

KIMBERLEY MARINE RESEARCH PROGRAM STRATEGY

**Report to the WAMSI Board on the general directions and process to
develop the Kimberley Marine Research Program Plan**

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July 2011



EXECUTIVE SUMMARY

The draft Kimberley Marine Research Program Strategy outlines the proposed geographical emphasis, research themes, management questions/issues, nominal funding and process to develop the Kimberley Marine Research Program Plan by 31 October 2011. The Plan is a key element of the State Funding Agreement to be signed between WAMSI and the Western Australian Government in November /December 2011. The draft Strategy has been considered by the WAMSI Strategic Programs Committee and Operational Group prior to being presented to the WAMSI Board for their consideration at the 11 August 2011 meeting.

1. INTRODUCTION

In May 2011 the Western Australian Government released the Kimberley Science and Conservation Strategy (KSCS)¹ “... to recognize and conserve one of the world’s last great wilderness areas”. Funding for the KSCS was announced as part of the State budget on 19 May and included \$12 M over 6 years, from 2011/12, for the Kimberley Marine Research Program (KMRP)². The goal of the KMRP is to undertake a program of marine research to support the management of the proposed State marine parks at Camden Sound, North Kimberley, Roebuck Bay and Eighty Mile Beach and the coastal waters outside of these proposed marine parks (Figure 1). Other related State funding for the Kimberley includes funding for the Integrated Marine Observing System (IMOS) of \$2.2M for research infrastructure and ~ \$15.2 M over 4 years³, from 2011/12, to DEC and DoF for the management of the proposed Camden Sound and Eighty Mile Beach marine parks, which includes further funds for monitoring and research activities within these marine parks. Funding for the proposed North Kimberley and Roebuck Bay marine parks will be considered in future State budgets.

Dr Chris Simpson of DEC was appointed Interim Node Leader for the KMRP at the WAMSI Board meeting on the 26 May. Action 3 from a meeting between WAMSI and DEC, DoF and DoC on 7 July 2011 was for Dr Simpson to “*Write a background paper outlining key information requirements, broad research areas and indicative levels of State Government funding* (for a program of marine research in the Kimberley) ...”. In subsequent discussions with the WAMSI CEO, it was agreed the document would be called the Kimberley Marine Research Program Strategy (Strategy). The purpose of the Strategy is to outline the general intent, directions and process to develop the Kimberley Marine Research Program Plan (Plan). The Plan is due in late October for inclusion in the State Funding Agreement for sign-off in November/December 2011.

The research direction in the Strategy is consistent with the KSCS and the research themes are broadly based on the December 2010 State Government Strategic Marine Research Priorities report⁴ which includes much of the WAMSI MRI proposal to DoC in October 2010 and other documents such as the WAMSI report *A Turning of the Tide: Science Decisions in the Kimberley-Browse Marine Region*. The institutional priorities

