Department of **Water**
Government of **Western Australia**

Looking after all our water needs

Benwenerup:
A management plan for Stokes Inlet

May 2008

Department of Water
Government of Western Australia

Benwenerup: A management plan for Stokes Inlet

Department of Water

May 2008

SOUTHCOAST
NATURAL RESOURCE MANAGEMENT INC.

– southcoastnrm.com.au –

Funded by the Western Australian and Australian Governments through the joint National Action Plan for Salinity and Water Quality programme and the Natural Heritage Trust.

GOVERNMENT OF WESTERN AUSTRALIA

Australian Government

Department of Water

168 St Georges Terrace
Perth Western Australia 6000
Telephone +61 8 6364 7600
Facsimile +61 8 6364 7601
http://www.water.wa.gov.au

South Coast Region
5 Bevan Street
Albany Western Australia 6330
Telephone +61-8-98425760
Facsimile +61-8-98421204

May 2008

ISBN 978-1-921468-37-7 (pbk)
ISBN 978-1-921468-38-4 (pdf)

Subject of cover photograph
Aerial view of Stokes Inlet

Contents

Acknowledgements

The preparation of this management plan was a cooperative effort between government agencies, organisations and the community.

The Stokes Inlet Steering Group was responsible for overseeing the plans preparation and the members of the group were:

Steeg Hoeksema	Centre for Fish and Fisheries Research, Murdoch University
Ben Chuwen	Centre for Fish and Fisheries Research, Murdoch University
Paul Close	Centre for Excellence in NRM, University of Western Australia
Doc Reynolds	Community, Traditional Custodian and Esperance Shire Councillor
Alan Longbottom	Community
Will Carmody	Community
Ruth Kirchner	Community
John Simons	Department of Agriculture and Food WA
Frank D'Emden	Department of Agriculture and Food WA
Ian Hughes	Department of Environment and Conservation, Esperance District
Geoff Young	Department of Environment and Conservation: February – May 2007
Klaus Tiedemann	Department of Environment and Conservation
Dave Wilkins	Department of Fisheries: member October – February 2007
Jason Froud	Department of Fisheries: member February – May 2007
Phil Shaw	Department of Fisheries: member from May 2007
Frank Martin	Department of Indigenous Affairs
Gary Wilson	Department for Planning and Infrastructure
Chris Gunby	Department of Water
Mieke Bourne	Department of Water
Nicole Reichelt	Esperance Regional Forum / South Coast NRM Inc.
Tim Fewings	Esperance Regional Forum / South Coast NRM Inc.
Paul Clifton	Shire of Esperance
Paul Benson	South Coast Licensed Fishermen's Association
Dylan Gleave	Coastal Facilitator, South Coast NRM Inc.
Owen Massenbauer	Biodiversity Officer, South Coast NRM Inc.

Stokes Inlet Steering Group, June 2007

Thank you to everyone who contributed to the plan's preparation. It is your interest in Stokes Inlet that made this plan possible.

The preparation of this plan was funded by South Coast Natural Resource Management Inc through the Australian and State Government support of the Natural Heritage Trust and National Action Plan for Salinity and Water Quality. The plan's preparation was coordinated and written by Mieke Bourne with assistance from Chris Gunby, Department of Water.

Summary

The *South Coast Regional Strategy for Natural Resource Management* highlighted Stokes Inlet as a priority for management given its high community values. Funding was made available, a project officer appointed and in October 2006 the Stokes Inlet Steering Group met for the first time to begin preparation of a management plan.

Stokes Inlet lies on the south coast of Western Australia, west of Esperance, and is known as Benwenerup by the Traditional Custodians.

The management plan for Stokes Inlet was prepared using available information, obtained through a literature review and synthesis of all known environmental data. A survey of the local community and visitors was undertaken to identify the social values of the inlet. Steering group members from involved agencies and organisations prepared background papers on issues of importance, helping to draft the plan.

Important values identified for the inlet included the ease of access, fishing, camping, the beauty of the area and its serenity. The community considered these values to be under threat from increased use and changes in water quality.

The management plan contains six main strategies to enhance these values and manage the threats. These are:

1 Improvement of inlet water quality
2 Management of fish stocks
3 Recommendations for access and public use
4 Protection and enhancement of historic and Aboriginal cultural values
5 Protection and enhancement of plant and animal values
6 Communication and education

Relating to each of these strategies are actions and recommendations with a lead agency, time period and priority.

This plan provides long-term goals for the inlet, as well as shorter term targets for management actions. These will be measured to gauge the performance of the plan.

The plan outlines how implementation of the actions will take place and expectations for reporting.

The plan has been prepared in a short time using available information, knowledge and expertise. As such, it is not a complete story but rather lays out what people would like to see and how to move forward. The plan is likely to develop and change as new information becomes available. This is both intended and encouraged.

Linkages and legislation

This management plan for Stokes Inlet aims to integrate management but does not override existing plans or legislative responsibilities.

Certain aspects of Stokes Inlet are managed by different government agencies and some issues highlighted in this plan are best managed through their individual processes. Below is a list of these agencies, what they manage and the main plans and legislation that relate to Stokes Inlet:

- The Department of Environment and Conservation manages Stokes National Park which surrounds the inlet, extending from the low water mark and including the lower Young River and Lort River corridors. The Esperance District Coastal Reserves Management Plan, a statutory management plan under the *Conservation and Land Management Act*, is presently in preparation. Once complete, the plan will outline the activities that can be undertaken in the park.
- The Department of Fisheries manages the fish resource in the inlet. *The South Coast Estuarine Fisheries Management Plan* outlines the restrictions on commercial fishing at the inlet. Recreational fishing restrictions are outlined in the *Fish Resources Management Act 1994* and associated regulations.
- The Department for Planning and Infrastructure manages boat usage on the inlet through the Navigable Waters Regulations 1958 and the *Marine Act 1982*.
- The Western Australian Government has commenced a Regional Marine Planning (RMP) process for state waters between Cape Leeuwin and the South Australian border. RMP for the south coast will entail the development of a comprehensive and integrated approach to the conservation and sustainable use of the marine environment. This includes estuaries, and the RMP will complement existing estuary plans and is likely to provide strategic guidance on estuary management issues.
- The Department of Water has general responsibilities for the management of water resources, and on the south coast undertakes considerable research and monitoring of estuarine condition, as well as resource planning and protection.

Additionally, Esperance Regional Forum has worked with the Young River Catchment Group to develop and implement the *Young River Catchment Plan* (Esperance Regional Forum 2006).

The South Coast Management Group has prepared a strategy, called *Southern Shores*, to guide coastal and marine planning and management from 2001 to 2021. This document discusses estuarine management.

Background Paper Four for the *South Coast Regional Strategy for Natural Resource Management* considers water resources in the South Coast Region. This document outlines south coast estuarine values and threats and provides a framework for determining which systems, such as Stokes Inlet, are priorities for management.

Pledges of support

The following organisations endorse this management plan and have pledged support for the cooperative implementation of its actions subject to their statutory management responsibilities, funding and priorities.

Dr Hamid Mohsenzadeh
Acting Regional Manager
Department of Water

Ian Mickel
Shire President
Shire of Esperance

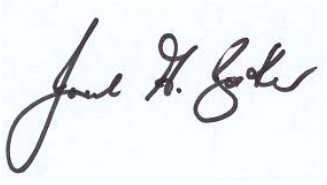
Phil Shaw
Regional Manager
Department of Fisheries

Bruce Bone
Regional Manager
Department of Environment and Conservation

Rob Edkins
Chief Executive Officer
South Coast Natural Resource Management Inc.

