State of Cockburn Sound

2011 Report

Cockburn Sound Management Council

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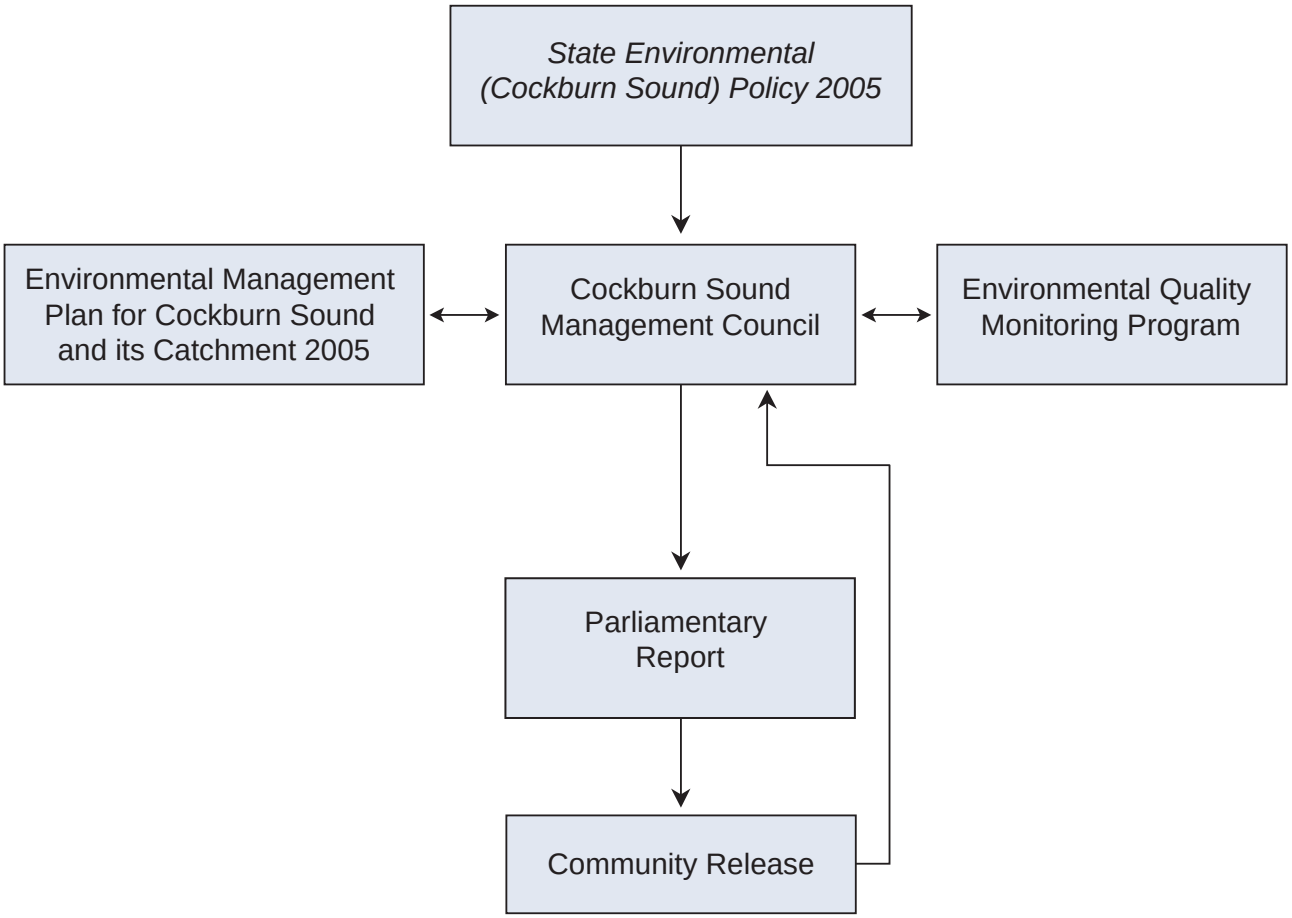
Fremantle Port Authority Infrastructure in Cockburn Sound

The role of the Cockburn Sound Management Council in implementing the *State Environmental (Cockburn Sound) Policy 2005*



This report was endorsed by the Cockburn Sound Management Council on 24 February 2012

Cover Photographs:
top – Mangles Bay moorings; middle – Dusk at Rockingham Beach; and bottom – Mussel aquaculture buoys

Foreword

2011 is Cockburn Sound Management Council's seventh year of reporting on the health of Cockburn Sound. The Council assesses and reports on a wide range of monitoring programs that are undertaken in accordance with the terms of the *State Environmental (Cockburn Sound) Policy 2005* (SEP).

In spite of the increasing usage and impact on the waters of the Sound this marine environment and economically crucial ocean waterway continues to meet most of the indicators of health and stability as measured by the criteria set within the SEP. While there have been fluctuations from time to time, and some areas that regularly fail to meet the SEP Standards, there are also signs of improvement in specific aspects, as can be seen in the report cards found in this Report.

All these results, however, need to be understood in the context of the 1960s and 1970s when heavy industry was first established along the shoreline of Cockburn Sound. With the loss of close to 80% of the seagrass meadows during that short time, the ancient marine system was ecologically altered, leaving a sandier, exposed, more turbid and disturbed environment. In other words, the baseline for the meaning of 'healthy' has changed over time and re-established itself at a new level.

Since the establishment of monitoring programs, our aim has been to protect the Sound from further damage, and wherever possible, improve its health. We have tried to do this by identifying problems quickly and coordinating remedial or preventative action through the relevant government, industry or community stakeholder groups. Cockburn Sound is under intense and increasing pressure. This is the result of many factors including expanding urbanisation in the Sound's catchment, planned and proposed industrial harbour and marina developments, and ever increasing use of the Sound for recreational activities such as boating, swimming, fishing and tourism. Consequently the range and nature of threats to the environment have also changed.

Stronger regulatory frameworks, along with innovations in waste water management and other industrial practices, have addressed some of these pressures and had a positive effect.

Our challenge into the future will be to ensure that the multiple and varied uses of the Sound by the community and industry can continue in such a way that the health of the Sound is not compromised and so that the hard won ecological stability and sustainability of Western Australia's most heavily and diversely used marine embayment does not take a downward turn again.

The CSMC, the Department of Environment and Conservation, and the Environmental Protection Authority have joint responsibility for the environmental management of Cockburn Sound. Late in 2011, the CSMC, DEC and Office of the Environmental Protection Authority (OEPA) responded to the Public Accounts Committee of Parliament following a Report by the W.A. Auditor General, 'Environmental Management of Cockburn Sound', tabled in Parliament in September 2010. Details of the Auditor General's findings and recommendations and our joint response have been included in this report.

The OEPA has recently commenced a scheduled review of the *State Environmental (Cockburn Sound) Policy* 2005 in collaboration with the CSMC and DEC.

I would like to acknowledge the dedication of the very small group of CSMC officers who coordinate the monitoring programs and work on many fronts, producing expert advice to government, industry, the EPA and the community, from a small resource base. I also acknowledge the extraordinary contribution of the Council itself which is made up of a wide range of leaders from the community, industry and government, who unselfishly provide their time, expertise and experience to work together with a single purpose – that of protecting the Sound for all users into the future. It is through the generous efforts of these people that the CSMC is able to offer its unique service to the community of Western Australia.

It is with pleasure that I present this State of the Sound report on one of Western Australia's most beautiful, diverse and valuable marine environments.

Professor Kateryna Longley
Chair, Cockburn Sound Management Council
20 May 2012

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Dusk at Palm Beach

Executive Summary

The Cockburn Sound Management Council (CSMC) is responsible for coordinating and undertaking a range of environmental monitoring programs to assess the environmental health of Cockburn Sound. The CSMC reports annually to the Minister for Environment, Parliament, the Environmental Protection Authority (EPA), and the wider public, on the state of the Sound and on whether the environmental values and objectives established for the Sound are being met, as defined in the *State Environmental (Cockburn Sound) Policy 2005* (SEP). The activities and progress of projects and programs are also reported to Parliament and the community. The CSMC therefore provides this State of the Cockburn Sound Report 2011 to the Minister for Environment and to Parliament, as mandated by the *State Environmental (Cockburn Sound) Policy 2005* (SEP).

The SEP and the CSMC's Environmental Management Plan 2005 (EMP) are endorsed Cabinet and government documents. This report is the seventh *State of the Sound Report* submitted to the Minister for Environment and Parliament. During 2011 eleven scientific monitoring programs were accessed and analysed to assess ecosystem health in Cockburn Sound.

The 2011 Report Cards indicate that the marine environment of Cockburn Sound, based on the criteria established by the SEP, remains generally healthy. The areas or zones of High and Moderate ecological protection, which currently make up 95% of the Sound, generally conformed to the SEP Guidelines and Standards. Monitoring carried out at all sites in the Sound has shown that key environmental variables relating to dissolved oxygen, temperature, salinity and pH levels have met established Guidelines. These are all key indicators of a healthy ecosystem. However, a number of individual monitoring sites raise some concerns in relation to other criteria as the report cards indicate.

Some environmental variables assessed for whole zones failed to meet Guidelines but did not exceed Standards. These included light attenuation, chlorophyll *'a'*–phytoplankton biomass and seagrass shoot density. It is believed that the very warm 2011 year (hottest on record for Cockburn Sound waters) influenced the relatively higher light attenuation and chlorophyll *'a'*–phytoplankton biomass results by stimulating phytoplankton or micro-algal growth in its waters. With respect to seagrass shoot density, one site recorded declines while another two improved but were still recorded as exceeding the Standard. Thus a total of three out of seven sites were deemed to have exceeded Standards and so the CSMC felt it prudent to grade the whole zone as amber or as exceeding environmental Guidelines overall. Because seagrass shoot density can vary widely between years, the Council will keep a close watch on the monitoring results and it is possible that the counts at the three sites will improve next year. These sites have not had any obvious recent impacts or influences that could be directly responsible for their decline. It is probable that the change is from natural causes as well as historical draw-down of nutrients from contaminated ground water leaving Garden Island.

During 2011, the CSMC, in partnership with the OEPA and DEC, provided a joint response to the Parliamentary Public Accounts Committee on activities and actions that have been undertaken to address the Auditor General's report and recommendations on the environmental management of Cockburn Sound. Further information on this matter is provided later in this report.

The main activities of the CSMC during 2011 fell into three broad categories: annual; strategic; and community-investigative. The CSMC now has eleven years of continuous environmental data. This provides a robust foundation for understanding this highly complex marine embayment and helps to quickly identify areas of concern. Utilising its extensive knowledge and experience, the CSMC provided expert advice on a wide variety of issues throughout 2011 to various stakeholders, including the Commonwealth and State Governments and the EPA, on development proposals, and to the three local governments bordering Cockburn Sound and Owen Anchorage.

The CSMC office near Rockingham Beach, and its community contact phone number, remained popular, attracting over 500 telephone enquires, approximately 350 office visitors and approximately 2350 window front display visitors. Table 2 provides a summary of some of the many inquiries and queries the CSMC office has received throughout 2011.

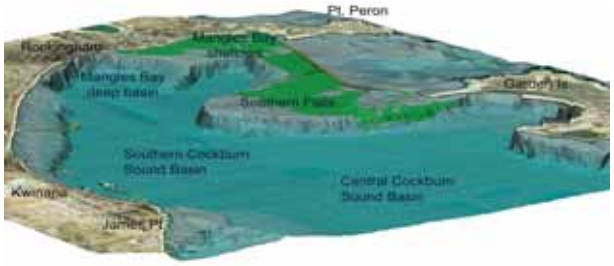
At a strategic level, the CSMC provided advice on several major development proposals, including large scale port and marina projects, as well as on Public Environmental Reviews. The CSMC completed one of its two long-term projects during 2011: the investigation into the grey sands in Owen Anchorage. The other long-term project, the environmental sign and sculpture interpretation trail for Cockburn Sound and Owen Anchorage, is progressing well toward completion. The CSMC also plans to install 10–12 eco-signs along a trail located between Pt Peron and Coogee Beach, to inform passers-by of the natural assets, inhabitants, ecology and beauty of Cockburn Sound.

Setting the Scene

All weather accessibility, unique and productive natural assets and proximity to transport routes, industry and port infrastructure have resulted in Cockburn Sound becoming the busiest and most popular marine embayment in Western Australia.

Continued development in Cockburn Sound and a multitude of uses for its shores and waters have been ongoing since colonial settlement in 1829. This has resulted in substantial economic, social and environmental benefit to Western Australia. However, continued growth, use and consequential impacts have increasingly put pressure on the environment. These growing pressures require careful management, especially as the pressures are expected to intensify as additional development occurs.

Cockburn Sound is a relatively shallow coastal basin, with a maximum depth of approximately 20 metres, lying between Garden Island to the west and the mainland to the east. The Sound is about 16 km long, north to south, and covers an area of approximately 124 square kilometres. Geologically the Sound has developed within an elongated depression that forms a margin between the Swan Coastal Plain and the Rottnest Shelf, known as the Cockburn-Warnbro Depression.



The first comprehensive environmental study of the Sound in the late 1970s identified a large variety of contaminants from industrial discharges entering the Sound. At that time water quality was poor and widespread loss of seagrass meadows had occurred. Industry, in response, reduced contaminant and nutrient discharges, particularly nitrogen, and by the early 1980s the Sound's water quality was much improved. By the late 1980s the water quality in the Sound declined again, resulting in a second comprehensive investigation (Southern Metropolitan Coastal Waters Study 1994). This study found that seagrass dieback had slowed considerably, but nutrient-related water quality was only slightly better than in the late 1970s. Contaminated groundwater had replaced direct industrial pipeline discharge as the main nitrogen input to the Sound. In 2001 a review of studies confirmed that a mix of co-operative and regulatory management had resulted in no further deterioration of the overall health of surviving seagrass meadows, and no significant further losses related to water quality.

The Cockburn Sound Management Council was established by the State Government in August 2000 in response to increasing pressures on Cockburn Sound. Its primary purpose is to facilitate and coordinate ongoing environmental management of Cockburn Sound, Owen Anchorage and their catchments. The CSMC has an independent Chairperson and 23 members representing a broad range of stakeholders. Community interests are represented by three community members.

The CSMC is guided in its activities by the Environmental Management Plan for Cockburn Sound and its Catchment 2005 and the State Environmental (Cockburn Sound) Policy 2005. This policy, scheduled for review in 2012, continues to be the guiding document for monitoring and management of the Values, Objectives and Environmental Quality of Cockburn Sound. Benchmarks, known as Environmental Quality Criteria, have been developed for Cockburn Sound and are be used to determine whether the Environmental Values for Cockburn Sound are being protected. These Criteria are outlined in a companion document titled Environmental Quality Criteria Reference Document for Cockburn Sound (2003-2004), Environmental Protection Authority 2005. In this document environmental guidelines and standards have been defined and are used to determine whether environmental quality and therefore objectives and values for protection in Cockburn Sound have been met.

The CSMC also produces annual Report Cards on the environmental health of Cockburn Sound. These Report Cards are derived by comparing monitoring data with relevant environmental quality criteria, following the process defined in the Environmental Quality Criteria Reference Document. The 2011 Report Cards are included within this report. Under the SEP, the Cockburn Sound Management Council is required to report to the Minister for Environment on the state of Cockburn Sound each year. This report includes annual performance and monitoring reporting and is tabled in Parliament annually.

Key Achievements 2011

In 2011 the CSMC undertook a range of activities that fall broadly under the headings: annual; strategic; and community-investigative. All were undertaken within the framework of the State Environmental (Cockburn Sound) Policy 2005. A selection of examples is provided here:

Annual

- **Seagrass Monitoring** was completed in late January 2011 and **Water Quality Monitoring** by the second week of April. These two monitoring programs provide a large portion of the annual State of the Sound report on ecosystem health for Cockburn Sound. The CSMC also co-opts critical monitoring programs undertaken by Fremantle Ports, the Department of Health, LandCorp, Aquaculture Industries, Local Governments, Dept of Defence and on occasions the Water Corporation. The information provided by these programs contributes to contaminant and bacterial information which is assessed and reported on according to the EQC outlined in the SEP.
- **The annual State of the Sound Report** is a major office task which integrates all the monitoring activities and advisory work undertaken by the Council over the course of the year. The report is reviewed and endorsed by the Full Council before being submitted to the Minister for Environment and Parliament. The environmental results are peer reviewed by in-house experts, and through the contracting of an external bio-statistician, as quality assurance measures to ensure accurate conclusions and interpretations have been drawn across all the monitoring programs used for reporting.
- The CSMC also develops an **annual Environmental Quality Management Program (EQMP)**, as required by the SEP. This year the CSMC staff worked closely with the DEC to ensure published annual EQMPs were up to date on the CSMC website <http://csmc.environment.wa.gov.au>. The CSMC relies on an average of eight to eleven annual environmental monitoring programs which often have changed sites and used extra methodologies in different years. The CSMC oversees these changes to ensure that monitoring remains relevant and consistent for the areas managed by the CSMC and that they conform to the current methodologies outlined in the companion documents to the **SEP, Standard Operating Procedures (SOPs).** If data does not conform to the SOP the CSMC does not include this data in their annual reporting but will use it to support or help interpret the results.
- **CSMC staff responded to and assisted with numerous direct queries** on a wide range of issues from concerned and interested community members, students, local government and other parties. These queries related to matters as diverse as: injured and dead fauna (e.g. penguins, turtles, seals, seal pups, crabs, birds), aquaculture contacts and activities, fish feeding (particularly snapper), smoke and burn-offs, jetty works, contaminated sites, pollution incidents and resultant dead fauna, rubbish and litter on beaches, boating speeds, reports of shark sightings and community art.