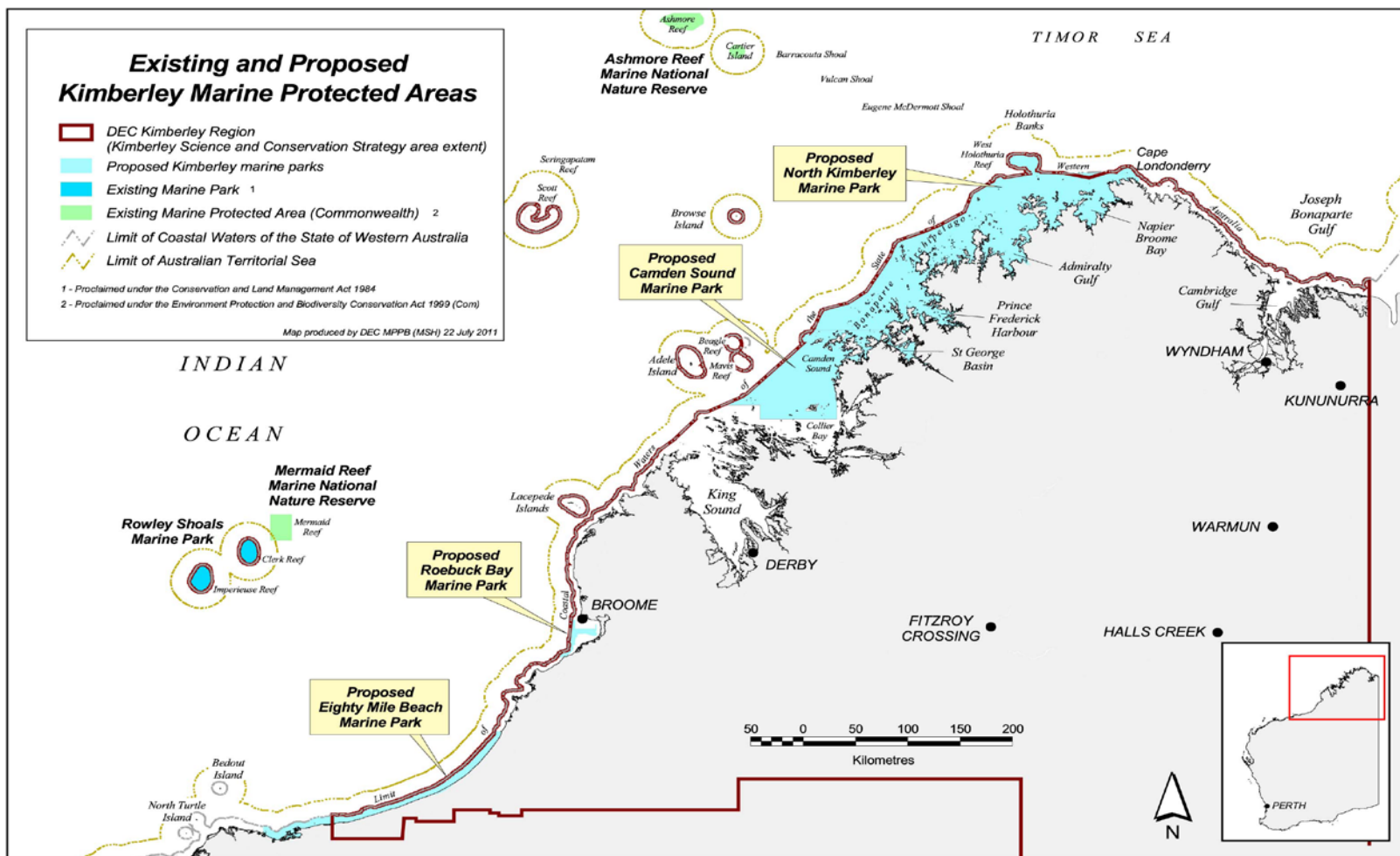
¹ Kimberley Science and Conservation Strategy, Government of Western Australia, May 2011.

² Referred to in the WA Government 2011/12 Budget as the Kimberley Science and Conservation Strategy- Western Australian Marine Science Institution.

³ Further ongoing funding of \$3.7M p.a. will be provided from 2015/16.

⁴ State Government Strategic Marine Research Priorities in relation to the Kimberley Science and Conservation Strategy and WAMSI 2, Departments of Environment and Conservation, Fisheries, Commerce and Office of the EPA, December 2010.

Figure 1: Map of the Kimberley showing Kimberley Science and Conservation Strategy boundary and existing and proposed Marine Parks.



of AIMS and CSIRO and the research interests of local universities have been broadly considered and further input has been provided through the WAMSI Strategic Programs Committee (SPC) and Operational Group(OP)⁵ meetings on 28 July and 1 August 2011, respectively.⁶ The interests of these organizations will be further considered through direct consultation in the development of the Plan. The response by AIMS and CSIRO to the December 2010 State priorities document confirmed the high degree of alignment between State and Commonwealth marine research priorities in the Kimberley.

