at CUT)
CODAR	Brand name for equipment
CPR	Continuous Plankton Recorder
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSIRO ICT	CSIRO Information and Communication Technologies
CTD	Conductivity Temperature Depth
CUT	Curtin University of Technology
DECC	Department of Environment and Climate Change (NSW)
DED	Department of Economic Development (Tas)
DEST	Department of Education, Science & Training
DIISR	Department of Innovation, Industry, Science and Research
DMQC	Delayed Mode Quality Control system
DPI	Department of Primary Industries (NSW)
DSTO	Department of Defence (Defence Science and Technology Organisation)
EAC	Eastern Australian Current
eMII	electronic Marine Information Infrastructure (Facility 10)
EPA Vic	Environment Protection Authority Victoria
ERS-2	European Remote-Sensing Satellite-2
FAIMMS	Facility for Automated Intelligent Monitoring of Marine Systems (Facility 9)
GA	Geoscience Australia
GBR	Great Barrier Reef
GBRMPA	Great Barrier Reef Marine Park Authority
GBROOS	Great Barrier Reef Ocean Observing System (Node)
GHRSSST-PP	Global High Resolution Sea Surface Temperature Pilot Project (UK )
GODAE	Global Ocean Data Assimilation Experiment
GOOS	Global Ocean Observing System
GOSUD	Global Ocean Surface Underway Data
GTS	Global Telecommunications System
GUI	Graphical User Interface
HPCCC	Joint Bureau of Meteorology/CSIRO High Performance Computing and Communications Centre
HRPT	High Resolution Picture Transmission
ICRS	International Coral Reef Symposium
IMOS	Integrated Marine Observing System
IOOS	Integrated Ocean Observing System - US
IPR	Intellectual Property Rights
ISSNIP	Intelligent Sensors, Sensor Networks and Information Processing Network
iVEC	Interactive Virtual Environments Centre
JCU	James Cook University
L2P	GHRSSST-PP Level-2 Pre-processed data format for satellite sea surface temperature
L3P	GHRSSST-PP Level-3 Pre-processed data format for satellite sea surface temperature
MAFFRI	Marine and Freshwater Fisheries Research Institute

<b>Acronym</b>	<b>Full Title</b>
MCP	Marine Community Profile
MEST	Metadata Entry and Search Tool
MHL	Manly Hydraulics Laboratory
MNF	Marine National Facility
MODIS	Moderate Resolution Imaging Spectro-radiometer
MTSAT-1R	Japan's Multi-functional Transport Satellite
NCRIS	National Collaborative Research Infrastructure Strategy
NeAT	National eResearch Architecture Taskforce
NOAA	National Oceans and Atmospheric Administration (USA)
NRM	National Resource Management
NRS	National Reference Station mooring
NSWIMOS	New South Wales Integrated Marine Observing System (Node)
ISO	International Standards Organisation
OAS	Obstacle Avoidance Sonar
OceanSITES	Ocean Sustained Interdisciplinary Timeseries Environment observation System
OcP	Oceans Portal
OPeNDAP	Open-source Project for a Network Data Access Protocol
ORG	Optical Rain Gauge
OSDM	Office of Spatial Data Management
OTN	Ocean Tracking Network
PIRVic	Primary Industries Research Victoria
PO.DAAC	Physical Oceanography Distributed Active Archive Center is located at the NASA Jet Propulsion Laboratory (JPL)
POST	Pacific Ocean Shelf Tracking
PULSE	Brand name for equipment
QCIF	Queensland Cyber Infrastructure Foundation
RAN	Royal Australian Navy (Directorate of Oceanography and Meteorology)
SA DEH	South Australia Department of Environment & Heritage
SAMOS	Shipboard Automated Meteorological and Oceanographic System
SAIMOS	South Australian Integrated Marine Observing System (Node)
SARDI	South Australian Research and Development Institute
SATRAX700	Brand of x-band satellite system
SCOR WG	Scientific Committee on Oceanic Research Working Group
SDTI	Department of State Development, Trade and Innovation (Qld)
SIMS	Sydney Institute of Marine Science (was SHIMS)
SIO	Scripps Institute of Oceanography (USA)
SOOP	Enhancing Measurement Programs from Ships of Opportunity (Facility 2)
SOFS	Southern Ocean Flux Station Meteorological Mooring
SOTS	Southern Ocean Time Series (Facility 3)
SRS	Satellite Remote Sensing (Facility 11)
SST	Sea Surface Temperature
SW	Sydney Water
TERSS	Tasmanian Earth Resources Satellite Station

<b>Acronym</b>	<b>Full Title</b>
TMN	Tropical Marine Network
TPAC	Tasmanian Partnership for Advanced Computing
T/S	Temperature/Salinity
US NODC	United States National Oceanographic Data Center
UNSW	University of New South Wales
UQ	University of Queensland
UTAS	University of Tasmania
UWA	University of Western Australia
VOS	Volunteer Observing Ships
VR2W	Submersible, single channel receiver with wireless technology capable of identifying coded transmitters, produced by the company VEMCO
WAIMOS	Western Australia Integrated Marine Observing System (Node)
WAMSI	Western Australia Marine Science Institute
WASTAC	Western Australian Satellite Technology and Applications Consortium
WERA	Brand name for equipment
WHOI	Woods Hole Oceanographic Institute
WMO	World Meteorological Organization
WMS	Web Map Services
XBT	Expendable bathy-thermograph