  The CSMC is proud of its reputation for dealing effectively with the concerns of the public, which often require a formal response with relevant information. In this way the CSMC provides a vital community service in that the staff are often able to defuse anxiety and correct misinformation at an early stage.
- Staff made public presentations on scientific issues in two forums: the Australian Marine Science Association annual conference in Fremantle and the Community Industries Forum run by the Kwinana Industries Council. Talks covered environmental risk and the 2011 marine heat wave. Staff also gave two lectures to local Universities on marine policy and environmental management. Staff attended a number of other relevant professional conferences, workshop and seminars that covered subjects such as marine natural disasters, urban ecology and forest and catchment diseases and pathologies.
- **Extensive advice was provided to proponents and the OEPA with regards to draft and final Environmental Scoping documents (ESDs)** for the Mangles Bay Marina proposal and James Point Private Port as well as commentary on extended dredging at the Australian Marine Complex (AMC) Southern Harbour works. The CSMC also contributed to a number of Environmental Improvement Plans for industry, including Verve Energy and Cockburn Cement. They contributed

to Stakeholder Reference Groups for James Point Private Port Stage 1 and Mangles Bay.

- CSMC advice was also provided on other wide-ranging issues including: the Sepia Depression Ocean Outfall Line (SDOOL) duplication works near Lake Richmond and Palm Beach Rockingham; the proposed East Rockingham Sewage Treatment Plant; licence renewals for local Kwinana Industry; potential impacts of small industrial accidents; and small scale developments such as shallow beach water amusement operations with inflatable revolving balls, slides and pontoons.

Strategic

- **Review of Strategic Plan – 2010-2015**. The CSMC completed their strategic plan in late 2009. In 2010 and early 2011 the detailed strategies were completed and endorsed by the Council. The strategic plan can be viewed on the CSMC website.

- **Seagrass Review**. In response to a number of recommendations and findings made in the 2010 Auditor General's report on environmental management of Cockburn Sound, the CSMC, DEC and OEPA commissioned Professor Paul Lavery and Dr Kathryn McMahon, from Edith Cowan University, to review seagrass monitoring and reporting. The Auditor General was mainly concerned about declines in results at the regional seagrass reference sites that are used for comparison with the results of Cockburn Sound seagrass sites. The OAG report also noted the lack of recent mapping of seagrasses throughout the Sound. It highlighted difficulties in interpreting the SEP with regards to reporting on sites within zones or overall conditions in the zones. The seagrass review indicated that only one reference depth had significant declines. While other depth reference sites were trending downwards, these declines were not weakening conclusions on the health of seagrass sites in Cockburn Sound. The review reported that declines at the reference site in Warnbro Sound reflected region-wide declines and that it remained appropriate to use Warnbro Sound monitoring results to compare with Cockburn Sound's results to assess seagrass health. The focus on seagrass through the OAG report and the seagrass review resulted in the CSMC, DEC and OEPA identifying potential improvements to monitoring, analysis and mapping. The seagrass review report is available on the CSMC website.

- **Senior Officers Group – OAG review**. In addition to issues associated with seagrass, the OAG report also made some recommendations on contaminant load assessments and environmental risk for Cockburn Sound. In response, the CSMC, DEC and OEPA plan to initiate a desk-top review and assessment of known contaminant inputs into Cockburn Sound and to integrate this data with an environmental risk assessment for the Sound. A better understanding of both issues would help the CSMC and other parties responsible for implementing the SEP to prioritise resources to manage specific environmental risks.

- **Three Agency Response to Public Accounts Committee.** The seagrass review, planned review of the SEP in 2012 and planned review of contaminant load and environmental risk provided the basis of the joint reply to the parliamentary PAC's request for a response to the Auditor General's recommendations.

- **Long-Term Database Development**. The CSMC has eleven years of SEP related environmental monitoring data as well as up to twenty years of other water quality and environmental data. All of this data now needs to be better organised and made more easily accessible for CSMC reporting and provision to parties needing this information for their work. The CSMC commissioned a scoping document to develop a Data-base Management System (DBMS) as the basis for establishing a simple and efficient system to help the Council address the growing demand for environmental information as well as supporting its own analytical and reporting responsibilities. The system will be compatible with existing DEC and other State natural resource management data. The CSMC is currently investigating future sources of funding for this critical support tool.

Community-Investigative

- **Grey Sands Investigation (Full Report and Community Paper).** The CSMC completed the Grey Sands investigation in 2011 and made it available to major stakeholders. The investigation looked at sediment along the beaches, submerged banks and Garden-Carnac islands. The report concluded that the source of the greyness of the sands washed ashore along Owen Anchorage was primarily a natural phenomenon which reflected a number of natural geological processes. The report is available on the CSMC website.

- **Heat Wave Plume (Leeuwin Current) Feb-April 2011 – Short technical paper**. CSMC officers, in the process of collecting and reviewing 2011 water quality monitoring data, noted the higher water temperatures and lower dissolved oxygen values in Cockburn and Warnbro Sounds. While 2008 was also a warm year the 2011 readings indicated that temperatures were 1.5 to 3.0°C warmer and oxygen concentrations were 2 to 3 ppm lower. While evident over the four months of monitoring these conditions were particularly notable over a three to five week period between late February and the end of March 2011. This data was analysed and reported in a paper given to the Department of Fisheries and submitted for publication in a Marine Journal. The Department of Fisheries documented a general heat wave that affected Western Australian marine waters in The "marine heat wave" off Western Australia during the summer of 2010–11, (Fisheries Research Report No. 222, Pearce et al., November, 2011). Publication of notable management and environmental conditions in Cockburn Sound is seen as an important part of the Council's role in the community.

- **Australian Research Council Climate Change Grant Submission.** The CSMC, with the University of Western Australia's Oceans Institute, attracted a group of contributing parties to develop an Australian Research Council (ARC) grant submission (Industry Linkage) to investigate the influence of warming marine waters on the settlement of organisms on hard surfaces in Cockburn Sound. It is estimated that less than 15% of Cockburn Sound's underwater environment contains hard surfaces which are mainly found on jetties, wharfs, causeways, limited coral outcroppings and limestone reefs. Seagrass fronds are also arguably another hard surface but are excluded. The large majority of Cockburn Sound is soft substrate but the few areas that contain hard surfaces maintain a wide range of algae and animals critical to the food-web and diversity found in Cockburn Sound, i.e. its ecology. Although the grant application was unsuccessful, it was very highly rated by assessors and the Council intends to apply again in 2012. The CSMC, in collaboration with the Kwinana Industries Council, developed a research and scholarship plan in late 2010 and early 2011 and an applied research priorities list, with potential seed funding to assist in the development and undertaking of relevant research on Cockburn Sound.

- **Community Liaison and Involvement – Natural Resource Management.** The CSMC maintained an active and close involvement with the Perth NRM Council and with programs supported by this umbrella Council. For example, active assistance and support was given to the Southern Metropolitan Coastcare Group (working out of the Town of Kwinana) for a number of restoration initiatives undertaken by the Group. The CSMC also supported the work of the Rockingham Bay Seagrass Monitoring Group (RBSMG) who annually measure seagrass around Cockburn Sound, Point Peron, Shoalwater Bay and Warnbro Sound. While their methods differ and results cannot be used by the CSMC in its formal reporting, their work and the work of other community groups is often collated and used as additional information or used for context when the CSMC provide their annual reports.

Public Accounts Committee Response to OAG Audit – November 2011

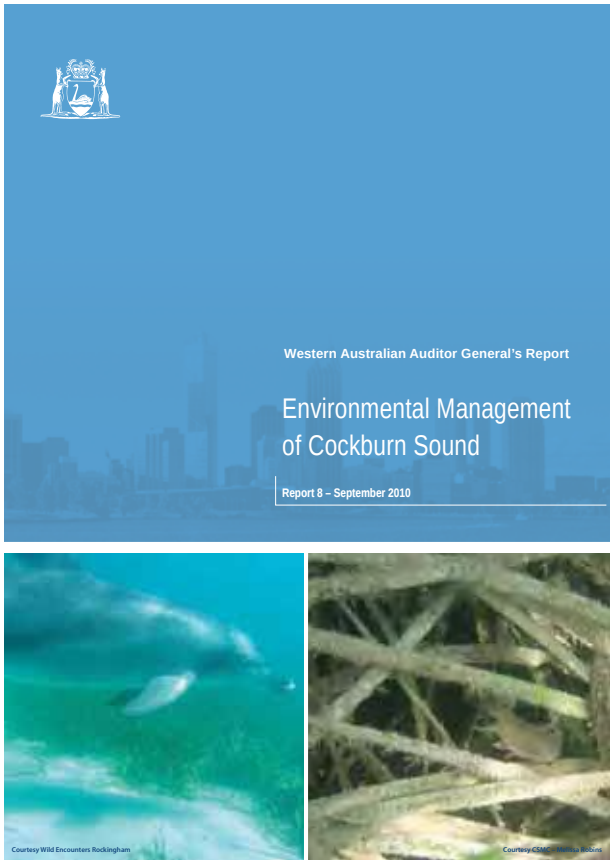
Following a preliminary examination starting in November 2009, the Office of the Auditor General (OAG) proceeded with a full performance audit of the environmental management of Cockburn Sound to determine whether existing environmental management practices promote ecosystem health in Cockburn Sound. This included examining the roles of the OEPA, DEC and CSMC which have shared responsibility for Cockburn Sound.

In September 2010 the OAG released its report *Environmental Management of Cockburn Sound Report 8 – September 2010.* The report was prepared for submission to Parliament under the provisions of section 25 of the *Auditor General Act 2006.*

The OAG report made the overall comment that

"A strong environmental framework has been established for Cockburn Sound."

Some areas of potential improvement were identified.



The overarching recommendation was that:

The EPA, DEC and the CSMC should bring forward the planned 2012 review of the State Environmental (Cockburn Sound) Policy (SEP).

This review is now well underway.

Other recommendations included considering specific measures to **"strengthen the current monitoring methodology and practice".**

The most significant specific measures have been outlined above in the "Key Achievements" section under the heading "Strategic".

The OAG report and recommendations along with the joint response of the CSMC, DEC and OEPA is available online at <http://csmc.environment.wa.gov.au>.

Our three organisations will continue to work collaboratively to optimise the environmental management of Cockburn Sound and its catchment.

Owen Anchorage 2011

The Cockburn Sound Management Council has noted that Owen Anchorage has not historically experienced the degree of environmental degradation that occurred southward in the adjacent Cockburn Sound. A number of industries previously discharged wastewater to Owen Anchorage, including tanneries, wool scourers and fish-processing related industries. These historical discharges have ceased and the only remaining discharge is from the Cockburn Cement wash plant. Continuing pressures are predominantly related to potentially polluted groundwater in-flow, dredging, coastal development, and increasing recreational and commercial uses.

In August 2004 the Minister for Environment announced the expansion of the Cockburn Sound Management Council's (CSMC) roles and responsibilities to include the waters of Owen Anchorage and its catchment. As a result, the Government provided additional funding from 2005 to 2008 to support the Council's expanded roles in this area. During this period the CSMC established the Owen Anchorage Sub-Committee (OASC) to act as a coordinating body for the environmental management of Owen Anchorage. The key focus of the OASC was to prepare an Environmental Management Plan for Owen Anchorage and its catchment.

Coogee Beach Jetty

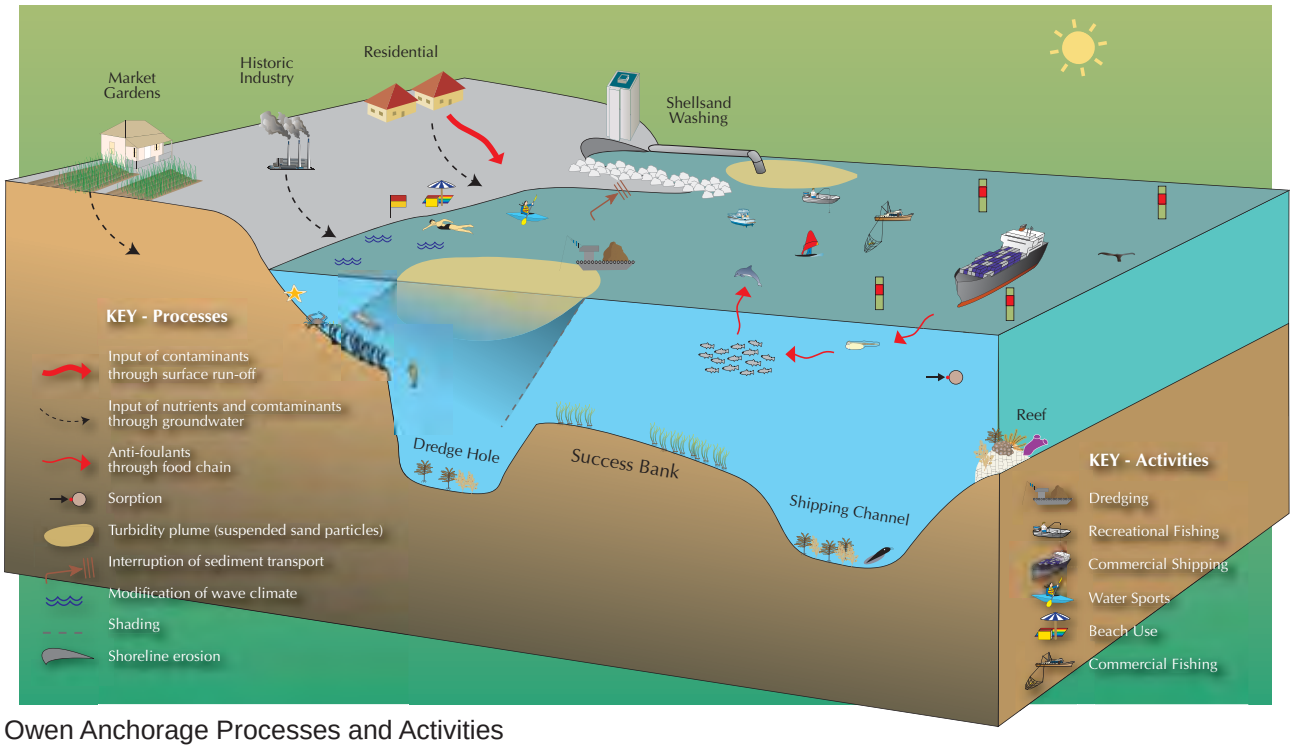
There are no formal protection zones attributed to Owen Anchorage as yet, other than the recently completed Port Coogee Marina which is zoned for a Moderate Level of Protection. The SEP review being undertaken by the Office of the Environmental Protection Authority (OEPA) may see the inclusion of Owen Anchorage under the SEP umbrella and the establishment of zones of protection.

To provide the basis of an Environmental Management Plan for Owen Anchorage the CSMC prepared a comprehensive description of the state of the Owen Anchorage environment, the pressures on the resource base and the current management responses. This report, *The State of Owen Anchorage*, was released in February 2007. The *State of Owen Anchorage Report 2007* includes detailed information on Owen Anchorage and makes a number of recommendations on future management options for this important marine embayment.

With the expansion of the CSMC's responsibilities to include Owen Anchorage, the CSMC took over coordination of the Owen Anchorage Water Quality Monitoring Program which was reviewed and modified in 2007 by the CSMC and DEC. It was decided that a total of ten sites would continue to be monitored. However, site locations were rationalised for a better overall spatial distribution for the future of the program. Of the ten original sites, five remain basically unchanged, with a number of new monitoring sites established and a range of additional monitoring parameters added to increase the effectiveness of the monitoring program.

Coogee Beach

Following the completion of the *State of Owen Anchorage Report 2007*, the CSMC had two main objectives for Owen Anchorage: to establish Environmental Values and Objectives for Owen Anchorage and to prepare an Environmental Management Plan for Owen Anchorage. The CSMC has completed a Draft Interim Environmental Management Plan for Owen Anchorage. It is anticipated this EMP will be further developed based on the outcome of the review of the existing *State Environmental (Cockburn Sound) Policy 2005*. The CSMC will continue to maintain its existing seagrass and water quality monitoring programs in Owen Anchorage in 2012.



Owen Anchorage Processes and Activities

Cockburn Coast Project

The City of Cockburn, in partnership with the Western Australian Planning Commission, has produced a guide, 'Cockburn Coast', as a framework for planning future land use and transport along the Owen Anchorage shoreline within an area stretching between South Beach and the Port Coogee marina. 'Cockburn Coast' establishes parameters for developing the Cockburn coastal strip as an intensive, mixed use urban environment.

Overlooking the Indian Ocean, between South Beach, Fremantle and Port Coogee, the Cockburn coast will offer a cosmopolitan beachside living and cafe lifestyle with new amenities and excellent transport networks.

About 10 000 people will live in the area which is anticipated to take approximately 15–20 years to fully develop.

The Cockburn coast project is a unique opportunity to revitalise a forgotten industrial coastal strip. Focussed on the South Fremantle Power Station, the former Robb Jetty abattoir site and surrounding industrial land, the Cockburn coast area incorporates 330 hectares of land located at North Coogee,

129 hectares of which are attributed to the Manning Reserve portion of Beeliar Regional Park and the coastal foreshore.

The Department of Planning prepared a Cockburn coastal district structure plan, to guide the future transition of the vacant and underutilised industrial land to a vibrant, mixed use urban location. This plan was prepared in conjunction with the City of Cockburn, City of Fremantle, LandCorp and a stakeholder reference group.

The role of the CSMC will be to coordinate appropriate monitoring and oversight to protect the environmental values of Owen Anchorage as pressures change and increase.