The comments of the SPC and OP have been incorporated and the draft Strategy will be presented to the WAMSI Board for consideration at their meeting on 11 August 2011.

2. GEOGRAPHICAL EMPHASIS

The coastal waters of the Kimberley are extensive, remote and ecologically complex. In addition, scientific knowledge about most of the area is limited. While the total investment by State and Commonwealth governments is likely to significantly exceed the \$14.2M⁷ State Government investment, the total area of coastal waters is too large to investigate in its entirety. Therefore, the relative geographical emphasis of the KMRP is a critical consideration to maximize the benefits of the public investment in marine research in the Kimberley region.

The geographical 'boundary' of the Kimberley Science and Conservation Strategy is shown in Figure 1 and includes all the State coastal waters from the south-western end of Eighty Mile Beach to the Northern Territory border. As outlined above, a primary focus of the State Government funding for marine research in the Kimberley is to support the management of the proposed marine parks at Eighty Mile Beach, Roebuck Bay, Camden Sound and North Kimberley (Figure 1). The locations of these proposed marine parks should therefore be a key consideration for the geographical focus of the KMRP.

Over the past five years, significant marine environmental research has been funded by Woodside and the State and Commonwealth Governments to understand the ecology of the coastal waters off the Dampier Peninsula. This research was focused on providing an improved understanding of the potential marine environmental impacts associated with the development of an industrial hub at James Price Point. Over the same period, a major research program funded by Woodside and the Australian Institute of Marine Science investigated aspects of the ecology of Scott Reef, the largest emergent offshore coral reef ecosystem in the Kimberley. This research focused on improving the understanding of the potential impacts of developing the offshore oil and gas resources in the Browse Basin. Further marine environmental research off the Dampier Peninsula and offshore will be required and funded by industry to support the approvals process as specific development proposals undergo environmental impact assessment (EIA). Furthermore, the EIA conditional approvals process will impose marine monitoring requirements and, potentially, environmental offsets that will likely include funding for marine research and enhanced on-ground management (e.g. compliance programs). The State Government would seek to align these environmental offset marine research and monitoring programs with the Kimberley Marine Research Program

⁵ The Operational Group will oversee the development of the Plan and has representatives from WAMSI, DEC, DoF, DoC, DPC and the Commonwealth agencies.

⁶ Other organizations such as Customs, GA, Coastwatch, Navy, RMP and int'l initiatives in N Aust (e.g. AFTSEA) will be assessed for synergies with the KMRP.

⁷ Includes \$2.2 M for IMOS.

While acknowledging the entire area of the KSCS is worthy of some level of research attention, it appears from the above that the **highest geographical priority of the KMRP would logically be the area from Carnot Bay⁸, on the central Dampier Peninsula, to Cape Londonderry**. This is the most ecologically complex and representative area of the majority of the Kimberley coastal waters and relatively little is known, scientifically. In addition, marine parks are proposed over much of this area and it is extensively used by Indigenous groups and for tourism, iron ore exports, commercial and recreational fishing, aquaculture and pearling.

The extensive recent research programs in the waters off the southern Dampier Peninsula and the offshore reef systems have already developed a comprehensive knowledge base to help manage resources development in these areas. More research will be needed and funded by industry to support resource development approvals in these areas. The KMRP will also provide an important regional perspective for the recent and future site-specific studies around the southern Dampier Peninsula. In particular, the KMRP will provide a more detailed understanding of current and future human usage, particularly recreational fishing, and current and future impacts on fish stocks and habitats in this area (and across the region). This will inform the development of compliance programs to manage the significant increase in projected use.

While the areas off Eighty Mile Beach and Roebuck Bay are ecologically less complex than most of the Kimberley, both have high conservation significance, support high recreational use, are relatively poorly studied and are proposed as marine parks. Hence, both deserve some level of attention from the KMRP. The least known of the Kimberley coastal waters is the area east of Cape Londonderry to the NT border, although significant research has been undertaken in the nearby Joseph Bonaparte Gulf and the impacts of the damming of the Ord River on downstream mangroves are well known. As such, some level of research effort should occur in this area of the Kimberley.