Ted English
Acting Chair
Esperance Regional Forum / Esperance Land Conservation District Committee

John Blake
South Coast NRM Manager
Department of Agriculture and Food WA



Joe Baker
Regional Manager
Department of Indigenous Affairs

Shelley Grice
Regional Manager
Department for Planning and Infrastructure

1 Stokes Inlet – an overview

1.1 Description

Stokes Inlet lies on the south coast of Western Australia approximately 80 km west of Esperance (map 1). It is the largest sheltered body of water in the area, covering 14 km^2 when full, with permanent water over 5 m deep in the channel. The inlet is normally closed from the ocean and breaches its sand bar infrequently. The occurrence of these bar breaks, while still infrequent, has increased since extensive land clearing and increased runoff in the catchment. Once breached, the bar generally remains open to the ocean for up to a couple of months before being re-established through sand deposition via wave action.

The Young and Lort rivers enter the inlet at its northern end, and both are estuarine for several kilometres upstream. These rivers have a combined catchment of more than 500 000 ha which extends more than 100 km inland. The rivers are typical of those in the area as they are naturally saline and normally have low flow, with an estimated 2 per cent or less of average annual rainfall in the catchment reaching the inlet through river flow.

Clearing in the catchment took place mostly in the 1970s and it is now 65–70 per cent cleared. Vegetated buffers along the main river channels form a link between the coastal strip and crown land to the north. These river corridors form part of the South Coast Macro Corridor Network and have been recommended as part of the state system of protected areas. Additionally, high biodiversity assets have been identified in the upper Lort and lower Young river corridors.

In the catchment there are 280 000 ha of agricultural land with wheat, barley, canola, lupins, oats and pulses being some of the main crops and some livestock, mostly beef cattle and sheep.

The inlet is vacant crown land and is surrounded by Stokes National Park (map 2) which is vested in the Conservation Commission of Western Australia and managed by the Department of Environment and Conservation. Access to the inlet is through the park which contains camping and day-use facilities. The park is maintained by an on-site ranger.

Due to its ecological and social values the Stokes Inlet is one of 72 candidate areas identified for further investigation and possible inclusion in the state's marine reserve system.

Saltwater paperbarks form a continuous fringe around the waterbody with sedges and samphire along the low sandy beaches. The inlet offers a range of habitats including deeper water, mudflats and fringing vegetation.

Few biological studies have been conducted on the inlet so little is known about the plants and animals that utilise it, but the area is known to be an important habitat for birds.

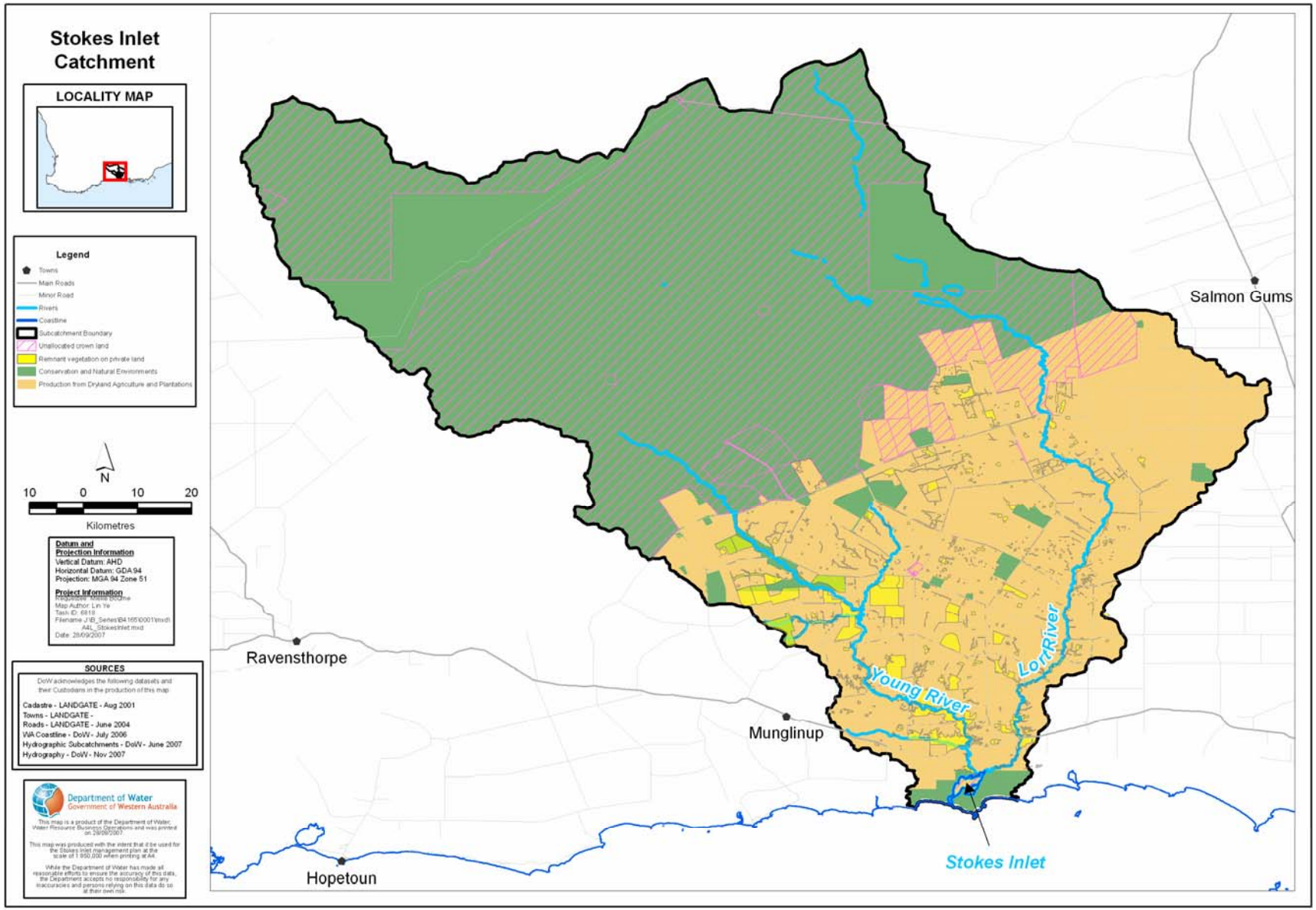
The inlet is one of 13 inlets that make up the South Coast Estuarine Fishery with an average of around 12 tonnes, mostly black bream, caught from it each year by commercial fishers. Recent studies have found 12 species of fish in the inlet with black bream (*Acanthopagrus butcheri*) being one of the most abundant and popular with recreational fishers. The inlet is an important recreational fishery with an estimated 3441 fisher hours spent and 2103 kg of black bream retained in the period from December 2002 to November 2003.

Little is known about the inlet's water quality but recent information suggests that the system is under stress with high nutrient concentrations and algal blooms. Salinity in the inlet varies naturally, and it is rarely less salty than seawater (35 parts per thousand (ppt)). By the end of summer, with evaporation, the inlet can become twice as salty as seawater. If salinity levels in the inlet increase further it may threaten the plants and animals that live in it. Sedimentation may also be an issue as it leads to shallowing of the inlet and river pools, the rate of sediment entering the inlet likely to have increased since land clearing.