Evironmental Quality Monitoring Program (EQMP)

What did we do?

In 2011, the CSMC coordinated an EQMP to assess the health of Cockburn Sound. Data was collected for physical and chemical measures, direct and indirect biological measures, contaminants in sediments and waters and biological contaminants.

What did we find?

Ecosystem Health in Areas of a High Level of Protection (broader area of Cockburn Sound) (Report Card 1)

The High Ecological Protection did not meet the Environmental Quality Guidelines (the Guidelines) for chlorophyll *'a'* concentrations which exceeded the Environmental Quality Criteria (EQC) at six of the thirteen sites in this Area.

Median light attenuation did not meet the Guidelines at six of the thirteen sites.

All sites met the Guidelines for temperature, salinity, pH and dissolved oxygen.

Chlorophyll *'a'*, as an indicator of phytoplankton biomass, did not meet the Guidelines. Concentrations at Mangles Bay and two sites in the Southern Sound exceeded the Standards and were labelled red.

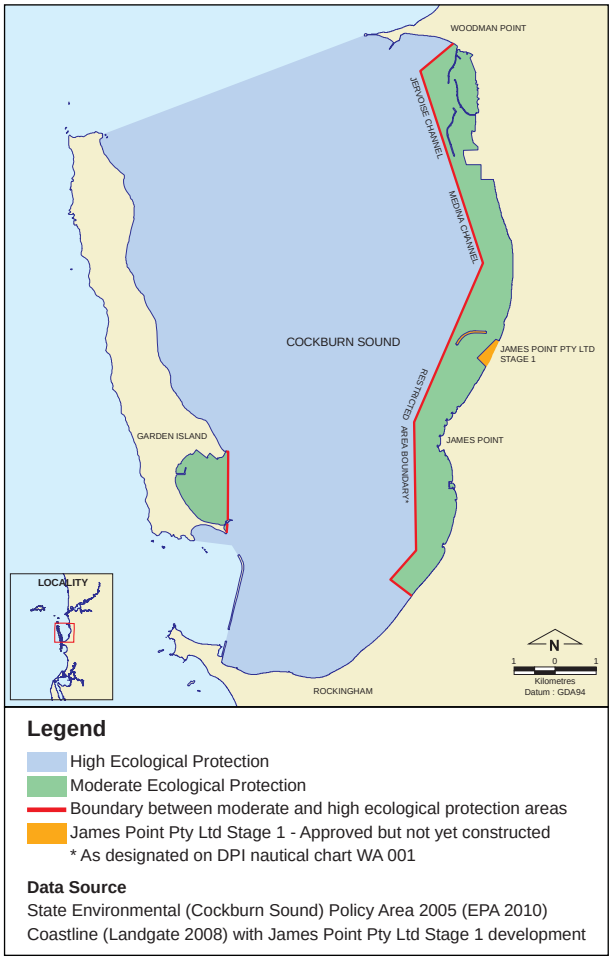
Most sites met the seagrass shoot density Guideline except those at Mangles Bay, Luscombe Bay and Garden Island Settlement which were labelled red. Garden Island Settlement has improved this year following deterioration over the past five years and Mangles Bay has also improved this year.

All sites met the Guidelines for seagrass depth limits. No observed reductions in the seagrass depth limit were detected. Stability at the lower depth limit suggests that there has not been a regional decline in water clarity and light availability sufficient to cause a loss of seagrass meadows (Seagrass monitoring results were reviewed in Aug-Sep 2011).

No formal Contaminants in Water sampling occurred in 2011. 2008 sampling indicated that all sites met the Guidelines or were below normal laboratory reporting limits.

No TBT sediment sampling was done this year. Samples taken in 2007 were all well below the Guidelines and graded green.

All sediment samples monitored to date (collected at 86 sites in March 2006) met the Guidelines.



Ecosystem Health in Areas of a Moderate Level of Protection (outside Jervoise Bay Harbours) (Report Card 2)

Chlorophyll *'a'* did not meet the Guidelines; concentrations were above Guideline levels at four of the seven sites in this Area.

Light attenuation coefficient did not meet the Guidelines at two of the seven sites.

All sites met the Guidelines for dissolved oxygen, temperature, salinity and pH.

All sites met the Guidelines for Phytoplankton Biomass (activity).

Seagrass shoot density met the Guidelines.

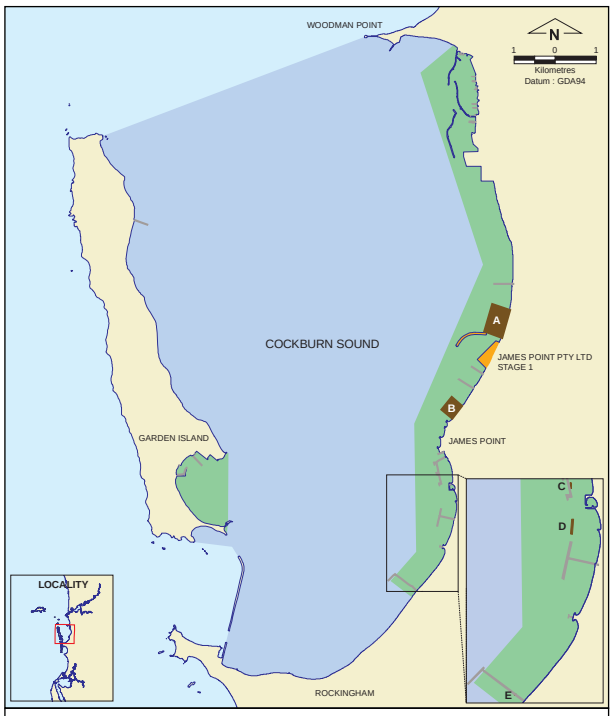
All sites met the Guidelines for seagrass depth limits. No reduction in seagrass depth limits was observed.

Contaminants in Water concentrations met the Guidelines or were below laboratory reporting limits.

Limited sampling of contaminants in sediments (mainly around industrial and commercial jetties and terminals) met the Guidelines.

No formal sampling for imposex in snails has been done by the CSMC since 2005-06. Data is considered to be too old to report on.

The Area met Guidelines for metals and metalloids. Two sites had elevated cadmium and copper sediment concentrations but were below Guidelines and no sites exceeded the Guidelines for poly-aromatic hydrocarbons.



Legend

- High Ecological Protection
- Moderate Ecological Protection
- Low Ecological Protection
- James Point Pty Ltd Stage 1 – Approved but not yet constructed
- Jetties (2004)

Data Source

State Environmental (Cockburn Sound) Policy Area 2005 (EPA 2010)
Jetties (Department of Planning 2004)
Coastline (Landgate 2008) with James Point Pty Ltd Stage 1 development

Areas of LEPAs

(A) – Western Power – 35.90 ha
(B) – BP – 15.64 ha
(C) – Tiwest Pty Ltd – 0.12 ha
(D) – CSBP Ltd – 0.48 ha
(E) – Mintech Chemical Industries – 0.04 ha

These areas currently occupy 4.39% of the water area east of the high/moderate ecological protection boundary.

Ecosystem Health in Areas of a Moderate Level of Protection (inside Jervoise Bay Harbours) (Report Card 3)

The median chlorophyll *'a'* concentration for Jervoise Bay Northern Harbour exceeded the Guidelines at four of five sites monitored. No sampling occurred in the Southern Harbour in 2011.

Light attenuation in Northern Harbour sites exceeded the Guidelines. No sampling occurred in the Southern Harbour in 2011.

Dissolved Oxygen, Temperature, Salinity and pH concentrations in Northern Harbour met the Guidelines. No sampling occurred in the Southern Harbour in 2011.

High phytoplankton biomass exceeded the Standards in Jervoise Bay Northern Harbour as it has every year since 2003. The median chlorophyll *'a'* concentration exceeded the Standards. No sampling occurred in the Southern Harbour in 2011.

No sampling for Contaminants in Water was undertaken in these Areas this year. When last tested in 2008 contaminant levels met the Guidelines.

Based on limited sampling, TBT concentrations for the Northern Harbour at three out of four sites monitored exceeded the Guidelines. Southern Harbour sampling met the Guidelines except at one site.

No formal sampling for imposex in snails has been done by CSMC since 2005-06. Data is considered to be too old to report on.

No sampling for organic contaminants in the Northern and Southern Harbours was undertaken this year. The last sampling occurred in 2003. Data is considered to be too old to report on.

Safe Seafood for Eating Report Card (Report Card 4)

All sites met the Guidelines for Thermo-tolerant faecal coliform levels in water and Thermo-tolerant faecal coliforms in seafood flesh.

Potentially toxic phytoplankton algae did not exceed the Guidelines. Levels of potentially toxic phytoplankton algae exceeded Environmental Quality Criteria and WASQAP Guidelines twice out of ten monitoring occasions at Kwinana Grain Terminal, on three out of seven monitoring occasions at Southern Flats, on six occasions out of twelve monitoring occasions at one site in Jervoise

Bay Northern Harbour and on seven out of fifteen monitoring occasions at one site in the Southern Harbour.

Because the overall Guidelines were not exceeded, no testing for algal bio-toxins was undertaken. Seafood tested in commercial growing areas did not exceed WASQAP Guidelines and was considered safe for eating. Whilst these species were present they did not produce toxins.

Under WASQAP, commercially farmed mussels in Cockburn Sound are subject to strict quality assurance processes to protect public health, including routine water quality and mussel sampling.

A watch-list of species known to be toxic to human health is maintained by WASQAP. These species, when tested in Cockburn Sound, have not been found to be toxic.

All sites met the Guidelines for cadmium, copper, lead, zinc and mercury levels in mussels. Some natural heavy metals were detected but well below food and safety Guidelines.

All sites met the Guidelines for organic compounds. No problems were identified for aquaculture in the monitoring data. All organic chemicals were below laboratory reporting limits or were well below food and safety Guidelines.

Clean Waters for Swimming and Boating (Report Card 5)

All sites met the Guidelines for Bacterial *Enterococci* (Swimming). Beach sites have greatly improved for bacteria contamination over the last few years. In 2009 all sites exceeded Guidelines and Standards; last year three out of seven sites exceeded Guidelines and this year no sites exceeded the Guidelines. This is a very positive result.

All sites met the Guidelines for Bacterial *Enterococci* (boating).

All sites met the Guidelines for toxic algae based on WASQAP sampling further off-shore. There were no reports of skin or eye irritation caused by toxic algae or algal poisoning by recreational users in 2011.

All sites met the pH Guidelines. All sites except Mangles Bay met the Guidelines for water clarity; this individual site was coded amber.

All sites met the Guidelines for Contaminants in Water. The CSMC's contaminants in water survey conducted in 2008 indicated a large majority of sites had very low levels of contaminants, including pesticides. They were below laboratory reporting limits

Protecting the Health of Aquaculture Species (Report Card 6)

All sites met the Guidelines for Dissolved Oxygen and pH. All sites met the Guidelines for Contaminants in Water. All sites were either below laboratory reporting limits or measured at very low levels, well below any Guidelines or trigger values.

Summary of Overall Health

The 2011 Report Cards indicate that while the marine environment of Cockburn Sound is generally good, there are some aspects that require attention. Monitoring carried out at all sites in the Sound has shown that measures for dissolved oxygen, temperature, salinity and pH levels have generally met established Guidelines. These are all key indicators of a healthy ecosystem.

On Going Action

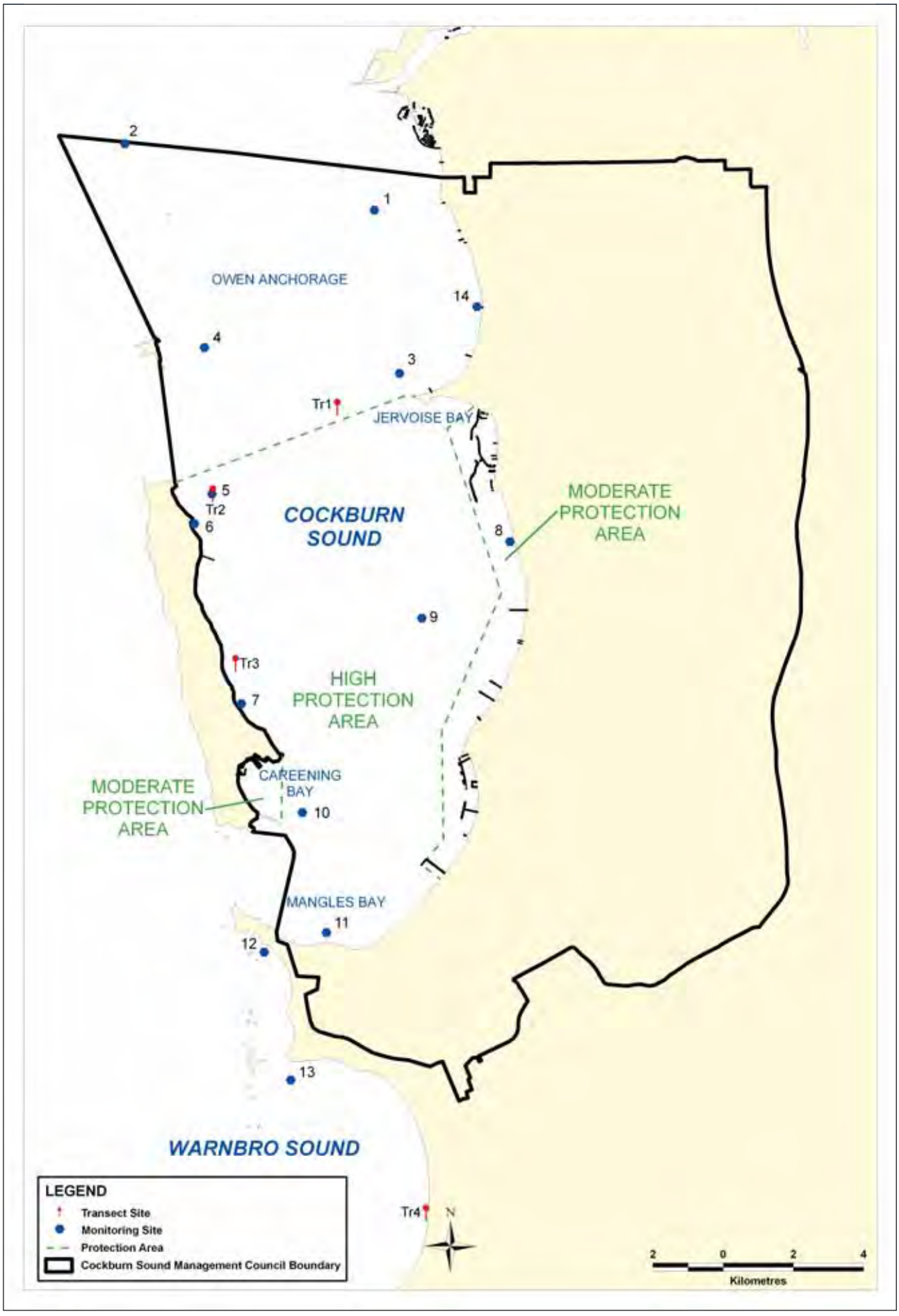
The CSMC will be working with the DEC and EPA to see if there are any practical management steps that can be taken to improve system wide results within the Sound.

It is pleasing to note the continued improvements this year. The Council is also in the final stages of preparing a Management Action Plan (MAP) to address poor water and sediment quality problems in Jervoise Bay Northern Harbour.

Action from 2011 Report Cards

The CSMC has presented the 2011 Report Cards to the Minister for Environment. Separate advice has been provided to the Office of the Environmental Protection Authority advising of all exceedances of Guidelines and Standards identified by the Council's Environmental Health monitoring, evaluation and reporting methodologies.

The CSMC will discuss with the Department of Defence whether any action can be undertaken to overcome the continuing decline of seagrass shoot density levels at Garden Island Settlement and Luscombe Bay, located within Naval Waters. It should be noted the Garden Island site did improve slightly this year.