While the principal interests of the State Government lie within the limits of State waters, the spatial scales of some key ecological processes extend into offshore waters. For this research, it is essential to consider the scales of the ecological processes rather than be constrained by administrative boundaries.

3. RESEARCH THEMES

3.1 Overview

The current major uses of the Kimberley coastal waters include traditional Indigenous use, marine tourism, commercial and recreational fishing, pearling, aquaculture and oil and gas and iron ore port facilities. The large area, small population, limited land access and remoteness and the relatively low level and localized nature of most of the commercial and non-commercial activity has resulted in minimal anthropogenic disturbance to much of the Kimberley marine environment. This is unlikely to change significantly over the next five or so years, with marine tourism as the most likely major Kimberley-wide growth industry. The current iron ore mines in the Buccaneer Archipelago and the development of an industrial hub at James Price Point on the Dampier Peninsula will be the major foci of on-shore industrial development in the Kimberley over the next decade. Offshore, the development of oil and gas reserves in the Browse Basin is projected to increase markedly

⁸ Carnot Bay is on the mainland just south of the Lacepede Islands (Figure 1).

over the next ten years and will be the focus of significant offshore resources development. The projected increase in the population of Broome to support the expansion of the resources industry and tourism is predicted to increase recreational use of Kimberley waters generally but particularly in the waters off Broome and along the northern Eighty Mile Beach and southern area of the Dampier Peninsula. Furthermore, the planned completion of a sealed road from Broome to One Arm Point is projected to increase recreational and tourism pressure on the marine resources off the northern Dampier Peninsula and in the Buccaneer Archipelago.

With consideration of the above, the Kimberley Marine Research Program Plan will focus on obtaining a regional perspective through two major areas of research:

- **Bio-physical and social characterization** - to provide the foundational datasets required for marine park and marine resource management as well as better understanding and managing current human impacts; and
- **Understanding key ecosystem processes** – to provide the scientific understanding of ecosystem functioning and response to a range of potential human impacts that are likely to arise in the future, including climate change.

The underlying logic of the above approach is that a more comprehensive description of the Kimberley marine ecosystems and the existing and future uses of this area will provide the necessary information and regional context needed to assess and manage the current impacts and risks to these resources. This knowledge base will also inform planning and management of the region's proposed marine parks, fisheries⁹ and the tourism industry. Building on the extensive existing knowledge of tropical ecosystem functioning in northern Australia, the proposed process studies will enhance the fundamental ecosystem understanding needed to better address a range of current and future pressures, including climate change, on this region.

The research will answer key questions directly relevant to the conservation and multiple-use management of this marine region and will be consistent with the management strategies outlined in the existing and proposed marine park management plans and the State Government's Kimberley Science and Conservation Strategy.

3.2 Research Themes

As stated above, this document outlines a strategy for the Kimberley Marine Research Program. Commonwealth agency and university perspectives are broadly considered and further consideration will be via the direct consultation process to be undertaken in the development of the Kimberley Marine Research Program Plan. The proposed research themes are outlined below:

1. Habitat mapping, biological survey, marine fauna distributions and associated biodiversity assessments;
2. Characterization and predictive capacity of the nature and levels of human usage and potential impacts¹⁰;
3. Characterization, understanding and predictive capacity of key ecological processes;
4. Biological implications and potential adaptations to climate change;

⁹ Including commercial and recreational fishing and pearling and aquaculture.

¹⁰ The proposed human use surveys undertaken as part of the KMRP will complement existing departmental programs of DEC and DOF which are also surveying human use for the planning and management of marine parks and the management of recreational fishing in the Kimberley.