Moir Homestead
(photo by Ian Hughes, 2006)

The inlet is an important place to the Traditional Custodians who call it Benwenerup, which relates to the dreaming story for the area of the eagle that came to scratch the cliff and die. Many heritage sites and artefacts exist at and around the inlet. Stokes Inlet was named again by the European surveyor JS Roe in 1848 after his friend John Lort Stokes. The first pastoral lease around the inlet was granted in 1863 and the Moirs took up a lease in 1873. The remains of their homestead still stand to the south-east of the inlet.

Indigenous artefacts found next to Stokes Inlet
(photo by Jenifer Strickland, 2006)



Map 1 Stokes Inlet catchment

Map 2 Stokes Inlet and surrounding area

1.2 Why a plan is needed

Stokes Inlet is recognised in the *South Coast Regional Strategy for Natural Resource Management* (South Coast Regional Initiative Planning Team 2005) as an inlet with important community and environmental values. This was confirmed by public input during preparation of the plan.

Presently there is no single agency or integrated approach to management of the inlet, and so, there is no coordinated approach to tackling any of the inlet's management issues. This is typical of many south coast inlets.

Despite this there is considerable work being undertaken by agencies, catchment groups and landowners seeking to better protect and enhance the inlet's values. An example of this is the important Landcare work being carried out in the Young River catchment by the catchment group and Esperance Regional Forum.

The benefits of having a plan for the inlet are that it can promote a more integrated approach to the work presently being prepared and implemented, engage wider community input, better describe the inlet's values, and attract funding to implement measures to enhance and protect these values.

1.3 How the plan was prepared

The plan has been prepared over a short time using available information, knowledge and expertise and guided by a steering group representing a wide range of interested groups and people.

The plan has been prepared using an approach that has previously been applied successfully to other inlets. Social values for the inlet were obtained through the use of a survey sent to the local community, and from available literature. An assessment of the inlet's condition (*Stokes Inlet condition statement*, Forbes 2007) was prepared by the Department of Water using available monitoring data and information and provided recommendations for further research. From this work, issues and gaps in knowledge were identified by the steering group, and background papers prepared on these issues. The background papers included recommendations on actions that could be included in the draft management plan. These actions were considered by the steering group and were subject to considerable public input. Endorsement of the plan by agencies likely to be responsible for its implementation followed the consultation period.

The process used was chosen to minimise expense and stakeholder 'burn-out', and to maximise community ownership whilst also recognising the statutory role of several agencies. It provided guidance for some initial work to start at Stokes Inlet in a short time frame. With this approach there are recognised knowledge gaps, so the plan also provides guidance on further research needs. It is expected that this plan will be frequently reviewed as new information arises from research.

Many different agencies and organisations have worked together cooperatively to prepare this plan. It is expected that this integrated approach will continue through implementation assisted by good communication networks and an ongoing Stokes Inlet Management Group.

This plan is a summary of an extensive amount of information and research, and a number of reports prepared during the plan's development. This information is listed in the reference section to ensure ease of reading of this plan. Those seeking clarification of the plan's recommendations are invited to read this further information.

2 Community values for Stokes Inlet

A survey of community values for Stokes Inlet was completed in December 2006. The survey was widely distributed throughout the shires of Ravensthorpe and Esperance through local papers and mail drops. A good response of 97 completed surveys was received from a wide variety of people in the catchment and local areas and as well as further inland.

When asked what they did at Stokes Inlet during their last visit, 62 per cent of respondents included fishing in their response (see table 1). Fishing, particularly for black bream, was also mentioned the greatest number of times in response to the question 'Why is Stokes Inlet important to you?'

A juvenile black bream (photo by Geraldine Janicke)

Other values identified as important include recreation, camping/facilities, accessibility, natural beauty, historical and Aboriginal cultural significance, the wildlife/natural environment and serenity.

The inlet provides a variety of recreational opportunities while being safe and accessible. The scenic beauty of this unique system and the plants and animals that utilise it are widely appreciated by the community. The remote location of the inlet ensures it is often a place of peace and serenity where people can relax. Yet the ease of access from the South Coast Highway makes it unusual compared with many south coast inlets and this ease of access is appreciated.

The community also valued the historical importance of the inlet, both European and Aboriginal, and several respondents felt a special connection to the inlet as they had been visiting it since they were children.

Table 1 Why respondents to the community survey considered Stokes Inlet important

Value groupings	Number of respondents
Natural environment	*43*
Important natural ecosystem/unspoilt/environmental significance	17
Natural beauty/scenery	10
Unique	8
Flora and fauna/wildlife/bird life	6
Interesting place/educational	2
Amenity	*62*
Fishing	24
Canoeing/water skiing/swimming/sailing/surfing/general recreation	15
Camping/picnicking	9
Boating	5
Place for relaxation/restful	5
A place to take visitors/good social site for tourists	3
Bird watching	1
Location	*10*
Easy access	4
Few areas like it that are accessible from Esperance	3
It's there	2
Remote	1
Historical/cultural	*9*
Have history at the place/personal history	5
Historic area	3
Related to our culture	1

Note: Ninety-five respondents answered this question, and they often listed more than one value as being important.

3 Threats to the inlet and opportunities

3.1 Threats

The community expressed concern about the future of Stokes Inlet with the three biggest threats considered to be increasing population pressure, catchment impacts and commercial fishing. These and additional threats to community values for the inlet are listed in Table 2 and discussed below.

Available scientific information on Stokes Inlet suggests that contrary to popular belief, the system is not healthy and is under stress. Of particular concern are the high nutrient levels, sedimentation rates and the occurrence of toxic algae and blooms.

Fish stocks

With respect to the black bream at the inlet, information suggests that water quality poses the greatest threat to fish stocks. Rising salinity is likely to threaten the fish, as are toxic algal blooms resulting from increasing nutrients in the system. Black bream populations in inlets tend to be unique to that system, which makes the populations vulnerable in the event of a mass fish kill, such as occurred at Culham Inlet in 2001.

The commercial fishery at Stokes Inlet is considered by the Department of Fisheries to be sustainable and, on average, commercial yields have not decreased since 1975. Black bream are slow growing in the inlet and reach sexual maturity at the end of their second year of life but do not reach the minimum legal catch size until, on average, they are seven years of age. This allows them to spawn approximately five times before they can legally be taken out of the system. This biological factor adds to the fishery's sustainability.

This suggests that the concern expressed by some of the community regarding the commercial fishery relates to the sharing of legal-sized black bream amongst recreational and commercial fishers, rather than the sustainability of the fish population. Another factor to be considered is that the impact of recreational fishing at the inlet is not clearly understood and may be increasing.

Population pressure

Threats relating to population pressures are already actively managed by the Department of Environment and Conservation, which ensures that visitor access and use areas are defined and have minimal impact on the natural environment. Additionally, the camping sites are self-regulating and have a set capacity.

Other threats relating to vandalism, bushfires, weeds and pests are also managed by the Department of Environment and Conservation so are not addressed in this plan.