CSMC Seagrass Monitoring Sites

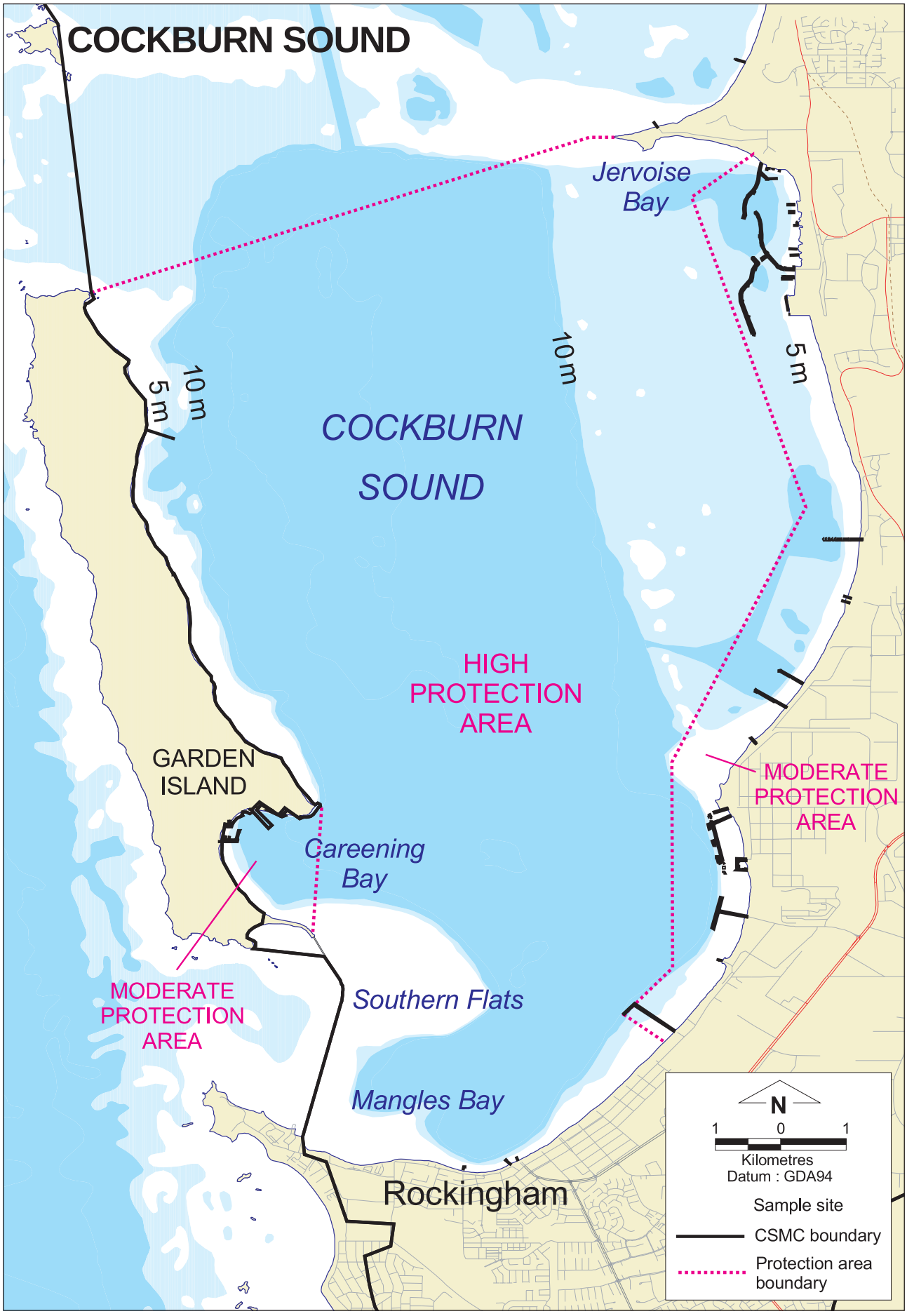
Cockburn Sound Management Council Environmental Report Cards 2011

CSMC Water Quality Monitoring Sites

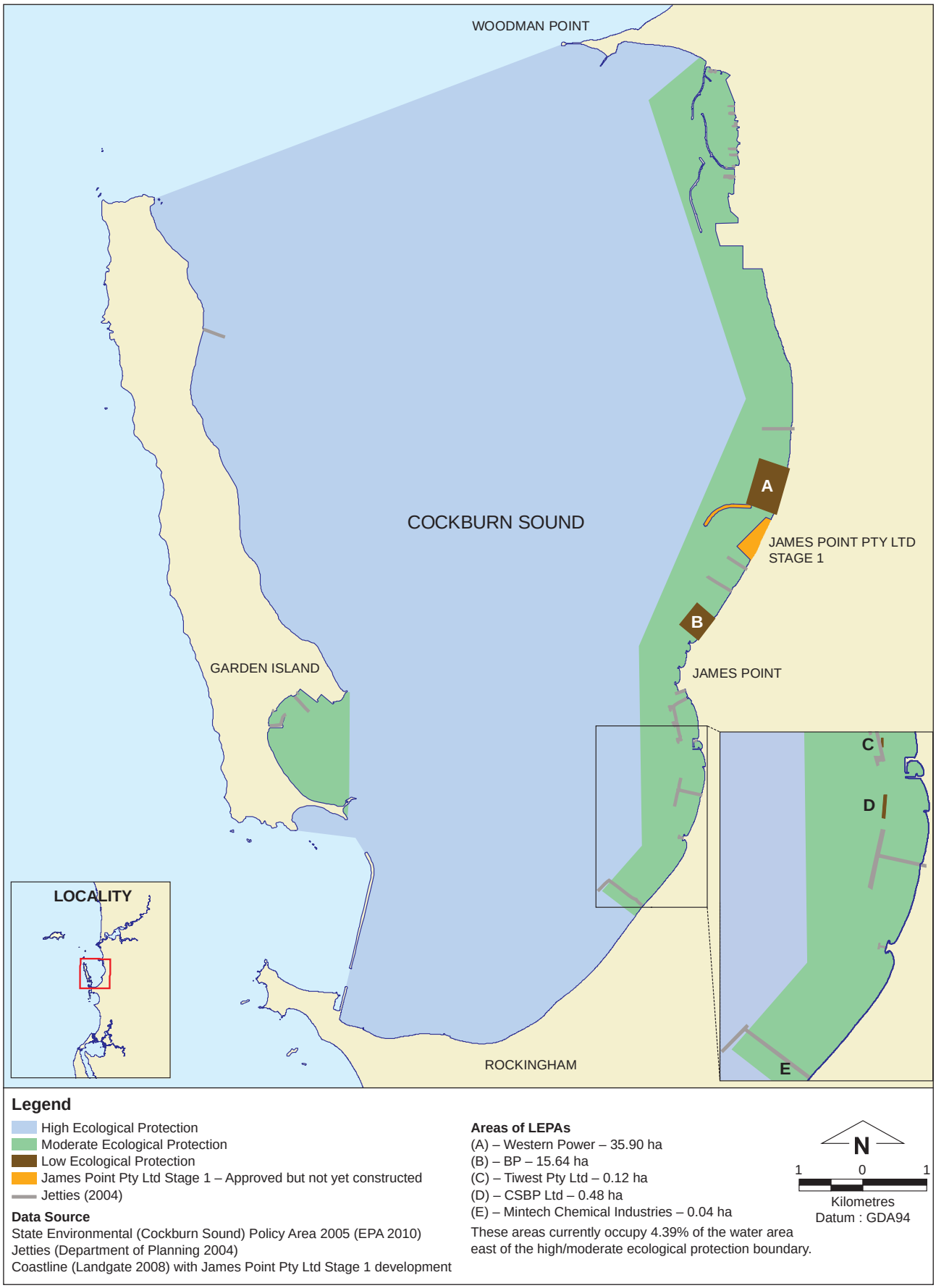
Cockburn Sound Management Council Environmental Monitoring Results – Evaluation Rules

The State Environmental (Cockburn Sound) Policy 2005 (SEP) requires the Cockburn Sound Management Council (CSMC) to report on two Ecological Protection Areas – High and Moderate Ecological Protection Areas. The CSMC have also created a third Ecological Protection Area – *Moderate Protection Area Harbours* – based on the SEP that advises the performance of harbours and marinas should be assessed individually and not be part of overall Moderate Ecological Protection Areas if the area is displaying different environmental conditions. Because of poor environmental conditions in Jervoise Bay harbours, the CSMC created this third Area. Each Area is monitored at a number of sites. Measurements at each site are collectively analysed to report on the environmental performance for each Ecological Protection Area. Environmental data is analysed according to the rules and criteria outlined in the SEP and associated Environmental Quality Criteria (EQC) and Standard Operating Procedure (SOP) documents. While the CSMC reports mainly on the Areas of Ecological Protection, a number of parameters are reported on a *site* basis. This is either because that is the specified procedure for reporting on that set of Environmental Quality Objectives (EQO – e.g. Clean Waters for Swimming and Boating) or because the CSMC believes that regardless of the overall Area meeting Environmental Quality Standards or Guidelines EQS-EQG), exceedances at sites are deemed important enough to grade the whole Area as exceeding the Guideline or Standard. In some cases this year, even though the Area met the EQC, if $\geq$ 50% of sites did not, then the Area was reported to have exceeded the EQC. When reporting, the CSMC also provides maps to show how the Areas and individual sites have performed against the EQC for a given parameter. The terminology word *Guidelines* is used to indicate Environmental Quality Guidelines while *Standards* are used when referring to Environmental Quality Standards.

Seagrass health is a key indicator of the environmental performance of the Cockburn Sound marine ecosystem. The CSMC will grade seagrass as either amber or red if too few sites are meeting the Guidelines or Standards based on the 50% rule outlined above. For example if three of the seven seagrass sites within the High Protection Area exceed either the Guideline or Standard, the Council, at its discretion, will grade this reporting parameter as either amber or red. The decision will depend on the individual monitoring results at each site. Because poor seagrass health may demonstrate a potentially broader water quality problem within the ecosystem, the Council generally adopts a conservative approach in borderline cases, triggering investigation for amber and intervention for red.



Protection Areas



State Environmental (Cockburn Sound) Policy 2005
Schedule 3 – Location, size and cumulative area of authorised Low Ecological Protection Areas

Report Card 2011

Ecosystem Health in the High Ecological Protection Area

Environmental Quality Indicators			Management Response	Comments
Physical and Chemical Measures	• Chlorophyll *'a'*		I	The High Ecological Protection did not meet the Environmental Quality Guidelines (the guidelines); chlorophyll concentrations exceeded the Environmental Quality Criteria (EQC) at six of the thirteen sites in this Area.
	• Light Attenuation		I	Median light attenuation did not meet the guidelines at six of the thirteen sites.
	• Dissolved Oxygen • Temperature • Salinity • pH		M M M M	All sites met the guidelines for temperature, salinity, pH and dissolved oxygen.
Direct Biological Measures	*Phytoplankton Biomass (Activity)* • Chlorophyll *'a'*		I	Chlorophyll *'a'*, as an indicator of phytoplankton biomass, did not meet the guidelines. Concentrations at Mangles Bay and two sites in the Southern Sound exceeded the standards and were labelled red.
	Seagrass • Shoot density		I	All sites met the guidelines except those at Mangles Bay, Luscombe Bay and Garden Island Settlement which were labelled Red. Garden Island Settlement has improved this year following deterioration over the past five years and Mangles Bay has also improved this year.
	• Depth limits		M	All sites met the guidelines. No observed reductions in the seagrass depth limit were detected. Stability at the lower depth limit suggests that there has not been a regional decline in water clarity and light availability sufficient to cause a loss of seagrass meadows (Seagrass monitoring results were reviewed in Aug – Sept 2011).
Contaminants in Water	*Metals and Metalloids*		M	No formal Contaminants in Water sampling occurred in 2011. Sampling in 2008 indicated that all sites met the guidelines or were below normal laboratory reporting limits.
	Non-metallic Inorganics • Organics • Pesticides • Herbicides and Fungicides • Surfactants • Hydrocarbons • Miscellaneous/Others		M M M M M M	
Contaminants in Sediments	*Organometallics (e.g. TBT)*	*Sediment*	M	No TBT sediment sampling was done this year. Samples taken in 2007 were all well below the guidelines and graded green [1].
		Imposex in Marine Snails	A	No formal sampling for imposex in snails has been done by CSMC since 2005–06 [2], but university studies (not published) have shown substantial reduction in imposex. CSMC data is considered too old to report on.
	Metals and Metalloids		M	All sediment samples monitored to date (collected at 86 sites in March 2006) met the guidelines [1].
	Organics		M	

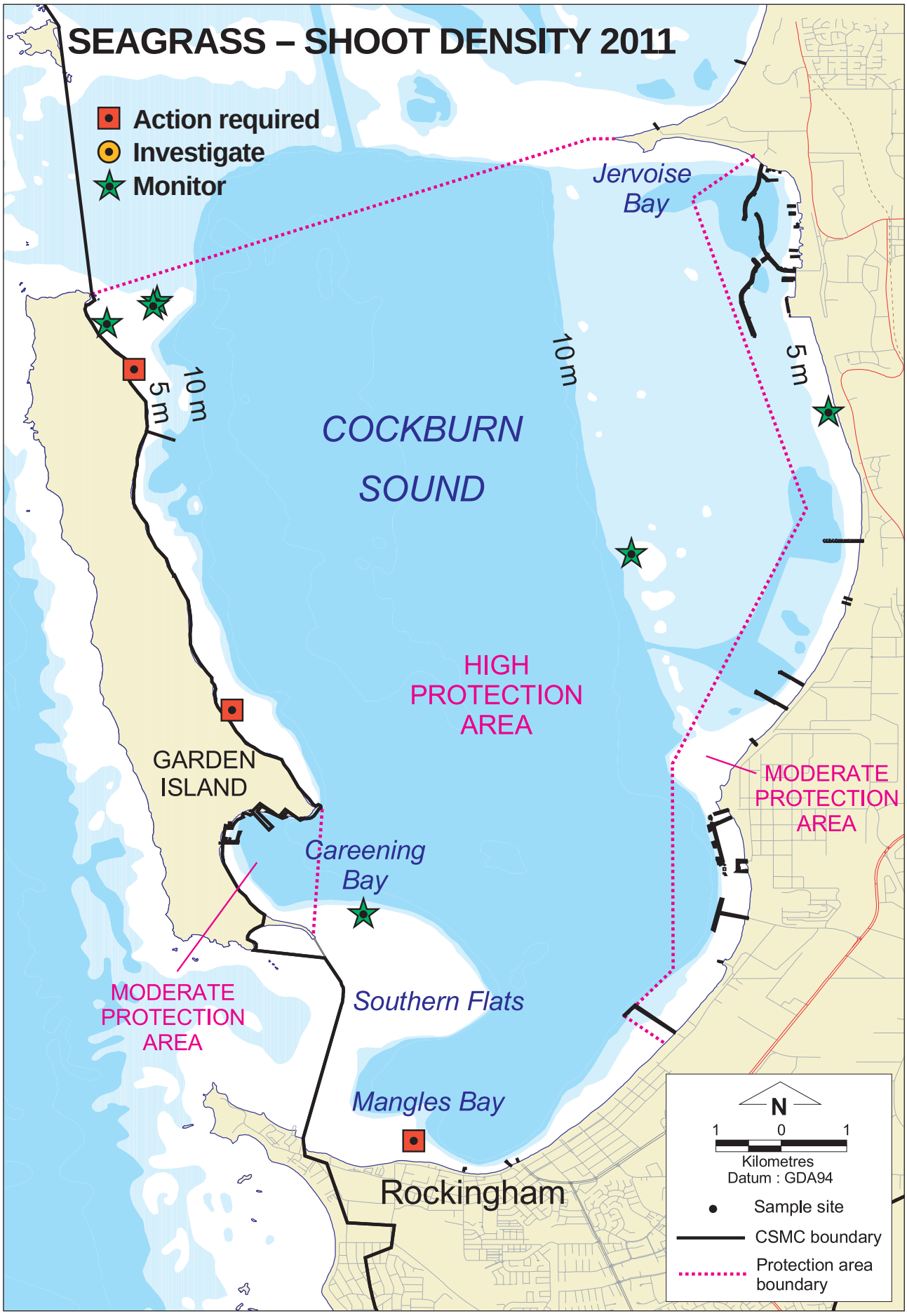
[1] Toxicants in Sediment Survey Report Cockburn Sound and Owen Anchorage prepared for Cockburn Sound Management Council by Aquatic Science Branch Department of Water October 2006.

[2] Limited sampling for imposex in snails occurred out of season (university studies 2007, 2009 & 2011). These studies indicated a continued decline in TBT contamination in Perth coastal waters as measured through the degree of imposex. However, a number of sites assessed (including Colpoys Point, Garden Island and Jervoise Bay harbours) still have relatively high levels of imposex, indicating that TBT contamination is still prevalent around industrial and naval harbours in the Sound. A significant reduction in imposex frequency was observed at Woodman Point. Sites at South Jervoise Bay and Colpoys Point have shown improvements between 2005 and 2011 studies (55 to 33%).

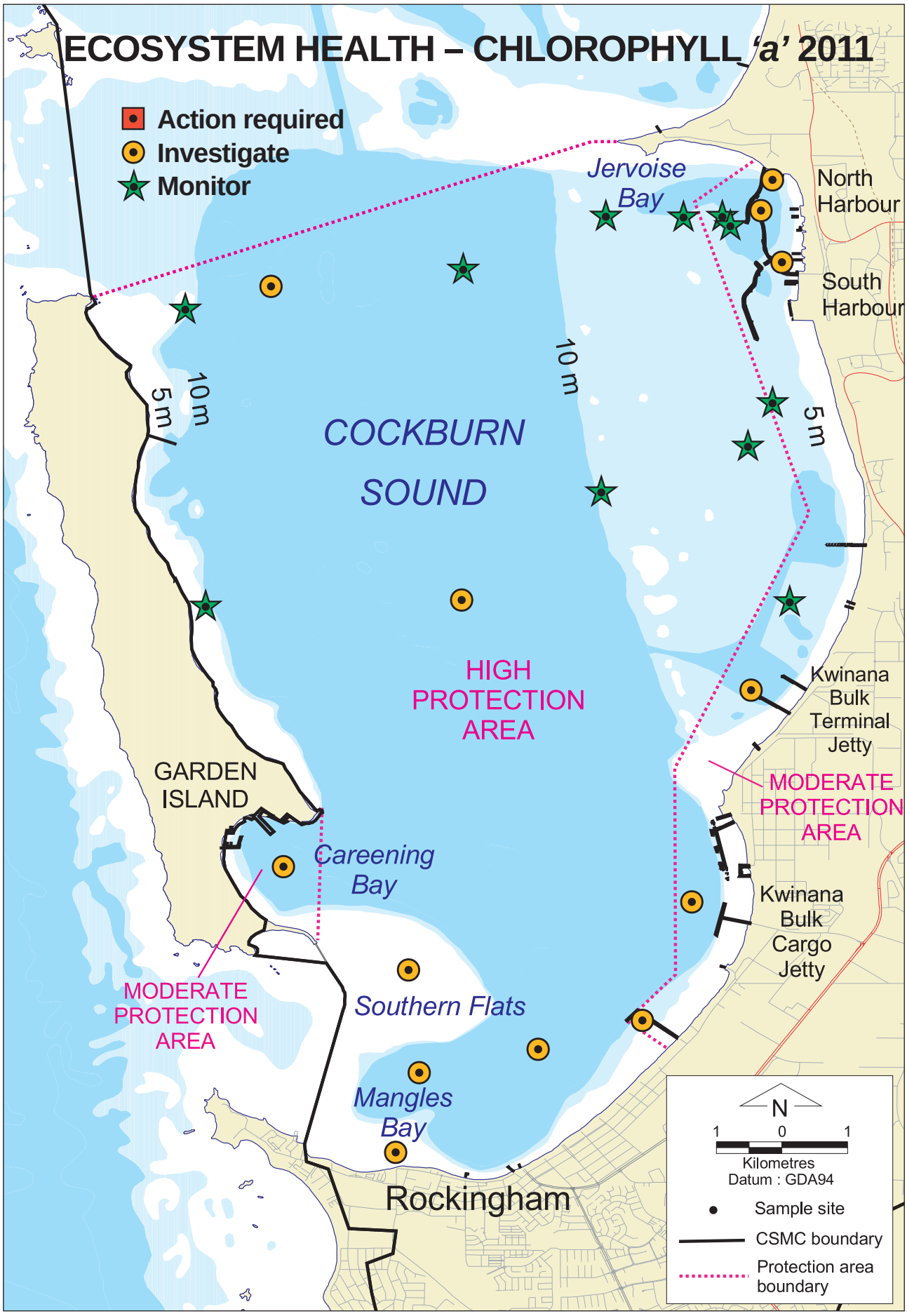
Report Card 1

- **M** — **Monitor:** below guidelines, continue monitoring.
- **I** — **Investigate:** above guidelines; investigate and where necessary take precautionary action.
- **A** — **Action Required:** Above standards; initiate management response.
- **N/A** — No official rating can be applied.