5. Development of cost-effective indicators and methodologies for long-term monitoring, with a particular focus on remote sensing and 'ships of opportunity'; and
6. Understanding and applying Indigenous coastal knowledge for marine biodiversity conservation and resource management.

4. INDICATIVE FUNDING AND DURATION

The indicative level and duration of research funding for each of the WAMSI KMRP research themes are shown below.

Research Theme	Funding (\$M)	Duration (yrs)	Links
1	5	4	Proposed DEC/DoF marine park management programs; Theme 7; AIMS/CSIRO surveys; WAM/Woodside biodiversity survey; Woodside whale, turtle and habitat surveys etc
2	1	3	DEC marine park planning programs; DoF recreational fishing surveys; Coastwatch data; Marine tourism and pearling industries; coastal Indigenous communities
3	3	3	IMOS
4	1.5	3	IMOS
5	1	3	Proposed DEC marine park management programs; Themes 1, 2 and 3
6	0.5	2	Proposed DEC marine park management programs; Themes 1, 2 and 3
Total	12		

Additional State funding for marine research and monitoring in the Kimberley from marine park budgets includes:

- \$2.3 M over 6 years research funding to DoF for the Camden Sound Marine Park; and
- \$780,000 over 6 years monitoring funding to DEC for the Camden Sound and Eighty Mile Beach marine parks.

5. NOMINAL MANAGEMENT QUESTIONS/ISSUES

The management questions/issues outlined below are indicative of the types of questions the Kimberley Marine Research Program will address. Specific management questions will be developed for each project to provide guidance in the formulation of the detailed project plans. This approach facilitates better knowledge transfer and uptake by managers on completion of the projects.

Theme 1

- What is the regional distribution, extent, species composition and conservation significance of the major benthic marine habitats (e.g. coral reefs, filter-feeders, mangroves, sediment in-fauna, inter-tidal communities)?
- Where are the marine biodiversity 'hotspots'?
- What is the distribution, abundance and movement patterns of large threatened marine fauna populations (i.e. whales, snub-fin and humpback dolphins, turtles etc) that use these waters and what, when and where are their critical habitats?
- What environmental factors are 'driving' the above patterns and population characteristics?
- What is the current condition of finfish stocks/communities (targeted/non-targetted species)?

- What is the current condition of other harvested species (e.g. dugong, turtle, trochus etc)?

Theme 2

- What are the current and future patterns and trends of human use (including displaced effort and biosecurity¹¹ risks)?
- What impacts and risks does this use pose to marine environment?
- What does the community value and what are their aspirations for the area?
- What are the anticipated effects of increased access to remote locations?

Theme 3

- What biological communities and biophysical processes are 'driving' primary productivity and what is their relative importance?
- What is the physical and biological connectivity between different parts of the Kimberley coastal waters and between the offshore and coastal waters?
- What are the key catchment-ocean interactions and how do they impact on the ecology of the marine environment?

Theme 4

- How will existing marine distributions change?
- What are good potential biological indicators of climate change?
- What are the stakeholders capacities and requirements for adapting to climate change?
- How have the coral reefs of the Kimberley developed over the Holocene and how does this knowledge help predict the impacts of climate change?

Theme 5

- What species/communities can be used to assess marine biodiversity condition?
- What are good indicators of management efficiency and effectiveness?
- How can remote sensing be used to cost-effectively monitor the environment of the Kimberley?

Theme 6

- How can Indigenous coastal knowledge be used to assist marine conservation and management programs?

6. EXPECTED OUTCOMES

The expected outcomes are outlined below and are consistent with the Department of Commerce's Evaluation Framework for Science and Innovation Investments.

- Enhanced capacity to identify and manage current human impacts and predict risks;
- Improved capacity to plan and manage marine parks and reserves;
- Improved capacity to plan and manage tourism, recreational and commercial fisheries, pearling and aquaculture;

¹¹ The State Government allocated to DoF \$4.7 M per year for two years from 20011/12 for statewide aquatic biosecurity management.