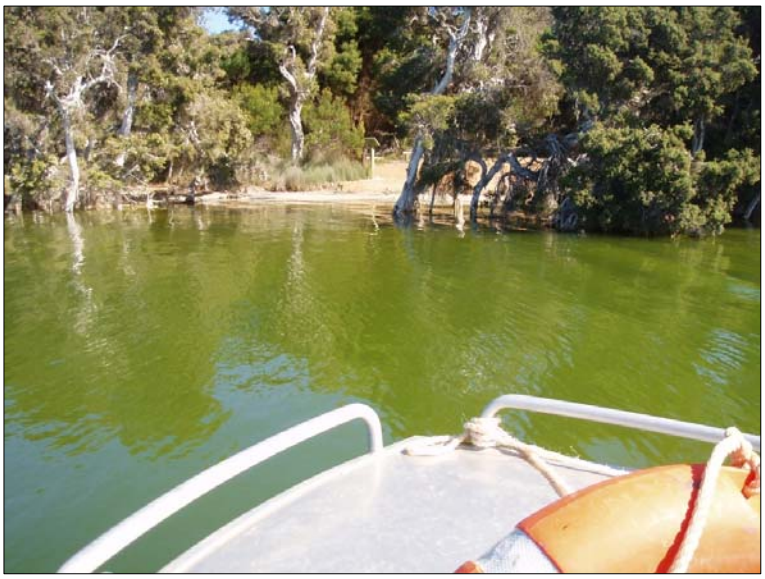
Catchment impacts are considered to be the most critical threat to the inlet that can be addressed through this plan; these are explained in more detail below.

Catchment clearing

Almost two-thirds of the catchment is cleared. As a result, there is reduced uptake of water by deep-rooted native plants which leads to rising groundwater tables and brings salt stored in the soil to the surface. This rising salty water can seep into waterways; this is likely to be occurring in the catchment as indicated by an increase in salinity of the naturally saline Young and Lort rivers. The end result is an increased salt load delivered to the river pools and inlet. Estuarine plants and animals are often adapted to variable salinity but if levels continue to rise it may threaten their health. The greatest threat to black bream is increased salinity as the black bream develop sores in concentrations higher than 60 ppt. Mass mortalities are known to occur above 85 ppt.

Nutrients

Much of the catchment is farmed and is likely to contribute nutrients to the waterways through runoff from fertilised paddocks. Some of these nutrients end up in the inlet where nutrient levels are already excessive. High nutrient levels often lead to algal blooms which can include toxic species that may be harmful to animals and humans. The community also expressed concern that other pollutants may be washed from the catchment into the inlet; however, this has not been assessed.



Visible green discolouration of water at the inlet caused by algae (photo by Mieke Bourne, 2006)

Sedimentation

With the loss of native vegetation in the catchment there has been an increase in the amount of soil that is eroded from farmland and stream banks. Vegetation along waterways stabilises the banks and reduces the speed of the water. When not protected, the soil is more easily eroded and the increased stream swiftness can dramatically increase the power of water to erode the channel and carry higher sediment loads.

In flood events the sediment moves downstream, eventually to the inlet. Sedimentation is a threat to the inlet as it leads to shallowing of the basin and river pools that act as important habitat and refuge to plants and animals as well as smothering vegetation and carrying nutrients which are attached to the eroded particles.

Some work has already begun in the catchment to start managing these threats. The Young River Catchment Plan is funding on-ground works to fence off and revegetate waterways, plant perennial pastures and manage surface water.

As is the case with many of the eastern inlets, little data is available on how the system works. The Stokes Inlet condition statement describes what we do know about the inlet and identifies information gaps. Filling these information gaps is a priority for understanding the system better and determining how it should be managed. Some of the information gaps identified include:

- measuring additional water quality parameters
- increasing the frequency of water quality sampling
- understanding the rate of sedimentation and its role in releasing nutrients
- determining the presence and role of aquatic plants, macroinvertebrates and fringing vegetation
- surveying visitors to obtain social values.

3.2 Opportunities and management strategies

The purpose of this plan is to identify opportunities to reduce the threats to the inlet and enhance its values. To achieve this, six main management strategies (listed in Table 2) are suggested to cover all of the identified values and the associated threats. These are:

1 Improvement of inlet water quality
2 Management of fish stocks
3 Recommendations for access and public use
4 Protection and enhancement of historic and Aboriginal cultural values
5 Protection and enhancement of animal and plant values
6 Communication and education

Improvement of inlet water quality results in improvement of the overall health of the system including the habitats for fish and other plants and animals, and the inlet's beauty and safety as a recreation area. The **management of fish stocks** addresses the perceived threat of commercial fishing to recreational fishers and resource sharing. **Recommendations for access and public use** as well as **protection and enhancement of historic and Aboriginal cultural values** concentrate on enhancing these community values. **Protection and enhancement of plant and animal values** focuses on gaining more much needed information through future studies to advise management decisions. **Communication and education** suggests how the inlet's values and management can best be communicated and how the community can be involved in looking after Stokes Inlet.

The actions laid out under each strategy in Section 5 provide more detailed advice on how they can be achieved.

Some information gaps were filled through the completion of projects during the plan's preparation, so are not included as actions in this plan. These include increasing the number and types of water samples taken, sediment coring and assessment of sediment nutrient release. Additionally, a social survey and a workshop with Traditional Custodians were completed to gain community views.

As indicated in the Linkages and legislation section (page 3), several organisations have statutory responsibilities with regard to aspects of the inlet and its management. Nevertheless, the parties which have pledged support (page 4) will strive to work cooperatively in the best interests of Stokes Inlet to implement the various strategies outlined in this document. It is envisaged that the Stokes Inlet Management Group will continue to oversee implementation of the plan through a dedicated project manager.

Table 2 Community values, perceived threats and management strategies for Stokes Inlet

Community values	Threats to the values	Management strategies
Fishing Recreation Camping / facilities Easy access Natural beauty History / Aboriginal culture Wildlife (plants and animals) Serenity	Over fishing both commercial and recreational Increased salinity Nutrient enrichment leading to algal blooms Erosion and sedimentation Pollution / chemicals Restricted access Bushfires Vandalism Dieback / weeds / pests / feral animals Too many people (increased visitation and recreational pressure) Unrestricted vehicle use Climate change Increased flooding Government restrictions Lack of information and understanding of values	Improvement of inlet water quality Management of fish stocks Recommendations for access and public use Protection and enhancement of historic and Aboriginal cultural values Protection and enhancement of animal and plant values Communication and education

This table is not linear as each value has a number of threats and each strategy covers many values and threats

4 Looking to the future

It is expected that the actions and recommendations in this plan will be addressed or completed over five years, but work at Stokes Inlet is likely to continue well beyond that time. Natural resource management work generally takes years to implement, but the results sometimes take decades to become apparent. Therefore, it is useful to have an aspirational goal that looks further into the future.

When asked 'How would you like to see the inlet in 20 years time?' the community responded by saying it would like to see it 'as it is now, healthy'. This view along with the expressed community values, founded the following vision for the inlet. This will be used to guide all future work.

'Stokes Inlet is a place of beauty and tranquillity, with well-designed recreation areas blending with the natural surrounds, where you can catch a feed of fish.'

It is helpful to have measurable targets set 10–20 years into the future to keep track of how the management of the inlet is proceeding (see table 3).

For example, for Stokes Inlet black bream stocks, visitor satisfaction and foreshore vegetation condition have been chosen as long-term targets as they best reflect the community values.

Long-term targets can be hard to measure and individually may not always accurately reflect the condition of the inlet. Outside factors such as climate and rainfall can influence the targets. Individually the targets may not be achieved so three have been selected so that collectively they can be used to judge wether the plan has been successful. If none of the targets are achieved then the community values for the inlet are not being met, and the plan and its implementation may need to be revised.