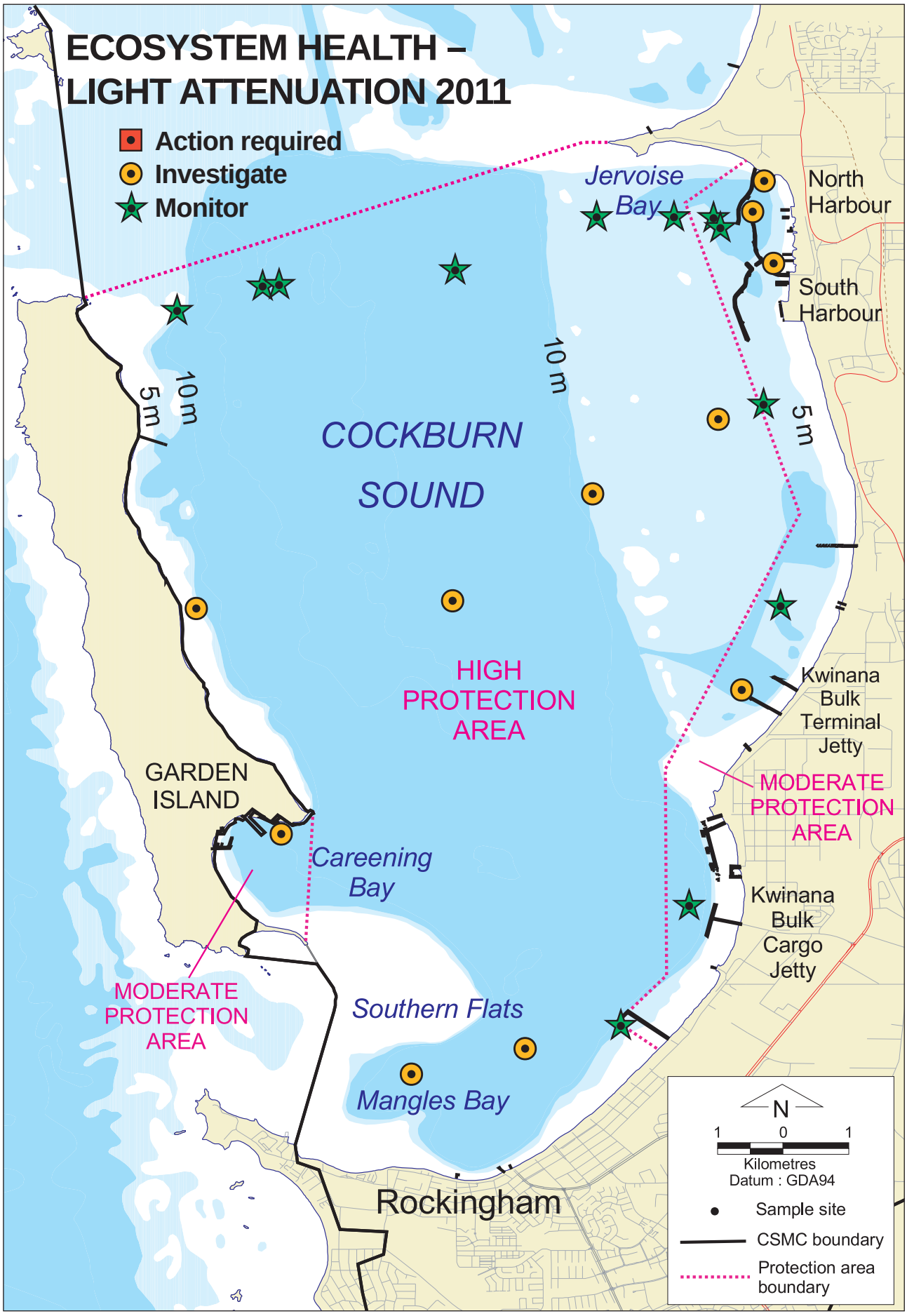
- Hatched means data greater than one year old.
- Green hatched means data greater than one year old but was below guidelines when last measured.
- Red hatched means data greater than one year old and above standards when last measured.
- Unable to Report. Monitoring data results were not provided to the CSMC or data is too old to be relied upon.


SEAGRASS – SHOOT DENSITY 2011
Action required
Investigate
Monitor
Jervoise Bay
10 m
5 m
10 m
5 m
COCKBURN SOUND
HIGH PROTECTION AREA
GARDEN ISLAND
Careening Bay
MODERATE PROTECTION AREA
MODERATE PROTECTION AREA
Southern Flats
Mangles Bay
Rockingham
N
1 0 1
Kilometres
Datum : GDA94
Sample site
CSMC boundary
Protection area boundary

Map 1a


ECOSYSTEM HEALTH – CHLOROPHYLL 'a' 2011
Action required
Investigate
Monitor
Jervoise Bay
North Harbour
South Harbour
10 m
5 m
10 m
5 m
COCKBURN SOUND
HIGH PROTECTION AREA
Kwinana Bulk Terminal Jetty
MODERATE PROTECTION AREA
GARDEN ISLAND
Careening Bay
Kwinana Bulk Cargo Jetty
MODERATE PROTECTION AREA
Southern Flats
Mangles Bay
Rockingham
N
1 0 1
Kilometres
Datum : GDA94
Sample site
CSMC boundary
Protection area boundary

Map 1b


ECOSYSTEM HEALTH –
LIGHT ATTENUATION 2011
Action required
Investigate
Monitor
Jervoise Bay
North Harbour
South Harbour
10 m
5 m
10 m
5 m
COCKBURN SOUND
HIGH PROTECTION AREA
Kwinana Bulk Terminal Jetty
MODERATE PROTECTION AREA
GARDEN ISLAND
Careening Bay
Kwinana Bulk Cargo Jetty
MODERATE PROTECTION AREA
Southern Flats
Mangles Bay
Rockingham
N
1 0 1
Kilometres
Datum : GDA94
Sample site
CSMC boundary
Protection area boundary

Map 1c

Report Card 2011

Ecosystem Health in the Moderate Ecological Protection Area
(Outside Jervoise Bay Harbours)

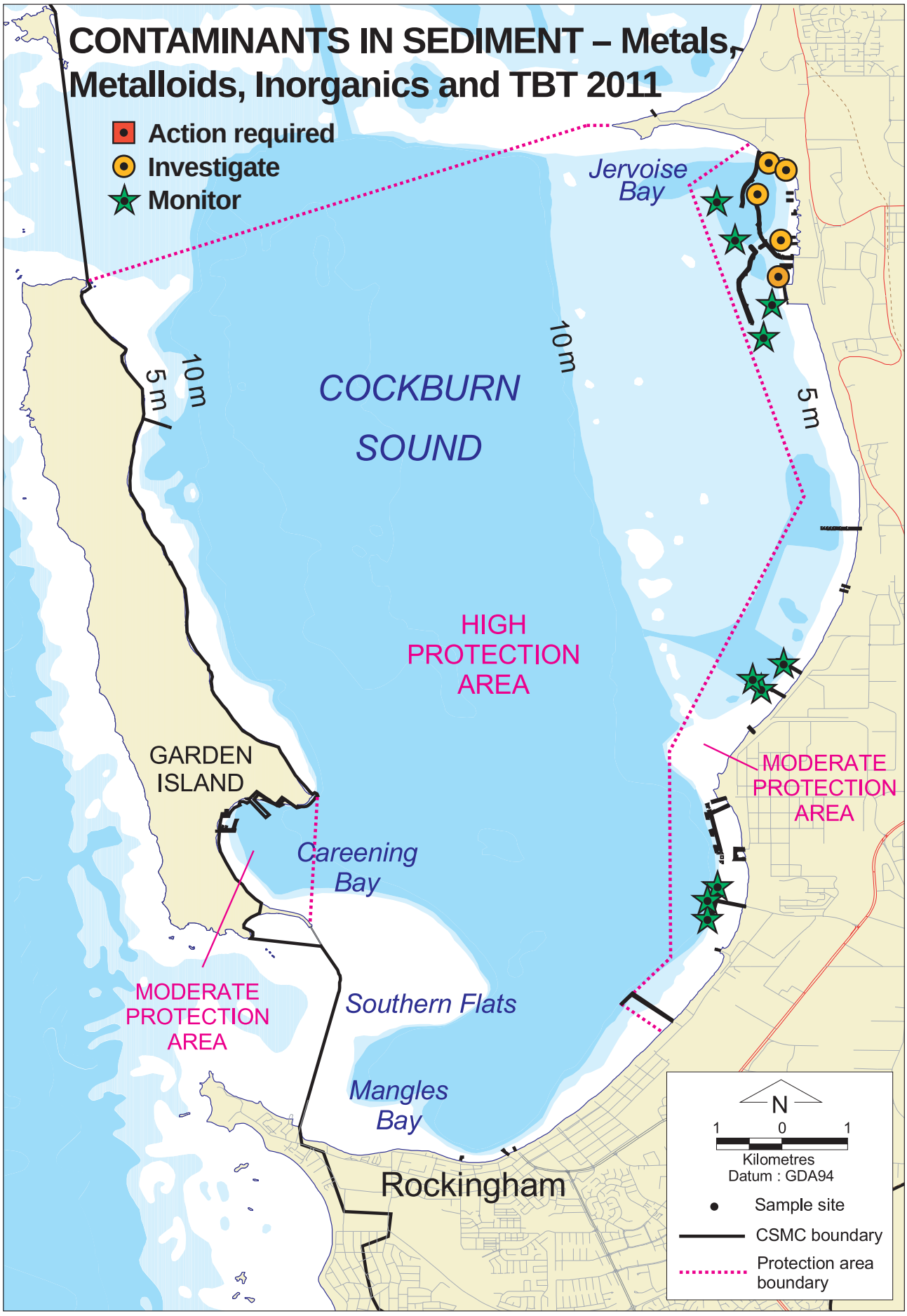
Environmental Quality Indicators			Management Response	Comments
Physical and Chemical Measures	• Chlorophyll *'a'*		I	Chlorophyll *'a'* did not meet the guidelines; concentrations were above guideline levels at four of the seven sites in this Area.
	• Light attenuation		I	Light attenuation coefficient did not meet the guidelines at two of the seven sites.
	• Dissolved Oxygen		M	All sites met the guidelines for dissolved oxygen, temperature, salinity and pH.
	• Temperature		M	
	• Salinity		M	
	• pH		M	
Direct Biological Measures	*Phytoplankton Biomass (Activity)*			
	• Chlorophyll *'a'*		M	All sites met the guidelines for Phytoplankton Biomass (activity).
	Seagrass			
	• Shoot density		M	Seagrass shoot density met the guidelines.
	• Depth limits		M	All sites met the guidelines. No reduction in seagrass depth limits was observed..
Contaminants in Water	*Metals and Metalloids*		M	Concentrations met the guidelines or were below laboratory reporting limits.
	Non-metallic Inorganics			
	• Organics		M	
	• Pesticides		M	
	• Herbicides and Fungicides		M	
	• Surfactants		M	
	• Hydrocarbons		M	
	• Miscellaneous/Others		M	
Contaminants in Sediments	*Organometallics (e.g. TBT)*	*Sediment*	M	Limited sampling of contaminants in sediments (mainly around industrial and commercial jetties and terminals) met the guidelines.
		Imposex in Marine Snails (2006)	A	No formal sampling for imposex in snails has been done by CSMC since 2005–06[2]. Data is considered to be too old to report on.
	Metals and Metalloids		M	The Moderate Ecological Protection Area met the guidelines.
	Organics		M	Two sites had elevated cadmium and copper sediment concentrations but were below guidelines and no sites exceeded the guidelines for poly-aromatic hydrocarbons.

[2] Limited sampling for imposex in snails occurred out of season (university studies 2007, 2009 & 2011). These studies indicated a continued decline in TBT contamination in Perth coastal waters as measured through the degree of imposex. However, a number of sites assessed (including Colpoys Point, Garden Island and Jervoise Bay harbours) still have relatively high levels of imposex, indicating that TBT contamination is still prevalent around industrial and naval harbours in the Sound. A significant reduction in imposex frequency was observed at Woodman Point. Sites at South Jervoise Bay and Colpoys Point have shown improvements between 2005 and 2011 studies (55 to 33%).

Report Card 2

- **M** — **Monitor:** below guidelines, continue monitoring.
- **I** — **Investigate:** above guidelines; investigate and where necessary take precautionary action.
- **A** — **Action Required:** Above standards; initiate management response.
- **N/A** — No official rating can be applied.

- Hatched means data greater than one year old.
- Green hatched means data greater than one year old but was below guidelines when last measured.
- Red hatched means data greater than one year old and above standards when last measured.
- Unable to Report. Monitoring data results were not provided to the CSMC or data is too old to be relied upon.


CONTAMINANTS IN SEDIMENT – Metals, Metalloids, Inorganics and TBT 2011
Action required
Investigate
Monitor
Jervoise Bay
COCKBURN SOUND
10 m
5 m
10 m
5 m
HIGH PROTECTION AREA
MODERATE PROTECTION AREA
GARDEN ISLAND
Careening Bay
MODERATE PROTECTION AREA
Southern Flats
Mangles Bay
Rockingham
N
1 0 1
Kilometres
Datum : GDA94
Sample site
CSMC boundary
Protection area boundary

Map 2

Report Card 2011

Ecosystem Health in the Moderate Ecological Protection Area – Harbours
(MEPAH – Jervoise Bay Harbours)

Environmental Quality Indicators		Management Response: Northern Harbour	Management Response: Southern Harbour▲	Comments
Physical and Chemical Measures	• Chlorophyll *'a'*	I		The median chlorophyll *'a'* concentration for Jervoise Bay Northern Harbour exceeded the guidelines in four out of five sites. No sampling occurred in the Southern Harbour in 2011.
	• Light Attenuation	I		Light attenuation in Northern Harbour at four of five sites exceeded the guidelines. No sampling occurred in the Southern Harbour in 2011.
	• Dissolved Oxygen • Temperature • Salinity • pH	M M M M		Dissolved Oxygen, Temperature, Salinity and pH concentrations in Northern Harbour met the guidelines. No sampling occurred in the Southern Harbour in 2011.
Direct Biological Measures	*Phytoplankton Biomass (Activity)* • Chlorophyll *'a'*	A		Exceedance of a standard (high phytoplankton biomass) was registered at four of five sites in Jervoise Bay Northern Harbour as it has every year since 2003. The median chlorophyll *'a'* concentration exceeded the standards. No sampling occurred in the Southern Harbour in 2011.
Contaminants in Water	*Metals and Metalloids* *Non-metallic Inorganics* • Organics • Pesticides • Herbicides and Fungicides • Surfactants • Hydrocarbons • Miscellaneous/Others	M M M M M M M		No sampling for Contaminants in Water was undertaken in these Areas this year. When last tested in 2008 contaminant levels met the guidelines.
Contaminants in Sediments	*Organometallics (e.g. TBT)* — *TBT in Sediment*	I	M	Based on limited sampling, TBT concentrations for the Northern Harbour exceeded the guidelines. Three out of four sites exceeded the guideline. Southern Harbour sampling met the guidelines except at one site.
	Organometallics (e.g. TBT) — *Imposex in Marine Snails*	A	A	No formal sampling for imposex in snails has been done by CSMC since 2005–06[2]. Data is considered to be too old to report on.
	Metals and Metalloids *Organics*	M M		No sampling for organic contaminants in the Northern and Southern Harbours was undertaken this year. The last sampling occurred in 2003. Data is considered to be too old to report on.