- Improved regional understanding, context and relative conservation significance of the key marine biodiversity assets;
- Increased capacity to respond to and mitigate the impacts of oil spills;
- Increased capacity to assess the regional environmental significance of resource development projects ;
- Enhanced capacity to determine ‘*value for money*’ and assess management efficiency and effectiveness of Government-funded conservation and management programs;
- Enhanced use of Indigenous knowledge and participation in marine management;
- Enhanced capacity to understand, adapt and mitigate climate change impacts;
- Improved community understanding and support for Government conservation and management programs;
- Improved links and collaboration between State and Commonwealth agencies, universities, industry and NGOs;
- Enhanced marine scientific capacity (including student training) in Western Australia; and
- Improved facilities and infrastructure for marine research and management in the Kimberley.

7. LINKS TO OTHER PROGRAMS

A key element in the developing the Plan will be to gain a good understanding of recent, current and planned marine research in the Kimberley. A ‘mapping’ exercise of WAMSI partners is currently underway to develop this understanding. This process will help identify key research gaps and establish links with other organizations and programs. Some current initiatives and links are outlined below.

7.1 Government Programs

State marine conservation and fisheries management programs and the Commonwealth Government’s Regional Marine Planning process are currently underway in the waters off the Kimberley. In addition, the Western Australian Government has allocated \$15.2M over 4 years¹², from 2011/12, to DEC and DoF for the management of the proposed Camden Sound and Eighty Mile Beach marine parks. Funding for the proposed North Kimberley and Roebuck Bay marine parks will be considered in future State budgets. The marine parks funding is provided for the implementation of the strategies, including marine ecological and social research and monitoring, outlined in the marine park management plans. The development of the KMRP Plan will align with the funding allocated for marine science and monitoring in the marine park budgets to ensure the programs are integrated. A further \$1.105 M over 4 years from 2011/12 was also allocated to DoF for marine education in the Kimberley.

7.2 Integrated Marine Observing System

The State Government budget included \$2.2M for IMOS in the Kimberley. This funding will be to provide further research infrastructure in the Kimberley and will contribute significantly to research themes 3 and 4.

7.3 Industry

As outlined above, Woodside and the State and Commonwealth Governments have contributed to significant marine research off the Dampier Peninsular and at Scott Reef

¹² Further ongoing funding of \$3.7M p.a. will be provided from 2015/16.

over the past five years. Similarly, Inpex has undertaken extensive marine environmental research around and offshore from the Maret Islands, in the northern Kimberley, over the same period. Knowledge of the scope and outputs of these programs will be sought in the development of the KMRP Plan. Further marine environmental research off the Dampier Peninsula and offshore will be required and funded by industry to support the approvals process as specific development proposals undergo environmental impact assessment (EIA). Furthermore, the EIA conditional approvals process will impose marine monitoring requirements and, potentially, environmental offsets that will likely include marine research.

7.4 Other

Other organizations and initiatives in the Kimberley include other State Government Departments, Customs, Coastwatch, the Australian Navy, Commonwealth Regional Marine Planning processes, Indigenous Protected Area programs and international initiatives, such as ATSEA, will be considered in the development of the KMRP Plan.

8. LOGISTICS

The remoteness and inaccessibility of much of the coastal waters of the Kimberley means that research vessel access is the only option for many types of research in these areas and routine access to the AIMS vessel RV Solander and other suitable vessels will be critical. The presence of research facilities on the mainland at Cygnet Bay, on the northern Dampier Peninsula, will be potentially very useful for a range of studies, particularly process research. Research facilities in Kuri Bay are also likely to be useful provided reliable access by air is routinely available. Fisheries and marine park patrol boats and Customs and naval vessels also provide opportunities to be used as research platforms.