Table 3 Suggested long-term targets for 2027 for Stokes Inlet

Long-term target	Reason chosen	Measure
No decrease in black bream stocks.	Black bream are the greatest community value for the inlet.	Compare catch rates over time. Commercial catch rates to effort ratio as reported to the Department of Fisheries by licensed fishers. Recreational catch rates. Could be measured through tagging, intensive surveys or voluntary programs.
Condition of the estuarine foreshore vegetation is maintained or improved.	The foreshore vegetation provides habitat for animals and is an integral part of the inlet's beauty.	Quality and quantity of foreshore vegetation as assessed during surveys every 5 years. Baseline information will be provided through the foreshore condition survey proposed for 2008/2009.

Long-term target	Reason chosen	Measure
No decline in visitor satisfaction.	Facilities, access and recreation are important to the community and can affect their satisfaction with visiting the inlet.	Surveys of visitors to determine their satisfaction. Use existing surveys where possible and compare responses over time.

5 Management strategies

Within this section of the plan you will find the six broad strategies that are suggested to improve the condition of Stokes Inlet. Under each strategy there are actions that once implemented are intended to either enhance a value or reduce a threat to the inlet.

Each action or recommendation is explained and a time frame for expected completion provided. A lead agency is nominated for each action. The lead is not expected to complete all the work independently as it is intended that implementation will be a cooperative effort. While all actions are important they have been given a priority as 1–high, 2–medium or 3–low to help with the staging of implementation.

Overarching these strategies is the need for leadership and coordination in the implementation of the plan – unless somebody is dedicated to the plan's implementation and this role is funded, it is unlikely the plan will be successful. The appointment of such a manager is considered the most important action in this plan.

Action 1 **Appoint a project manager dedicated to assisting with the implementation of this management plan.**

Explanation: It is important that someone takes the lead in helping to implement this plan and to act as a point of contact for matters relating to the management of the inlet. It is expected that the proposed Stokes Inlet Management Group will play a role in appointing this person, who would preferably be based at the Esperance Regional Forum.

Lead: Stokes Inlet Management Group

Priority: 1

Time period: appointed 2008/2009 and employed for the duration of the plan (5 years)

Strategy 1. Improvement of inlet water quality

The currently available information, as summarised in the Stokes Inlet condition statement indicates that increased nutrients, salinity and sediment loads from the catchment are impacting the water quality of the inlet. What still needs to be understood is the rate and scale of these impacts and the main source of each in the catchment. Once these factors are researched, targeted on-ground catchment works can be implemented focusing on priority source areas. On-ground work is already taking place in parts of the catchment and it is important that this is supported and continued while future works are planned.

Action WQ1 Encourage good integration between proposed catchment works in this plan and projects being undertaken by the Young River Catchment Group.

Explanation: The Young River Catchment Group began implementation of on-ground works in 2007. It is anticipated that this work will continue after 2008. It is essential that this plan complements and supports existing work in the catchment. Esperance Regional Forum provides the link between the two groups and should ensure that catchment works are integrated and that good communication and information sharing continues.

Lead: Esperance Regional Forum

Priority: 1

Time period: ongoing

Action WQ2 Undertake a water quality snapshot of waterways in the catchment.

Explanation: High nutrient levels have been recorded in the inlet, but their source is not known. A catchment snapshot will indicate which waterways have high nutrient concentrations and may indicate nutrient sources. The snapshot should include the full catchment and follow methodology used for similar snapshots, such as in the Walpole catchment, and include two sampling occasions, one per high- and low-flow period. Salinity and organic matter should also be tracked during these snapshots. Where possible, catchment landholders should be invited to participate.

Lead: Department of Water

Priority: 1

Time period: 2008–2010

Action WQ3 Use risk assessment to determine high-risk nutrient loss areas in the catchment.

Explanation: Run a risk-based model to provide an indication of high-risk nitrogen and phosphorus loss areas, which are likely to contribute the most nutrients to the inlet. Much of the information required for the model is already available and includes digital land use and soil maps for the catchment. Nutrient balances for land uses have been calculated for nearby Bremer and Lake Warden catchments and could be used for the model. Analysis should be performed using as much available data as possible and combined with existing water quality data. Results will inform priority areas for on-ground work to reduce nutrient input from the catchment to the inlet.

Lead: Department of Agriculture and Food WA

Priority: 1

Time period: 2008–2010

Action WQ4 Characterise the groundwater systems near the inlet and the interactions between the groundwater and the inlet.

Explanation: Little is known about the interaction between the groundwater and the inlet. To learn more, a groundwater monitoring site should be installed within close to the inlet. The results may help explain the groundwater systems in the area and will hopefully provide information on groundwater movement, proximity and interactions with the inlet as well as its salinity and nutrient concentrations.

Lead: Department of Agriculture and Food WA

Priority: 1

Time period: 2008

Action WQ5 Investigate the main catchment sources of sediment that reach the inlet.

Explanation: Sedimentation is a threat to the inlet as it leads to shallowing of the basin and river pools that act as a place of refuge during periods of unfavourable conditions (refugia), as well as smothering vegetation and carrying nutrients. Slope analysis within 125 m of first to third-order streams was undertaken to prioritise investment in the Young River catchment. Areas with greater slopes on cleared agricultural land were considered to be more susceptible to erosion and given a higher priority for investment.

Analysis needs to be carried out for other areas within the entire catchment (i.e. in higher order streams and the Lort River) to determine the main sources of sediment. Image analysis using aerial photography, in which displacements of images due to tilt and relief have been removed, from 2003/2004 and 2007 (before and after the 2007 flood event) focusing on high slope areas will assist in determining which areas are losing the most sediment and aid in further prioritisation of investment.

Lead: Department of Agriculture and Food WA

Priority: 1

Time period: 2008–2010

Stream bank erosion in the Young River catchment (photo courtesy of Frank D'Emden)

Action WQ6 Measure the movement of sediment in the lower river reaches and basin.

Explanation: Available information suggests the rate of sedimentation has increased post land clearing. The impact this has on the inlet is unknown but is likely to have the greatest impact on the delta where the rivers meet the inlet basin, and in the river pools. To measure the movement of sediment, a combination of aerial photography, depth measurements (bathymetry) of the entire inlet and specific parts of the inlet, and comparison of photographs taken over time from the same point could be used. Sediment coring of the basin was completed in 2008 and the results from this research should be utilised in this action.

Lead: Department of Water

Priority: 2

Time period: 2009–2011

Action WQ7 Survey the bathymetry of the inlet.

Explanation: It is important to gather baseline information on the bathymetry of the inlet and estuarine reaches of the rivers so that future sediment movement can be measured. The bathymetry could be mapped using a boat and depth measure by the Department of Water or contractors. The results could also be used to calculate the inlet's water volume.

Lead: Department of Water

Priority: 2

Time period: 2009–2011

Action WQ8 Determine areas in the catchment that are likely to contribute high salt loads to the inlet.

Explanation: Combine results of salinity measurements taken during the water quality snapshot with gauging station data and the present understanding of salinity in the catchment to determine which areas are contributing large amounts of salt to the inlet. As part of understanding the salt input, it is important to determine the influence groundwater is having directly on the inlet as well as on the movement of regional groundwater systems. It will also be important to measure stream baseflow salinities in drier times of the year.