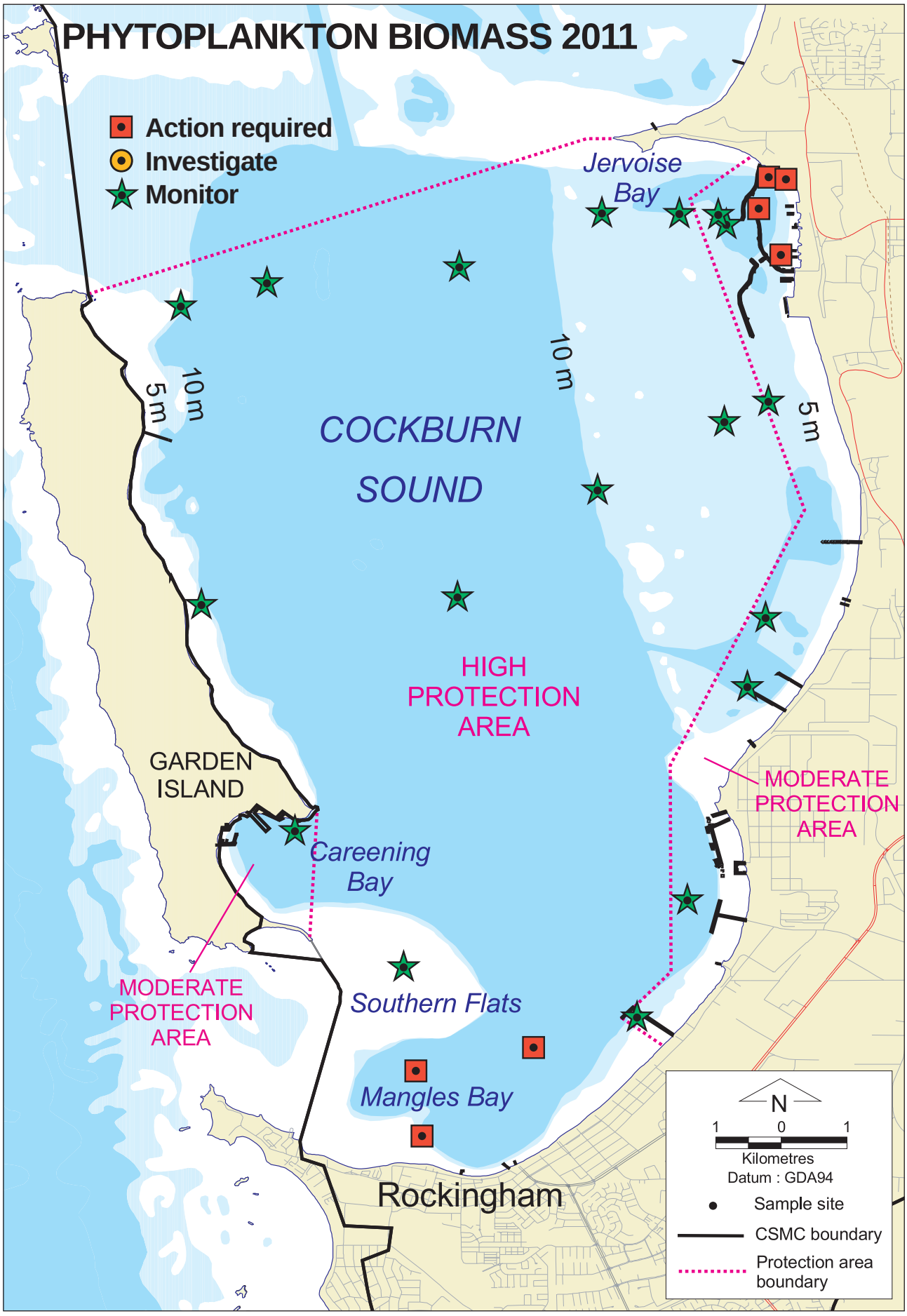
▲The CSMC did not receive any Physical/Chemical, Direct biological or Contaminants in Water monitoring data for the Southern Harbour in 2011 and older data is considered too unreliable to report upon. The last time monitoring for this data occurred was in 2008.

[2] Limited sampling for imposex in snails occurred out of season (university studies 2007, 2009 & 2011). These studies indicated a continued decline in TBT contamination in Perth coastal waters as measured through the degree of imposex. However, a number of sites assessed (including Colpoys Point, Garden Island and Jervoise Bay harbours) still have relatively high levels of imposex, indicating that TBT contamination is still prevalent around industrial and naval harbours in the Sound. A significant reduction in imposex frequency was observed at Woodman Point. Sites at South Jervoise Bay and Colpoys Point have shown slight improvements since the 2005 and 2007 studies

Report Card 3

- **M** — **Monitor:** below guidelines, continue monitoring.
- **I** — **Investigate:** above guidelines; investigate and where necessary take precautionary action.
- **A** — **Action Required:** Above standards; initiate management response.
- **N/A** — No official rating can be applied.

- Hatched means data greater than one year old.
- Green hatched means data greater than one year old but was below guidelines when last measured.
- Red hatched means data greater than one year old and above standards when last measured.
- Unable to Report. Monitoring data results were not provided to the CSMC or data is too old to be relied upon.


PHYTOPLANKTON BIOMASS 2011
Action required
Investigate
Monitor
Jervoise Bay
10 m
5 m
10 m
5 m
COCKBURN SOUND
HIGH PROTECTION AREA
GARDEN ISLAND
Careening Bay
MODERATE PROTECTION AREA
MODERATE PROTECTION AREA
Southern Flats
Mangles Bay
Rockingham
N
1 0 1
Kilometres
Datum : GDA94
Sample site
CSMC boundary
Protection area boundary

Map 3

Report Card 2011

Safe Seafood for Eating

	Environmental Quality Indicators	Management Response	Comments
Biological Contaminants	• Thermo-tolerant faecal coliform levels in water	M	All sites met the guidelines.
	• Thermo-tolerant faecal coliforms in seafood flesh	M	All sites met the guidelines.
	• Algal Bio-toxins – Presence of potentially toxic algae above guideline levels (e.g. > 15 000 cells/mL) – Presence of algal bio-toxins in mussel flesh due to elevated levels of toxic algae	M	Potentially toxic phytoplankton algae did not exceed the guidelines. Levels of potentially toxic phytoplankton algae exceeded Environmental Quality Criteria and WASQAP guidelines twice out of ten monitoring occasions at Kwinana Grain Terminal, on three out of seven monitoring occasions at Southern Flats, on six occasions out of twelve monitoring occasions at one site in Jervoise Bay Northern Harbour and on seven out of fifteen monitoring occasions at one site in the Southern Harbour. Because the overall guidelines were not exceeded, no testing for algal bio-toxins was undertaken. Seafood tested in commercial growing areas did not exceed WASQAP guidelines and was considered safe for eating. Whilst these species were present they did not produce toxins. Under WASQAP, commercially farmed mussels in Cockburn Sound are subject to strict quality assurance processes to protect public health, including routine water quality and mussel sampling. A watch-list of species known to be toxic to human health is maintained by WASQAP. These species, when tested in Cockburn Sound have not been found to be toxic. •*The public need to be aware of the risk associated with the consumption of potentially contaminated seafood collected recreationally outside of areas monitored by WASQAP, particularly in Jervoise Bay or around any jetties, piers and port related facilities. These shellfish are unmonitored and their quality cannot be assured.*
Chemical contaminants in seafood flesh	• Metals	M	All sites met the guidelines for cadmium, copper, lead, zinc and mercury levels in mussels. Some natural heavy metals were detected but well below food and safety guidelines.
	• Organic Chemicals	M	All sites met the guidelines. No problems were identified for aquaculture in the monitoring data. All organic chemicals were below laboratory reporting limits or were well below food and safety guidelines.

Report Card 4

- **M** — **Monitor:** below guidelines, continue monitoring.
- **I** — **Investigate:** above guidelines; investigate and where necessary take precautionary action.
- **A** — **Action Required:** Above standards; initiate management response.
- **N/A** — No official rating can be applied.

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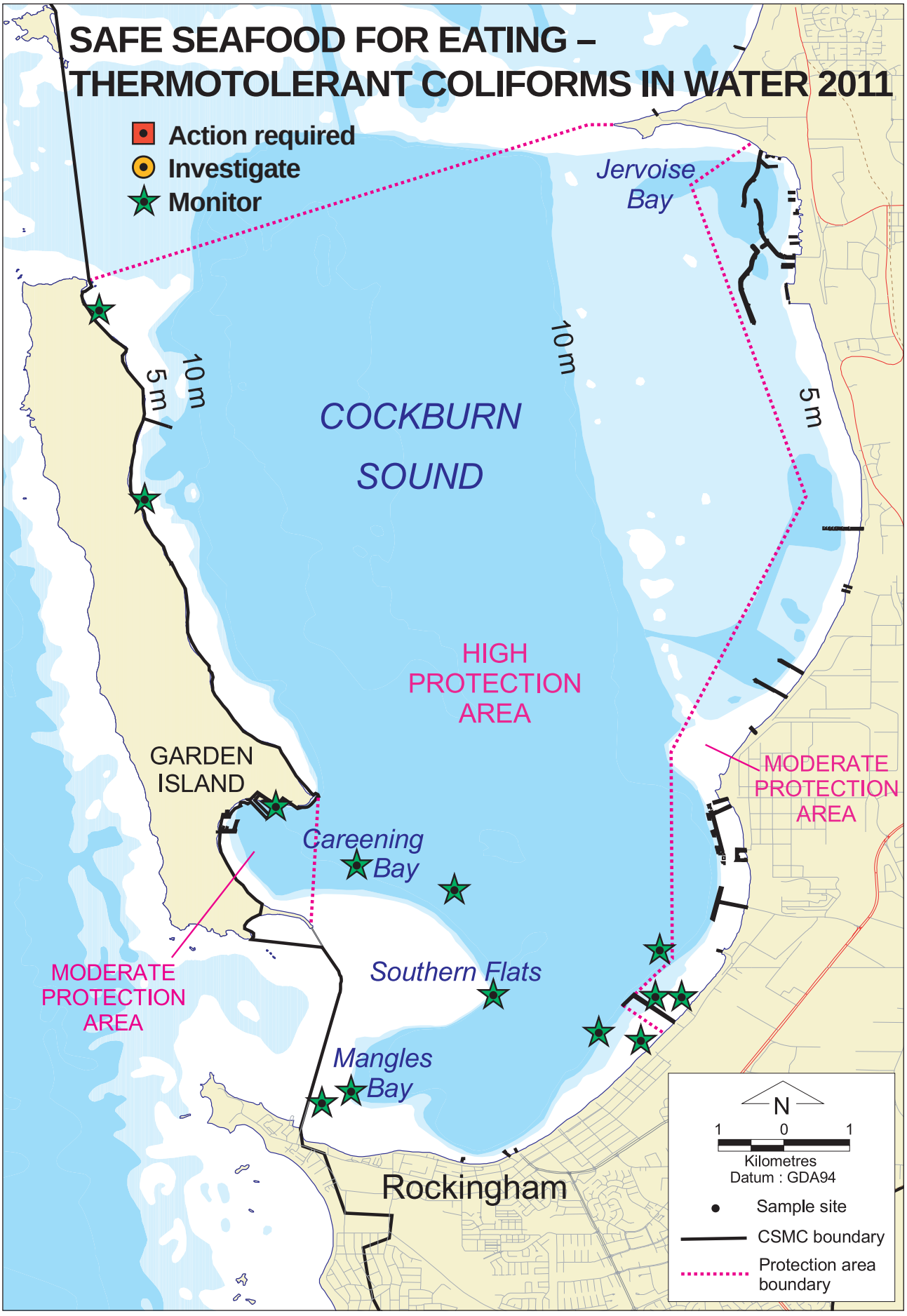
- Red hatched means data greater than one year old and above standards when last measured.
- Unable to Report. Monitoring data results were not provided to the CSMC or data is too old to be relied upon.


SAFE SEAFOOD FOR EATING –
THERMOTOLERANT COLIFORMS IN WATER 2011
Action required
Investigate
Monitor
Jervoise Bay
10 m
5 m
10 m
5 m
COCKBURN SOUND
HIGH PROTECTION AREA
MODERATE PROTECTION AREA
GARDEN ISLAND
Careening Bay
MODERATE PROTECTION AREA
Southern Flats
Mangles Bay
Rockingham
N
1 0 1
Kilometres
Datum : GDA94
Sample site
CSMC boundary
Protection area boundary

Map 4

Report Card 2011

Clean Waters for Swimming and Boating

	Environmental Quality Indicators	Management Response	Comments
Biological Measures	• Bacterial *Enterococci* (swimming)	M	All sites met the guidelines. Beach sites have greatly improved for bacteria contamination over the last few years. In 2009 all sites exceeded guidelines and standards; last year three out of seven sites exceeded guidelines and this year no sites exceeded the guidelines; this is a very positive result.
	• Bacterial *Enterococci* (boating)	M	All sites met the guidelines.
	• Toxic algae	M	All sites met the guidelines based on WASQAP sampling further off-shore. There were no reports of skin or eye irritation caused by toxic algae or algal poisoning by recreational users in 2011.
Physical Measures	• pH	M	All sites met the pH guidelines. All sites except Mangles Bay site met the guidelines for water clarity; this individual site was coded amber.
	• Water clarity	M	
Contaminants in Water	• Inorganic chemicals	M	All sites met the guidelines. The CSMC's contaminants in water survey conducted in 2008 indicated a large majority of sites had concentrations of contaminants, including pesticides, below laboratory reporting limits.
	• Organic chemicals	M	
	• Pesticides	M	

Report Card 5

M — **Monitor:** below guidelines, continue monitoring.

I — **Investigate:** above guidelines; investigate and where necessary take precautionary action.

A — **Action Required:** Above standards; initiate management response.

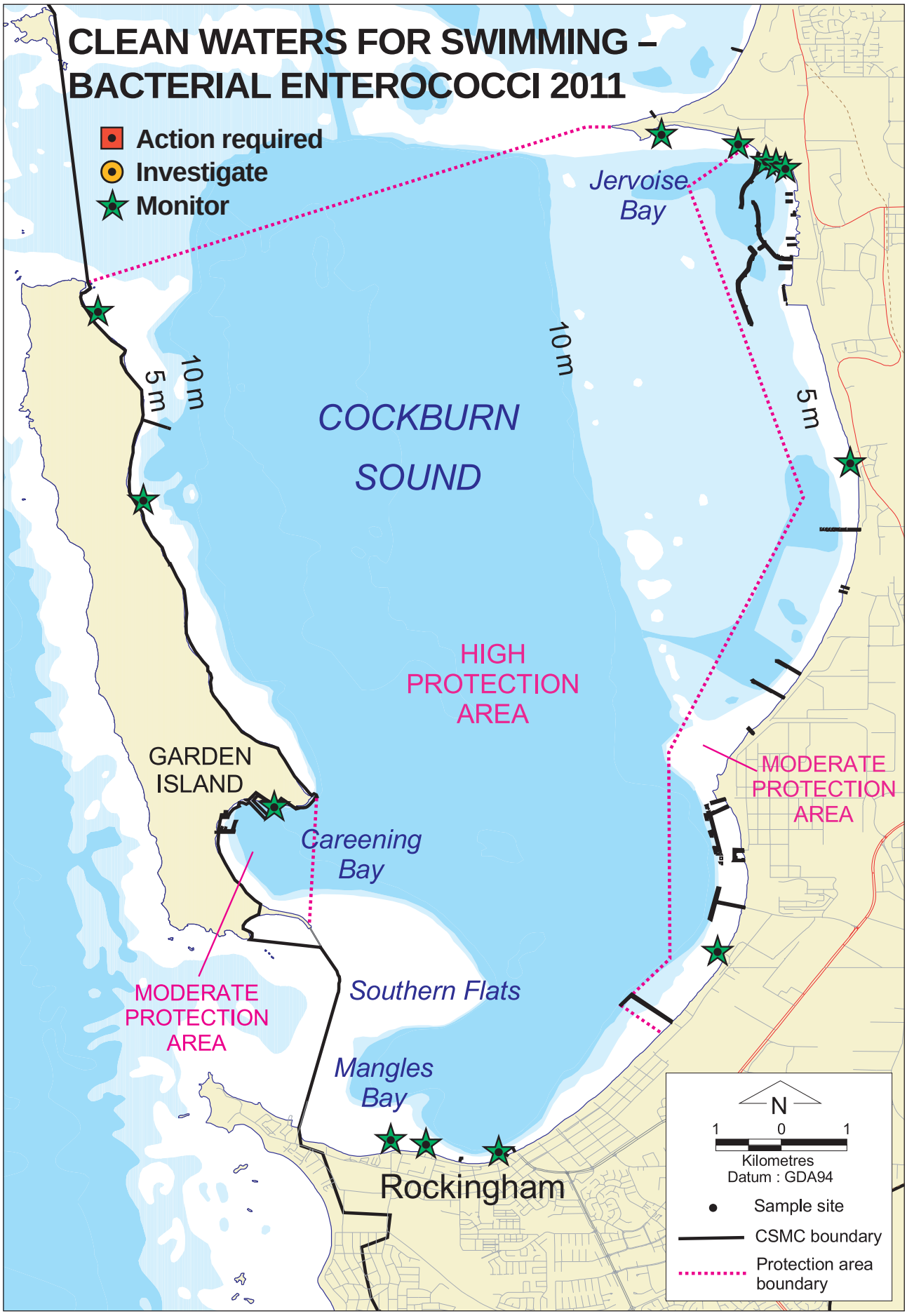
N/A — No official rating can be applied.

Hatched means data greater than one year old.

Green hatched means data greater than one year old but was below guidelines when last measured.

Red hatched means data greater than one year old and above standards when last measured.

Unable to Report. Monitoring data results were not provided to the CSMC or data is too old to be relied upon.