Overcoming the logistic constraints to deliver the strategic research outcomes from the KMRP will depend, therefore, upon the goodwill, good planning, co-operation and collaboration and sharing of research and management (e.g. marine park and fisheries patrol vessels) infrastructure between the participating organizations. Co-ordination will be the key to success. A clear, transparent and equitable process to develop the KMRP projects and allocate funding will also be a key element in fostering the necessary goodwill from the outset.

9. PROCESS TO DEVELOP THE KIMBERLEY MARINE RESEARCH PROGRAM PLAN, PROJECT PLANS AND AGREEMENTS

The process and timeline to develop and approve the Kimberley Marine Research Program Plan, project plans and project agreements is outlined below and the major milestones are summarized in section 10. The timeline is predicated on the assumption that it does not compromise co-investment by WAMSI partners and will help ensure research projects begin by mid-2012 or earlier.

1. WAMSI Board appoints the interim Kimberley Marine Research Program Node Leader;
2. Undertake a 'mapping' exercise of recent (last 5 years), current and planned (next five years) marine research in the Kimberley;
3. Develop a draft *Kimberley Marine Research Program Strategy*;
4. Consider the Commonwealth research agencies response to December 2010 State Marine Research Priorities document;

5. Finalize the Strategy via the WAMSI Strategic Programs Committee and the WAMSI Operational Group;
6. Present the final draft Strategy to the WAMSI Board at the 11 August 2011 meeting;
7. Provide the Strategy to all WAMSI partners as soon as possible after the WAMSI Board meeting and undertake consultations in regard to the development of the Plan;
8. Develop¹³ and seek comment on the draft Plan from WAMSI partners by 31 September 2011;
9. Finalize the draft Plan and present to the WAMSI Board;
10. Get WAMSI Board signoff of the Plan by 31 October 2011;
11. Invite EOI for the projects outlined in the Plan by 30 November 2011;
12. Obtain WAMSI Board sign-off of EOIs recommended for approval by WAMSI Operational Group and call for detailed project plans by 31 December 2011.
13. Call for detailed project plans from successful EOI applicants to be finalized by 15 March 2012;
14. Assess Project Plans and make recommendations to the WAMSI Board by 15 April 2012;
15. Obtain sign-off of successful Project Plans by the WAMSI Board by 30 April 2012;
16. Obtain sign-off for Project Agreements by the WAMSI Board by 30 June 2012.

10. SUMMARY OF MAJOR MILESTONES

The timing of the major milestones to develop the KMRP Plan through to the signed-off KMRP Project Agreements is outlined below.

Milestone	By	To
1. Preliminary draft of the KMRP Strategy	28/7/2011	WAMSI SPC
2. Final draft of the KMRP Strategy	11/8/2011	WAMSI Board
3. KMRP Plan sign-off	31/10/2011	WAMSI Board
4. KMRP Plan included in State Financial Agreement for sign-off	Nov/Dec 2011	State Gov't
5. KMRP Project Plans sign-off	30/4/2012	WAMSI Board
6. KMRP Project Agreements sign-off	30/6/2012	WAMSI Board

11. SUMMARY

The draft Kimberley Marine Research Program Strategy outlines the proposed geographical emphasis, research themes, management questions/issues, nominal funding and process to develop the Kimberley Marine Research Program Plan by 31 October 2011. The KMRP Plan is a key element of the State Funding Agreement to be signed between WAMSI and the WA State Government in November /December 2011.

¹³ Drawing on: Northwest Shelf Research Inventory; Kimberley Science and Conservation Strategy; Protecting the Kimberley: A summary of scientific knowledge to support conservation management in the Kimberley region of Western Australia; Foundations for a Kimberley Strategy: Report by the Hon Chris Ellison on the consultation process for the Kimberley Science and Conservation Strategy; A Turning of the Tide: Science Decisions in the Kimberley-Browse Marine Region; State Government Strategic Marine Research Priorities in relation to the Kimberley Science; Proceedings of the Kimberley Symposium and Conservation Strategy and WAMSI 2 and the research and monitoring sections of the management plans of the proposed Kimberley marine parks.