Lead: Department of Agriculture and Food WA with assistance from the Department of Water

Priority: 1

Time period: 2008–2010

Action WQ9 Support the continuation and expansion of existing monitoring projects.

Explanation: Current monitoring projects in the catchment and inlet looking at soil health, water quality and biodiversity should be continued to provide longer term monitoring data. This data will be important in determining the existing status of the system's health and to monitor and evaluate progress. These projects should be supported where possible and the information arising from them

utilised in management decisions. Recent concerns in relation to the possible impact of herbicides and pesticides, particularly atrazine, on fish health need to be further investigated. Research into the presence of herbicides and pesticides in the Young and Lort rivers following spraying in the catchment should be encouraged.

Lead: Stokes Inlet Management Group
Priority: 1
Time period: ongoing

Action WQ10 Combine risk analysis results from sediment, salinity and nutrient studies.

Explanation: Combine the results from the nutrient, sediment and salinity studies completed in the first years of implementation. From this, a map should be produced showing high-risk areas for each, which will be used to determine priority areas for on-ground catchment investment.
Lead: Stokes Inlet Management Group
Priority: 2
Time period: 2010

Action WQ11 Determine the environmental condition of the inlet.

Explanation: At the end of the first two years of implementation, more data will be available on the nutrients, salinity and sediment coming from the catchment and within the inlet. This and existing information should be brought together for discussion by a panel of experts with the intention of assessing the state of the inlet. This panel should also revise the main threats to the inlet and examine selected priorities for on-ground work using maps produced by Action WQ10.
Lead: Stokes Inlet Management Group
Priority: 2
Time period: 2010

Action WQ12 Continue on-ground works in the catchment focussing on prioritised areas.

Explanation: Once priority high-risk areas for investment are determined by Action WQ11, suitable on-ground works should be implemented. On-ground works should be strategically targeted to reflect high-risk areas with catchment groups and community capacity developed in these areas. Suitable on-ground works may include river restoration, surface water management and soil management. Fertiliser use and other workshops may also be targeted at priority areas.
Lead: Esperance Regional Forum, Department of Water and Department of Agriculture and Food WA
Priority: 3
Time period: 2010–2013

Action WQ13 Encourage fencing and revegetation of areas along the tributaries and main channel of the Young and Lort rivers, below the South Coast Highway, and enhance the vegetation buffer throughout this area.

Explanation: A preliminary assessment of the state of the Young and Lort rivers recommended that high erosion-risk areas in the floodway of the main channels of the Young and Lort rivers, primarily below the South Coast Highway (specific locations have been identified in the state of the Young and Lort river reports), be assessed on the ground and fenced off and revegetated as required.

Lead: Esperance Regional Forum and Department of Water

Priority: 1

Time period: 2008–2010

Action WQ14 Complete a riparian vegetation condition survey for the Young River and implement any recommendations.

Explanation: No survey of the condition of the vegetation along the banks of the Young River has been completed. It is important to determine the condition of the riparian zone (vegetation on the banks of the river) so that changes can be monitored and areas for restoration and protection are identified.

Unfenced and degraded vegetation areas should be fenced off to exclude stock, and revegetated to stabilise the banks and reduce erosion, nutrient movement and rising salty groundwater.

The vegetation survey should make recommendations about priority areas for work and map the current waterways fencing status. Esperance Regional Forum will need to work with landholders to implement the recommendations.

Lead: Department of Water and Esperance Regional Forum

Priority: 1

Time period: complete survey in 2008–2009 then initiate implementation

Action WQ15 Prepare and implement a river action plan for the Lort River.

Explanation: A coordinated assessment of river care and rehabilitation needs has not been completed within the Lort River catchment. Capacity building and assessment of the need and desire for a catchment group is required so that work can be undertaken in the entire Stokes Inlet catchment. To initiate this process a community-based river action plan looking at the main channel and tributaries should be prepared and implemented. This action is likely to require a dedicated officer.

Lead: Department of Water

Priority: 2

Time period: prepare the plan 2009–2010 then initiate implementation

Strategy 2. Management of fish stocks

The community survey indicated fish stocks, primarily black bream, are the most valued community asset for Stokes Inlet. Research to date suggests that the greatest threat to the black bream population is reduced water quality, in particular, high salinity levels.

Available information indicates that the commercial black bream fishery is sustainable. However, the community perception is that there needs to be greater sharing of the bream amongst commercial and recreational fishers.

Action F1 Educate the community about the sustainability of the fishery and its management.

Explanation: Stokes Inlet is one of 13 inlets that make up the South Coast Estuarine Fishery. Community perception of the commercial fishery at Stokes Inlet suggests that there is not a good understanding of its management or purpose. Community education about how the fishery is managed and its sustainability, including recent restrictions to the fishery, catch data and the results from recent research would be beneficial to improve this. This could take place through the media, workshops or presentations. This action will form part of a broader education action and should therefore be overseen by the multi-agency management group. It is expected that the Department of Fisheries will provide information relating to the fishery to assist in the implementation of this action. Additionally, the WA Fishing Industry Council has offered assistance in implementing this action. Information about the whole fishery including the recreational component should be included.

Lead: Stokes Inlet Management Group

Priority: 1

Time period: ongoing

Action F2 Write to the Minister for Fisheries and the Department of Fisheries seeking support for a voluntary resource sharing process to be used for the black bream fishery at Stokes Inlet.

Explanation: A section of the community believes that commercial fishing should be reduced or stopped at Stokes Inlet. As there is no evidence that the commercial black bream fishery is unsustainable, the issue is considered by the steering group to be one of equity and resource sharing rather than stock sustainability. It is proposed that the Stokes Inlet Management Group write to the Department of Fisheries and the Minister for Fisheries providing all the information that has arisen during the preparation of the plan in relation to the fishery. The group should indicate that it has been made aware of the voluntary resource-sharing process which could be used for the black bream fishery at the inlet and that it is supportive of a trial of this process. The group should also express that it understands that if the issues are not resolved through the voluntary process then the minister will need to make a decision based on the available information.

Lead: Stokes Inlet Management Group
Priority: 1
Time period: 2008

Action F3 Promote Stokes Inlet as a priority for integrated fisheries management.

Explanation: Department of Fisheries anticipate reviewing the allocation of fin fish resources for the south coast, including the fishery at Stokes Inlet, through the development of integrated fisheries management (IFM). This approach is needed at Stokes Inlet and it is recommended that the Department of Fisheries highlight the inlet as a priority for the IFM process. While it is unlikely that the IFM process will reach the inlet within the life of this management plan, it is still considered important to continue promoting the need for it and recognising that the IFM process is a long-term solution to resource sharing issues.

Lead: Department of Fisheries
Priority: 3
Time period: ongoing

Action F4 Support continued monitoring of the black bream population size and health.

Explanation: The Centre for Fish and Fisheries Research at Murdoch University has undertaken studies of estuarine fish populations for many years. Given the importance of black bream in the inlet, monitoring of this species needs to continue into the future. One required outcome of the present study is to recommend a cost-effective method of long-term monitoring. This identified methodology should be used.

Lead: Department of Fisheries and South Coast NRM Inc.
Priority: 1
Time period: ongoing

Action F5 Promote research into the impacts of recreational fishing on black bream at the inlet.

Explanation: Little is known about the catch rates and effort associated with the recreational fishery. One way of increasing this understanding is for the group to support the existing volunteer programme established by the Department of Fisheries. Additional options to improve the understanding of the recreational impact are to conduct intensive surveys at the inlet or tag the black bream.