CLEAN WATERS FOR SWIMMING –
BACTERIAL ENTEROCOCCI 2011
Action required
Investigate
Monitor
Jervoise Bay
10 m
5 m
10 m
5 m
COCKBURN SOUND
HIGH PROTECTION AREA
MODERATE PROTECTION AREA
GARDEN ISLAND
Careening Bay
MODERATE PROTECTION AREA
Southern Flats
Mangles Bay
Rockingham
N
1 0 1
Kilometres
Datum : GDA94
Sample site
CSMC boundary
Protection area boundary

Map 5

Report Card 2011

Protecting the Health of Aquaculture Species

Environmental Quality Indicators		Management Response	Comments
Physico-Chemical Stressors	• Dissolved Oxygen	M	All sites met the guidelines.
	• pH	M	
Contaminants in water	*Metals and Metalloids*	M	All sites met the guidelines. Contaminants in water at all sites were either below laboratory reporting limits or measured at very low levels, well below any guidelines or trigger values.
	Non-metalic inorganic chemicals		
	• Organic Chemicals	M	All sites met the guidelines.
	• Pesticides	M	

Report Card 6

M — **Monitor:** below guidelines, continue monitoring.

I — **Investigate:** above guidelines; investigate and where necessary take precautionary action.

A — **Action Required:** Above standards; initiate management response.

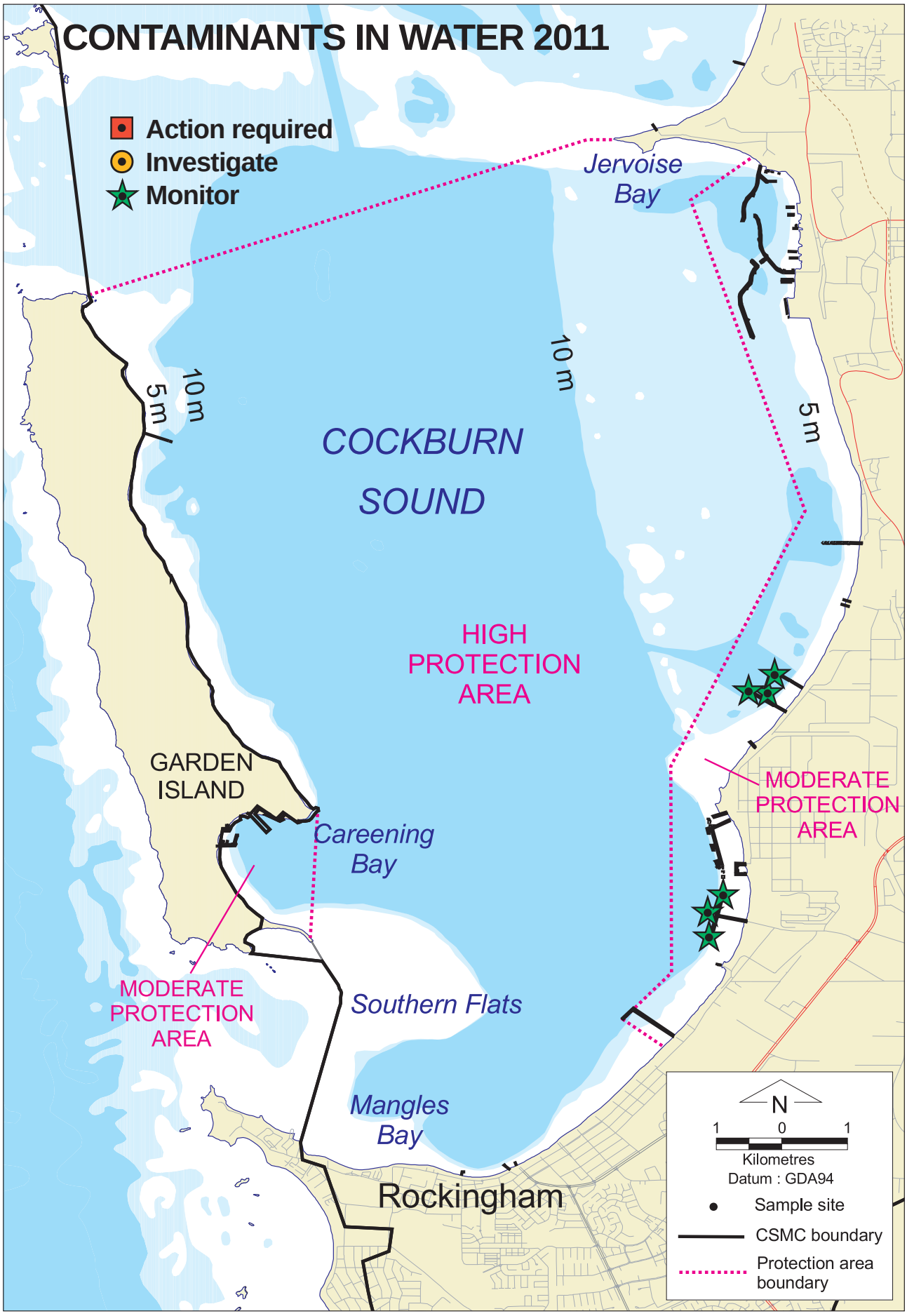
N/A — No official rating can be applied.

Hatched means data greater than one year old.

Green hatched means data greater than one year old but was below guidelines when last measured.

Red hatched means data greater than one year old and above standards when last measured.

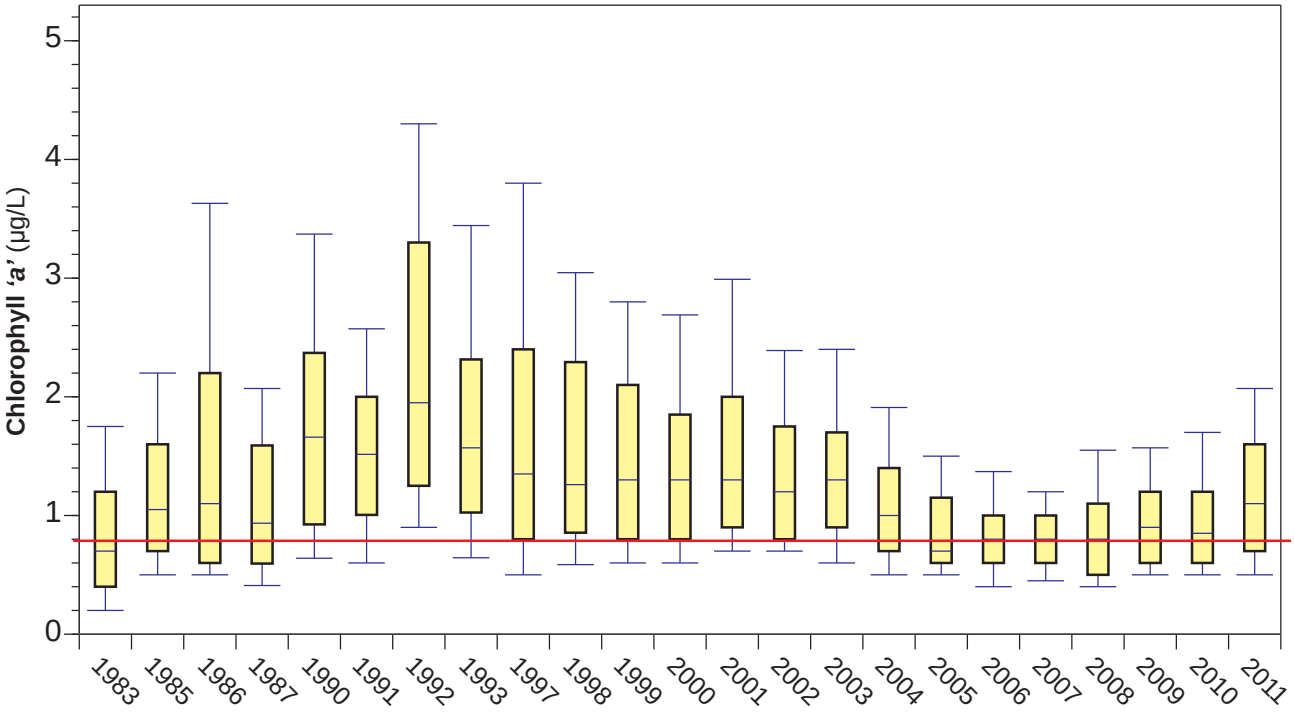
Unable to Report. Monitoring data results were not provided to the CSMC or data is too old to be relied upon.


CONTAMINANTS IN WATER 2011
Action required
Investigate
Monitor
Jervoise Bay
10 m
5 m
10 m
5 m
COCKBURN SOUND
HIGH PROTECTION AREA
GARDEN ISLAND
Careening Bay
MODERATE PROTECTION AREA
MODERATE PROTECTION AREA
Southern Flats
Mangles Bay
Rockingham
N
1 0 1
Kilometres
Datum : GDA94
Sample site
CSMC boundary
Protection area boundary

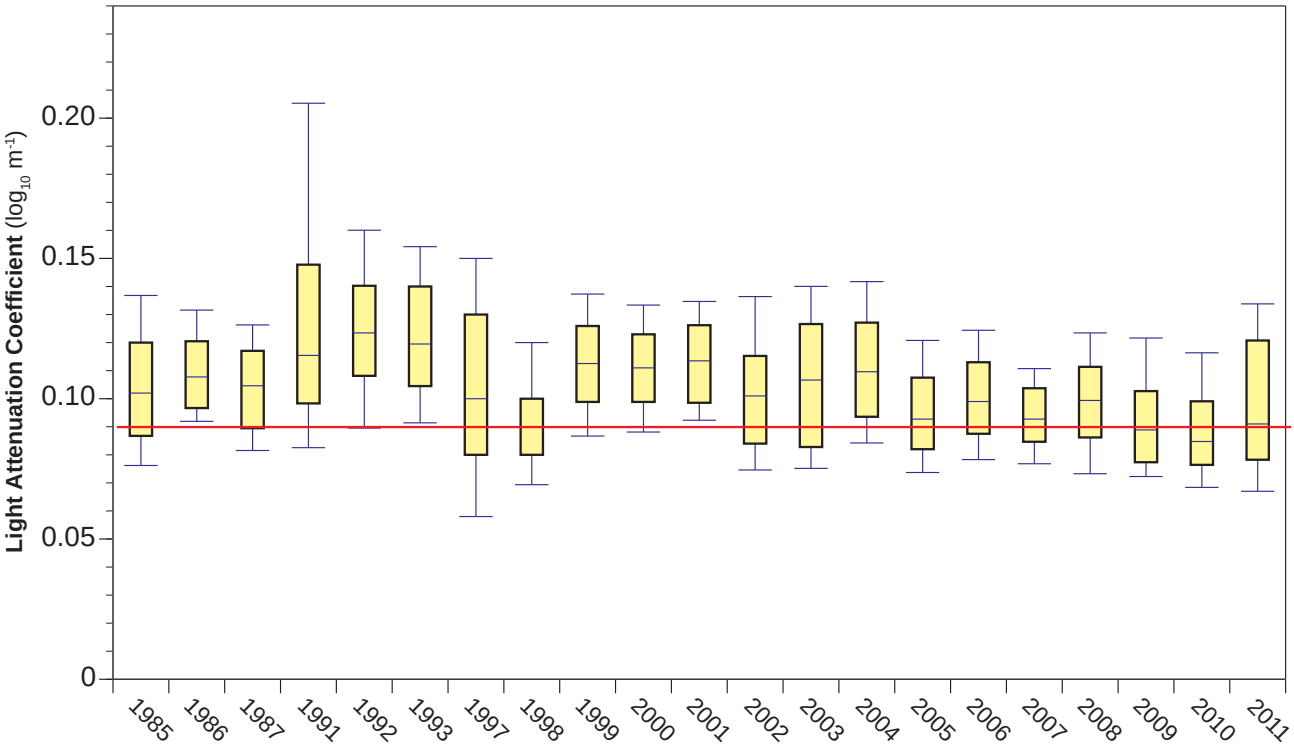
Map 6

Annual Report Card Comparisons – 2003–2011

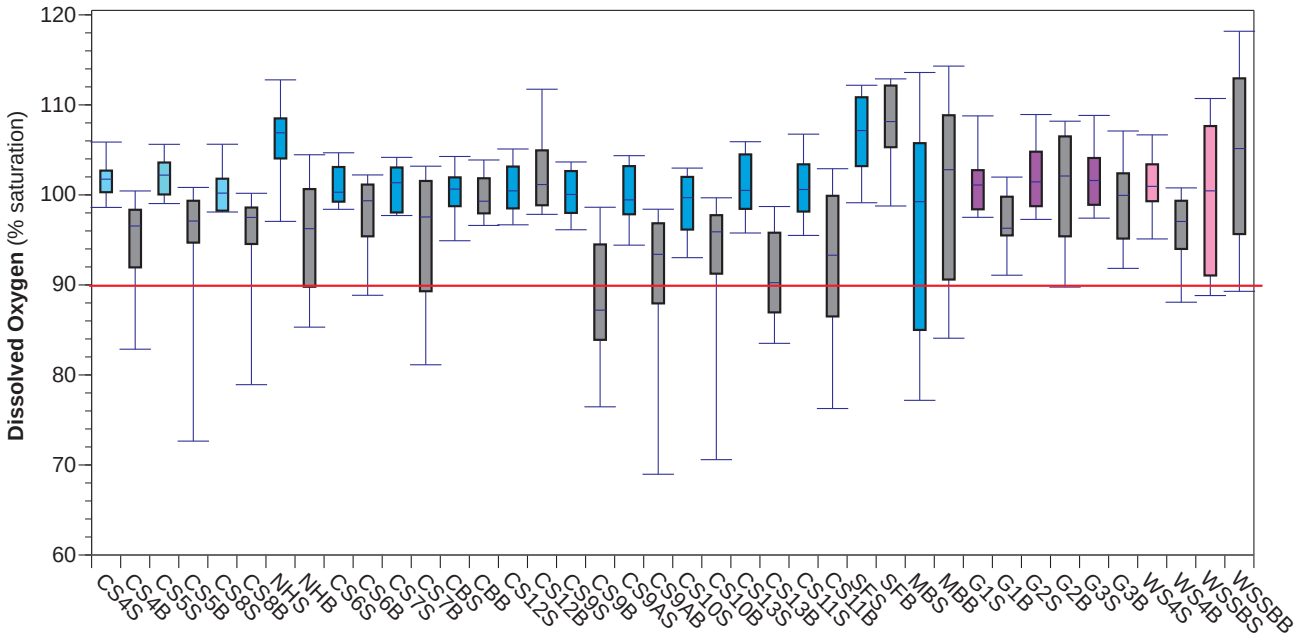
Area	Parameter	2003	2004	2005	2006	2007	2008	2009	2010	2011	Change
High	Light Attenuation	I	I	M	I	N/A	I	M	M	I	↓
	Chlorophyll *'a'*	M	M	M	M	M	M	M	M	I	↓
	Dissolved Oxygen	M	M	M	M	M	M	I	M	M	↔
	Seagrass Shoot Density	I	I	I	M	M	M	I	I	I	↔
	Safe Seafood for Eating (Presence of potentially toxic algae)	M	M	I	I	I	M	I	M	M	↔
	Clean Waters for Swimming – Potentially toxic algae Primary Contact	M	M	M	M	I	I	I	M	M	↔
	Clean Waters for Swimming – *Enterococci* Primary Contact	M	M	A	A	I	I	I	M	M	↔
	Imposex – TBT (All areas)	N/A	N/A	N/A	A	A	A	A	A	A	↔
Moderate	TBT Sediment	A	I	M	A	I	M	M	M	M	↔
Northern Harbour (Moderate)	Light Attenuation	N/A	N/A	I	I	N/A	I	I	I	I	↔
	Chlorophyll *'a'*	I	I	I	I	I	I	I	I	I	↔
	Phytoplankton Biomass	A	A	A	A	A	A	A	A	A	↔
	TBT Sediment	A	I	I	A	I	I	I	I	I	↔
Southern Harbour (Moderate)	TBT Sediment	A	I	I	A	I	M	M	M	M	↔



Median summer chlorophyll 'a' *concentrations in Cockburn Sound*



Median summer light attenuation coefficients in Cockburn Sound



Median dissolved oxygen, surface and bottom December 2010 to March 2011

Occasions where phytoplankton biomass exceeded EQC values.

Site	Zone	Percentage of occasions (%)						
		2005	2006	2007	2008	2009	2010	2011
CS4	high	0	0	0	0	0	6	0
CS5	high	0	0	0	0	0	0	6
CS8	high	6	0	0	6	0	0	6
G2	high	0	0	0	6	0	0	6
G3	high	0	0	0	0	0	0	12
SF	high	0	0	0	0	0	0	**25**
CB	high	0	0	0	0	0	0	0
CS11	high	19	6	0	20	13	19	**38**
CS13	high					**31**	**38**	**44**
MB	high						**50**	**94**
CS6A	moderate	0	0	0	0	0	0	0
CS7	moderate	0	0	0	0	0	0	6
CS9	moderate	0	6	0	0	13	6	13
CS10	moderate	0	6	0	20	13	0	19
CS9A	moderate	6	25	7	20	19	19	31
CS12	moderate			0	0	0	0	6
NH	moderate	**75**	38	**73**	**93**	**94**	**81**	**100**
G1	moderate	0	0	0	0	1	0	6

Annual Monitoring Programs 2011

A detailed report outlining the monitoring programs undertaken in Cockburn Sound is available from <http://csmc.environment.wa.gov.au>. The following is a list of the programs undertaken in 2011 including the parameters they measure. **Programs denoted with an asterisk contribute data for the Cockburn Sound Environmental Report Cards.** A total of ten monitoring programs were accessed this year to produce the 2011 Report Cards.