Black bream in the inlet are slow growing and are likely to be caught and released many times before they reach the minimum legal size. Information on the survival rates of catch and release black bream already exists and needs to be collated and considered as part of determining the recreational impact on the fishery.

Lead: Department of Fisheries
Priority: 3
Time period: 2009–2011

Action F6 Interference with the sand bar should not be supported.

Explanation: It has been suggested that artificial opening of the bar could lead to greater fish recruitment and flush the inlet when salinities are too high. Bar interference at other inlets along the south coast has not been very successful. If a bar is opened before sufficient water levels are achieved to cause a natural break, the water exchange is severely limited and often results in wave action closing the bar soon after. As Stokes National Park extends to the low water mark, the bar is part of the park and hence managed by the Department of Environment and Conservation.

Lead: Department of Environment and Conservation

Priority: 2

Time period: ongoing

Action F7 Describe the fish fauna of upstream pools and identify pools that have the potential to act as refugia for fish species in the Young River.

Explanation: The importance of upstream pools as refugia for fish species has been demonstrated in other inlets. Such pools have not been identified for Stokes Inlet. Salinities within the basin and estuarine reaches of the tributaries of Stokes Inlet are approaching those known to be lethal to all but one species of fish that inhabit this system with increased frequency. Upstream pools need to be identified and then studied to find out the number, type and the importance of these pools as refugia determined. Actions need to be taken to protect the identified refugia pools.

Lead: Centre for Fish and Fisheries Research, Murdoch University with the Department of Water and South Coast NRM

Priority: 1

Time period: 2008

Strategy 3. Recommendations for access and public use

The community appreciates the accessibility of the inlet and the facilities provided for their use in Stokes National Park which surrounds the inlet. The park is managed by the Department of Environment and Conservation. All recommendations within this strategy are intended to complement and support their work in the park. Any proposed changes to existing access and facilities will be considered through the preparation of the Esperance Coastal Reserves Management Plan under the provisions of the *Conservation and Land Management Act*, and as such, several recommendations instead of actions are listed below.

Recommendation A1 Investigate options for changing the tenure of the inlet.

Explanation: The present tenure of the inlet and parts of the Young and Lort rivers below the South Coast Highway is of concern as they are not vested in any management authority and their purpose and value is not recognised. This is the situation for most inlets on the south coast. This needs to be addressed so these areas can be better protected. Changes in tenure must involve

public consultation and be accompanied by adequate resources so that the area can be managed effectively.

Lead: Stokes Inlet Management Group and Department of Environment and Conservation

Priority: 2

Time period: ongoing

Recommendation A2 Support the maintenance of, or increase in, the number of rangers at Stokes National Park.

Explanation: The community values the ranger's presence at Stokes National Park. This role is vital in maintaining the facilities, access and wildlife values. Therefore, this plan supports the Department of Environment and Conservation in the retention of adequate staffing levels.

Lead: Stokes Inlet Management Group in consultation with Department of Environment and Conservation

Priority: 1

Time period: ongoing

Recommendation A3 Extend the existing walk trail to the beach.

Explanation: Increased access to the beach is sought by the community. The existing walk trail at the inlet extends only from the north to the southern campsites and was damaged by fire in 2007. Community support exists to extend this walk trail by approximately three kilometres to the ocean by the most appropriate route, with the addition of lookouts and interpretative signage. The development of the trail should involve consultation with the community and the Traditional Custodians.

Lead: Department of Environment and Conservation

Priority: 2

Time period: 2009–2012

Action A4 Fence off and revegetate the tributary that enters Stokes National Park in its north-west corner.

Explanation: Historically, sediment coming down a tributary on a property adjacent to Stokes National Park has impacted the only access road to the inlet, through the deposition of sand. Restoring the waterway is likely to be the best long-term solution to reduce the impact of sediment on the road structure.

Lead: Esperance Regional Forum and Department of Water

Priority: 1

Time period: 2008–2009

Action A5 Ensure any proposal to increase boating activity at the inlet is provided to the Stokes Inlet Management Group for comment.

Explanation: Increased boating at the inlet including houseboats, water and jet skis, helicopter rides or boat hiring operations is likely to impact negatively on the inlet's serenity and birdlife. All proposals should be considered by the Stokes Inlet Management Group to ensure the inlet's values are not reduced.

Lead: Department for Planning and Infrastructure
Priority: 2
Time period: ongoing

Action A6 Gazette the inlet as unsurveyed waters with associated 8 knot speed limit.

Explanation: Inappropriate boat speeds can cause increased noise levels and disturbance. Additionally, the waters of Stokes Inlet are unsurveyed so any underwater hazards are unknown and pose a potential danger to boat users. Therefore, the waterway should be gazetted as unsurveyed and an 8 knot speed restriction applied to the whole area. On gazettal, signs to this effect should be erected at all boat launching areas.

Lead: Department for Planning and Infrastructure in liaison with the Department of Environment and Conservation
Priority: 2
Time period: 2008–2009

Strategy 4. Protecting and enhancing historic and Aboriginal cultural values

Both European and Aboriginal sites of importance exist at the inlet and their protection and interpretation is important to the community. Many aspects of the inlet that are important to its Traditional Custodians such as healthy water, plants and animals are covered in other parts of the plan so are not repeated here.

Recommendation CH1 Engage an archaeologist to record identified heritage sites and establish management options for these sites in liaison with Traditional Custodians.

Explanation: Sites identified in a workshop held in 2006 and in more recent work with Traditional Custodians need to be officially recorded and managed appropriately. Some of the locations of the sites are provided in the workshop report prepared by the consultants. The Traditional Custodians and the Department of Environment and Conservation must determine the best management of the sites cooperatively. To add to this work, an ethnobotanist could be engaged to comment on the condition of traditional foods associated with the inlet.

Lead: Department of Environment and Conservation with Traditional Custodians
Priority: 2
Time period: 2008–2009

Action CH2 Protect the freshwater pools located near the mouth of the inlet from four-wheel vehicles.

Explanation: Four-wheel vehicles sometimes access the ocean beach by driving over the dunes at the mouth of the inlet. This threatens the freshwater pools that are valued by the Traditional Custodians, which lie between the dunes. Access

to the pools needs to be restricted and longer term management of the site will be covered in the management plan for the park.
Lead: Department of Environment and Conservation
Priority: 1
Time period: 2008–2009

Recommendation CH3 Implement the remaining recommendations from the Moir Homestead Conservation Plan.
Explanation: The remains of Moir Homestead are located near the south-east edge of the inlet on a small reserve managed by the National Trust and the Department of Environment and Conservation. This historic site is important to the community and a conservation plan was prepared for it in 2000. The remaining recommendations from the conservation plan should be implemented through consultation with the National Trust.
Lead: Department of Environment and Conservation
Priority: 2
Time period: 2009–2012

Recommendation CH4 Prepare an interpretation plan for Moir Homestead.
Explanation: To add value to the site for visitors, an interpretation plan could be developed. The plan would need to be prepared by a suitably qualified person, and closely linked to any interpretation plan prepared for the Stokes National Park. The plan would need to be prepared with the National Trust and consider such things as education and signage.
Lead: Department of Environment and Conservation
Priority: 2
Time period: 2009–2012

Strategy 5. Protection and enhancement of plant and animal values

Very little is known about the valued plants and animals at Stokes Inlet. This strategy is dedicated to learning more about the plants and animals that exist at the inlet so that they can be protected into the future. Fish have been discussed in Strategy 2 so are not considered here. Additionally, actions in the Water Quality Strategy 1, relating to fencing and revegetation of waterways will result in the enhancement and protection of riparian corridors and add to the plant and animal values of the inlet by providing connectivity with the surrounding landscape.