Cockburn and Warnbro Sounds Water Quality Monitoring Program*

This program is coordinated by the CSMC and receives financial contributions from the KIC and DoD.

Objective: to coordinate monitoring and reporting under the SEP and implement the EMP.

Parameters measured

Water: temperature, salinity, dissolved oxygen, light attenuation, Secchi depth, pH, total nitrogen, total phosphorus, ammonia, nitrate-nitrite, phosphate (FRP), chlorophyll *'a'*, total suspended solids (for 6 weeks).

Phytoplankton: species present but samples are stockpiled and stored. No analyses are undertaken.

Jervoise Bay Northern and Southern Harbour Monitoring Program*

This program is coordinated and funded by LandCorp.

Objective: to fulfil Ministerial Conditions and environmental approvals for the construction of Southern Harbour. The program also meets requirements under the Operation Environmental Management Plan for Southern Harbour.

Parameters measured

Water: temperature, salinity, dissolved oxygen, Secchi depth, light attenuation coefficient, total nitrogen, ammonium, nitrate-nitrite, total phosphorus, ortho phosphate, chlorophyll *'a'*, *'b'* and *'c'*.

Sediment: heavy metals (As, Cd, Co, Cr, Cu, Pb, Hg, Ni, Sn and Zn), total Kjeldahl nitrogen, total phosphorus, total organic carbon, butyl-tin compounds (Mono-MBT, Di-DBT and Tri-TBT), polycyclic aromatic hydrocarbons (PAH).

Sentinel mussels: Ag, As, Cd, Cr, Cu, Pb, Hg, Ni and Zn. Mussels were taken but are not measured now.

Phytoplankton: species present.

Fremantle Ports Marine Quality Monitoring Program*

This program is coordinated and funded by Fremantle Ports.

Objectives: to determine whether water and sediment quality monitoring meets the Environmental Quality Criteria set out in the *State Environmental (Cockburn Sound) Policy 2005*. Further objectives are to monitor the overall health of those areas of the port that are at risk of being adversely affected by port-related activities and to monitor specific areas of environmental concern associated with historical activities, in order to identify possible requirements for management responses.

Parameters measured

Water: temperature, salinity, conductivity, dissolved oxygen, pH, Secchi depth, total suspended solids, total nitrogen, total phosphorus, ammonium, nitrate-nitrite, free reactive phosphorus, dissolved organic carbon, alkalinity, chlorophyll *'a'*, *'b'* and *'c'* and phaeophytin, dissolved copper.

Sediment: total nitrogen, nitrate, nitrite, total phosphorus, total organic carbon, heavy metals (As,

Cd, Cr, Cu, Pb, Hg, and Zn), organotins (TBT, DBT, MBT), polycyclic aromatic hydrocarbons (PAH).

Mussels: metals (As, Cd, Cr, Cu, Pb, Hg, and Zn), organotins (TBT, DBT and MBT), polycyclic aromatic hydrocarbons (PAH).

Annual Survey of Selected Seagrass Meadows in the Fremantle–Warnbro Sound Region*

This program is coordinated and funded by the CSMC with field assistance from the OEPA, in conjunction with the University of Western Australia (UWA).

Objective: to monitor and report on seagrass health under the SEP.

Parameters measured

Seagrass: dominant seagrass species, epiphyte characteristics, rhizome mat, colonising species, videography, seagrass shoot density, seagrass shoot height, seagrass species, depth.

Environmental Waters Microbiological Monitoring Program*

This program is coordinated and funded by the DoH.

Objectives: to undertake water quality monitoring in recreational areas within Cockburn Sound to establish the degree of microbiological contamination; to identify trends in the microbiological quality of recreational waters within Cockburn Sound and to provide advice to the public on microbial water quality. Limited data for analysis was received this year.

Parameters measured

Bacteria: Bacterial *Enterococci* (confirmed).

City of Cockburn Microbiological Monitoring Program*

This program is coordinated and funded by the CoC.

Objectives: to monitor the recreational water quality of Jervoise Bay and ensure compliance with the ANZECC *Australian Water Quality Guidelines for Fresh and Marine Waters 1992*; to identify trends in the microbial water quality of recreational waters within Cockburn Sound and provide advice to the public on microbial water quality.

Parameters measured

Bacteria: Thermo-tolerant coliforms (presumptive), *Enterococci* (confirmed).

City of Rockingham Microbiological Monitoring Program*

This program is coordinated and funded by the CoR.

Objectives: to undertake water quality monitoring in recreational waters within Cockburn Sound to establish the degree of contamination and identify trends in microbial quality; advise stakeholders on microbial water quality and gather data to assist decision making on initiatives to improve coastal waters for users.

Parameters measured

Bacteria: Bacterial *Enterococci* (confirmed).

Defence Microbiological Monitoring Program*

This program is coordinated and funded by the DoD in conjunction with the DoH.

Objectives: to safeguard people who come into frequent and direct contact with the water during activities such as swimming.

Parameters measured

Bacteria: Thermo-tolerant coliforms (presumptive), bacterial *Enterococci* (confirmed).

Parameters measured

Mussel flesh: TBT, heavy metals (Cu, Zn, As, Cd, Pb, Hg, Sn).

Owen Anchorage Water Quality Monitoring Program

This program is coordinated and funded by the CSMC. In previous years it was funded by Cockburn Cement.

Objective: to coordinate monitoring under the SEP and implement the EMP, in general.

Water: temperature, salinity, dissolved oxygen, light attenuation, Secchi depth, pH, total nitrogen, total phosphorus, ammonia, nitrate-nitrite, phosphate (FRP), chlorophyll *'a'*, total suspended solids (for 4 weeks).

Perth Seawater Desalinisation Plant Water Quality Monitoring Program

This program is coordinated and funded by the Water Corporation.

Objective: to fulfil Ministerial Conditions set to ensure protection of the water quality of Cockburn Sound, and to ensure that the discharge complies with the requirements of the SEP and the EQC Reference Document (Cockburn Sound).

Fremantle Port Kwinana Bulk Jetty

Parameters measured

Water: turbidity, total suspended solids, salinity, total dissolved solids, dissolved oxygen, pH, temperature, light attenuation, Secchi depth, total nitrogen, nitrate, nitrite, ammonia, total phosphorus, ortho-phosphate, total organic carbon, metals (Al, As, Cd, Cr, Cu, Fe, Pb, Mn, Mo, Hg, Ni, Se, V, Zn) chlorophyll *'a'*, phaeophytin, phytoplankton species, fluorescence.

Sediments: Metals: (Al, As, Cd, Cr, Cu, Fe, Pb, Mn, Mo, Hg, Ni, Se, V, Zn)

Phytoplankton: species, fluorescence.

Sediment habitat: habitat and benthos, species number, abundance of macrofauna.

Meteorological observations: wind (direction and speed), water levels (hourly intervals), estimated Swan River out-flow data.

Brine: toxicity testing (done once in 2006).

Defence Annual Survey of Selected Seagrass Meadows on the eastern shore of Garden Island*

This program is coordinated and funded by the DoD in conjunction with Edith Cowan University (ECU).

Objective: to monitor seagrass health in Department of Defence controlled waters under the SEP.

Parameters measured

Seagrass: dominant seagrass species, epiphyte characteristics, rhizome mat, colonising species, videography, seagrass shoot density; seagrass shoot height, seagrass species, depth.

Western Australian Shellfish Quality Assurance Program*

This program was coordinated and funded by the DoF and the DoH together with the WAMPA.

Objective: to ensure compliance with the WASQAP for the commercial harvest of aquaculture bivalve molluscs.

Parameters measured

Phytoplankton in water and algal biotoxins: species present and presence of toxin.

Mussel flesh: algal biotoxins, *E.coli*, salmonella, inorganic arsenic, copper, zinc, cadmium, lead, mercury, organochlorine, organophosphate, pesticides, polychlorinated biphenyls.

Water: total coliforms, thermo-tolerant coliforms, *E. coli.*

References

ANZECC 1992, *Australian Water Quality Guidelines for Fresh and Marine Waters*

Cockburn Sound Management Council 2009, *CSMC Strategic Plan 2010–2015*

Cockburn Sound Management Council 2005, *Environmental Management Plan for Cockburn Sound and its Catchment*

Cockburn Sound Management Council 2005, *State Environmental (Cockburn Sound) Policy*,

DA Lord and Associates in association with PKK Environment and Infrastructure P/L 2001, *State of Cockburn Sound: A Pressure-State-Response Report*. Report No 01/187/1, Cockburn Sound Management Council

Department of Fisheries 2011, *Annual Report to the Parliament of Western Australia 2010/11*

Department of Fisheries, Pearce, A., Lenanton, R., Jackson, G., Moore, J., Feng, M. and Gaughan, D. 2011, *The 'marine heat wave' off Western Australia during the summer of 2010/11*, Fisheries Research Report No. 222, Western Australia

Environmental Protection Authority 2003–2004, *Environmental Quality Criteria Reference Document for Cockburn Sound*,

Environmental Protection Authority 2003–2004, *Manual of Standard Operating Procedures for Environmental Monitoring against the Cockburn Sound Environmental Quality Criteria*

Fremantle Port Authority 2012, *Industrial area photographs*

Klau, K Photo-Coffee, Rockingham 2007–09, *Professional photographs*

Oceanica Pty Ltd February 2007, *The State of Owen Anchorage – A Pressure State Response Report*

Office of the Auditor General September 2010, *Environmental Management of Cockburn Sound Report 8*

Sinclair Knight Merz/Kwinana Industries Council 2007, *Kwinana Industrial Area Integrated Assessment, Environmental, Social and Economic Impact Study*

Rose T.H., Smale D.A. and Botting G. 2011, *The 2011 Marine Heat Wave off Southwest Australia*, Ocean Science Discussion

James Point, Cockburn Sound

Glossary

AMC	Australian Marine Complex (Henderson)
CoC	City of Cockburn
CoR	City of Rockingham
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSMC	Cockburn Sound Management Council
DEC	Department of Environment and Conservation
DoD	Department of Defence
DoF	Department of Fisheries
DoH	Department of Health
DPI	Department for Planning and Infrastructure
DoIR	Department of Industry and Resources
DoW	Department of Water
EMP	Environmental Management Plan for Cockburn Sound and its Catchment 2005
EPA	Environmental Protection Authority
EQC	Environmental Quality Criteria
EQG	Environmental Quality Guideline
EQMP	Environmental Quality Monitoring Program
EQO	Environmental Quality Objectives
EQS	Environmental Quality Standard
EV	Environmental Values
KIC	Kwinana Industries Council
MARZONE	Maritime Zone boundaries software based on MARXAN zonation package for marine multiple use planning
MCA	Mooring Control Area
MSE	Management Strategy Evaluation
OAG	Office of the Auditor General
OASC	Owen Anchorage Sub-Committee
OEPA	Office of Environmental Protection Authority
SEP	*State Environmental (Cockburn Sound) Policy 2005*
SRT	Swan River Trust
TBT	
ToK	Town of Kwinana
WAMPA	Western Australian Mussel Producers Association
WASQAP	Western Australian Shellfish Quality Assurance Program

CSMC Membership

Member	Designation	Representation	Occupation
Professor Kateryna Longley	Chair	Community	Emeritus Professor Murdoch University
Bob Goodale	Member	Community	Retired
John Polglaze	Member	Community	Environmental Consultant
Bart Houwen	Member	Community-Com Net Inc	Business Manager Bendigo Bank
Professor Philip Jennings	Member	Conservation Council	Professor of Energy Studies, Murdoch University, Delegate Representative of the Conservation Council
Matt Gillett	Member	Recfishwest	Committee member
Glenn Dibbin	Member	WA Mussel Producers Assoc	Chair, WA Mussel Producers Association
Chris Oughton	Member	Kwinana Industries Council	Director, Kwinana Industries Council
Cr Carol Reeve-Fowkes	Member	City of Cockburn	Councillor, City of Cockburn
Cr Ruth Alexander	Member	Town of Kwinana	Councillor, Town of Kwinana
Cr Richard Smith	Member	City of Rockingham	Councillor, City of Rockingham
Jarrad Scott	Member	Dept of Defence	Senior Environmental Manager, Defence Support Group WA,
Dr John Keesing	Member	Commonwealth Scientific & Industrial Research Organisation	Head of Marine Research CSIRO
Ian Briggs	Member	Dept of Mines and Petroleum	General Manager Strategic Policy
Kelly Gillen	Member	Dept of Environment & Conservation	Assistant Director Regional Services
Gino Valenti	Member	Fremantle Ports	General Manager Strategy and Planning
Laurie Caporn	Member	Dept of Fisheries	Principal Management Officer
Vivienne Panizza	Member	Dept of Planning	Team Leader Coastal Planning
Vacant	Member	Water Corporation	NA
Leon Brouwer	Member	Dept of Water	Regional Manager Kwinana-Peel
Jim Dodds	Member	Dept of Health	Director of the Environmental Health Directorate

Cockburn Sound Management Council Members

Professor Kateryna Longley, Chair

Bart Houwen

Ruth Alexander

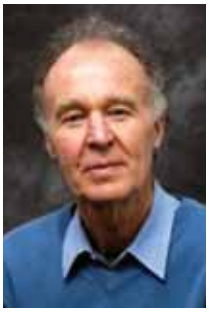
Ian Briggs

Laurie Caporn

Stefan DeHaan

Glenn Dibbin

Bob Goodale



Professor Phil Jennings

Dr John Keesing

Chris Oughton

Vivienne Panizza

John Polglaze

Carol Reeve-Fowkes

Jarrad Scott

John Smedley

Richard Smith

Gino Valenti

Cockburn Sound Management Council Staff

Dr Tom Rose

Geoff Botting

Petra Kohn

Absent: Matt Gillett, Guy Watson, Jim Dodds

2011 CSMC Shopfront – Customer Inquiries – Summary of Issues

- Port Rockingham Marina Public Environmental Review
- Shoalwater Islands Marine Park
- Penguin Island/brochures
- Mooring control and gazettal
- Mangles Bay swimming safety
- Starfish washed up on beach
- Palm Beach boat ramps
- CBH drain discharges
- Palm Beach Jetty redevelopment
- Foreshore rehabilitation and weed control
- Dolphin mortalities
- Sub-Antarctic Fur Seals
- Fishing
- Bag limits
- Garden Island access
- Blue Swimmer Crab fishing ban
- Mangles Bay Marina Environmental Scoping Document and Draft Public Environmental Review
- Palm Beach Jetty
- Algal blooms
- Silver Gull deaths
- TBT
- Little Penguin boat strikes
- Boats on beaches and adrift
- Foreshore car parking and storm damage
- Seagrass anchor damage
- Oil spills from moored and anchored boats
- Seagrass at dog beach
- Pink Snapper
- Snakes/removal
- Wasps in Foreshore Park

Rockingham Beach foreshore

Appendix 1 – CSMC Strategic Plan

Our Vision

To be recognised as a world leader in coordinating successful multiple-use coastal marine management.

	1 Foresight	2 Knowledge	3 Connection	4 Positioning	5 Funding
Objectives	With increased large-scale developments occurring over the next 20 years in Cockburn Sound and Owen Anchorage, it is important for us to have a clear vision of success based on rigorous analysis, supported by community and stakeholder consultation. We will need to develop a strategy to meet the desired outcomes for Cockburn Sound and Owen Anchorage with the support of key stakeholders.	CSMC has a rich database based on nine years of data. However, this information is not complete and our monitoring and research need to address what may be emerging issues for the future. A number of environmental knowledge gaps remain. With new decision-making and monitoring technologies becoming available, CSMC could provide further modelling, forecasting and more complete, up-to-date information in line with the complexity of the environment in which it operates.	CSMC needs to understand what is important to the Western Australian Community and the priorities it sees for the organisation. The community includes the general public, government, industry and other stakeholders. An effective communication approach will need to be developed to increase the level of support for CSMC and to improve the flow of information and feedback. Being located close to the Sound and easily accessible to the general public remains a critical part of this strategy.	CSMC is a collaborative body that facilitates and coordinates solutions with stakeholders. CSMC needs to work collaboratively with DEC and other key areas of government in order to successfully pursue its purpose. A Memorandum of Understanding (MOU) or agreement between CSMC and DEC may be one approach of ensuring this collaborative approach is maintained and strengthened.	Reliable and sustained funding is essential for us to maintain base level operations and to effectively achieve our vision. We will need to build commitment for additional funding from existing and alternative sources such as the Department of Environment and Conservation, members, other corporate entities and government. The strategic plan will form a key plank of the case for additional funding. Support from other bodies will be required to build the case.
Measure of Success	Cockburn Sound and Owen Anchorage Strategic Plan developed	Project based milestones for new technology	Increase awareness of the Cockburn Sound Management Council	MOU/Agreement with DEC in place and operating effectively	Secured additional funding
2010–2011	Investigate	Review	Survey	Establish	$80 000
2011–2012	Investigate and develop	Two decision support services chosen and trialled	Monitor	Effective 80% Target	$100 000
2012–2013	Develop and Implement	Officer assigned custodian	Monitor	Effective 90% Target	$150 000
2013–2014	Implement	Implement	Monitor	Effective and Review	$200 000
2014–2015	Implement and Review	Review	Review	Effective 95% Target	$250 000

Our Purpose

To keep Cockburn Sound and Owen Anchorage healthy and sustainable for the Western Australian community.

Point Peron north to Garden Island

Kwinana Industrial Area

Rockingham Beach/Mangles Bay




Cockburn Sound Management Council

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Rockingham Beach WA 6168

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Rockingham Beach WA 6969

Telephone: (08) 9591 3837
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Department of
Environment and Conservation

Our environment, our future