Recommendation PA1 Map and prioritise habitats at the inlet to guide future studies.
Explanation: A range of habitats exists at Stokes Inlet including open water, mudflats, foreshore vegetation and estuarine river reaches. A simple exercise mapping these habitats, their use, possible threats to each and identification of important habitats will provide useful information to guide additional studies as well a map which could be used as an education tool.

Lead: Stoke Inlet Management Group in liaison with Department of Environment and Conservation
Priority: 1
Time period: 2008–2009

Action PA2 Complete a survey of bird populations at the inlet.
Explanation: Bird-watching at the inlet is a popular activity. The first step to better understanding how the inlet should be managed so that it provides the best environmental conditions for birds and enhances the bird-watching experience is to complete a survey of bird populations. The survey should consider species present, abundance, habitats, threats and what birds use the inlet for. The survey will need to be completed at different times over two years to take into account the variability of bird populations at the inlet between seasons and years. The survey should provide management recommendations and suggest what facilities, such as bird hides, would improve bird-watching and where they should be placed. The Esperance Bird Observers group and Birds Australia WA should be included in any study.
Lead: Stoke Inlet Management Group
Priority: 2
Time period: 2010–2012

Pelicans on Stokes Inlet (photo by Mieke Bourne, 2006)

Recommendation PA3 Determine which vertebrates utilise the inlet.
Explanation: With the exception of fish and birds, no information is available on the vertebrates that utilise the inlet or if rare or endangered species are found there. A survey is required to determine existing vertebrates at the inlet, the optimal environmental conditions for their survival and the potential threats. The survey report should include recommendations on what needs to be done to better protect identified vertebrates.
Lead: Department of Environment and Conservation
Priority: 3

Time period: 2012

Action PA4 Complete a survey of aquatic invertebrates in the inlet, including the estuarine reaches of its tributaries, to determine presence, diversity and temporal variation.

Explanation: Macroinvertebrates are easy to catch and often provide a good indicator of estuarine health. Baseline information on what macroinvertebrates are in the system is needed so that future changes can be monitored. Initially, one sampling occasion in spring should be conducted, but this could be repeated following changes to the system, such as a bar opening. Sampling should take place again five years later to monitor any change.

Lead: Department of Water

Priority: 2

Time period: initial survey in 2009–2010

Action PA5 Complete a foreshore vegetation condition assessment.

Explanation: Foreshore vegetation provides an important habitat as well as an important component of the inlet's visual amenity. A vegetation foreshore condition assessment should be completed for the inlet and estuarine reaches of the rivers to determine vegetation type, condition, weed invasion and optimal environmental conditions. The survey could initially focus on the areas impacted by recreation on the western side of the inlet and the estuarine reaches of the Young and Lort rivers, and should provide management recommendations. This area should be surveyed again five years after the initial assessment to determine the impact of recreation on the foreshore vegetation condition.

Lead: Department of Water in liaison with the Department of Environment and Conservation

Priority: 1

Time period: 2008/2009

Action PA6 Complete a survey of the aquatic vegetation present in the inlet.

Explanation: Some work is being undertaken to look at phytoplankton in the inlet as part of a Department of Water's quarterly inlet sampling programme. However, little information exists on the larger aquatic vegetation in the inlet. This knowledge gap could be filled through a survey and monitoring of the macrophyte and macroalgae to determine presence, distribution and biomass of species as well as their roles in the system.

Lead: Department of Water

Priority: 3

Time period: 2013

Strategy 6. Communication and education

It is important that throughout the implementation of this plan there is good communication between the partner organisations and with the community. Information gained from studies of the inlet needs to be shared so that managers and the community are better

educated about the condition of the system. The community should be given an opportunity to comment, volunteer and learn about the plan's progress.

Action CE1 Undertake a communication strategy for the implementation of this plan.

Explanation: It is important that the communication expectations for the plan's implementation are laid out clearly from the initiation of the project in a communications strategy. The strategy should consider who will be communicated to, how and when. Tools such as media articles, community education letters to interested persons, workshops and presentations should all be considered. This strategy should guide all communication, and be prepared immediately and used throughout the life of the plan.

Lead: Stokes Inlet Management Group

Priority: 1

Time period: prepared in 2008

Action CE2 Develop and implement an integrated interpretation plan for the inlet.

Explanation: The plan should consider heritage, Aboriginal and environmental values. Signage and leaflets are expected, with common themes. The interpretation plan for the inlet needs to be integrated with any interpretation planned for the national park.

Lead: Department of Environment and Conservation

Priority: 1

Time period: developed in 2008/2009 with implementation initiated by 2010

Action CE3 Inlet research to be made available to agencies and the wider community.

Explanation: An improved understanding of Stokes Inlet and the processes that influence it is important to ensure the inlet is managed effectively. All new information arising from research projects and studies should be used to educate the community and other organisations. The methods for this should be laid out in the communication strategy under Action CE1.

Lead: Stoke Inlet Management Group

Priority: 1

Time period: ongoing

Actions CE4 Actively encourage community participation in the implementation of this plan.

Explanation: Community ownership and participation is an integral part of the ongoing management of the inlet. This participation could be encouraged through a range of activities and should involve local schools and the wider community.

Lead: Stoke Inlet Management Group

Priority: 1

Time period: ongoing

6 Implementation

The implementation of this plan will be supported by a proposed Stokes Inlet Management Group, which is expected to meet approximately every three months. This group is to be established as the first priority for implementation and should comprise representatives from agencies such as the Department of Water, Department of Environment and Conservation, Department of Fisheries, and Department of Agriculture and Food WA. Additionally, the Young River Catchment Group, Esperance Regional Forum, the Shire of Esperance, South Coast NRM, WA Fishing Industry Council, the regional Recreations Fishing Advisory Committee and the community, including the Traditional Custodians, will need to be represented.

It is preferred that the Esperance Regional Forum in partnership with South Coast NRM service the group and host the project manager, given the considerable number of catchment actions. If this is not possible, other organisations such as the Department of Water could be considered.

The dedicated project manager will be employed to help coordinate the plan's implementation and could perform several roles if it was considered appropriate, such as assisting catchment groups or preparing the Lort River action plan.

At the beginning of implementation and for each year of implementation an operational plan will be developed, with annual work priorities. The first year of work is likely to be dominated by gathering more information through research. By years two and three, research results should indicate priorities for on-ground work in the catchment. This on-ground work should then continue for the life of the plan and beyond.

Costing for the completion of actions has not been included in this plan but will be determined before submissions for funding applications. Funding for implementation of this plan will be sought through the next round of state and federal natural resource management funding, as well as from partner organisations in the form of in-kind support and completion of discrete projects. Other grant options will also be explored.

This management plan was prepared through cooperation and integration and it is expected that the implementation phase will continue in this way while recognising statutory responsibilities and other planning processes.

The management plan will be reviewed five years from the beginning of implementation. This review should take into account learning and new information available from completed research projects. The review could include a repeat of the social survey completed during the plan's preparation to determine any changes in the community's views towards the inlet after five years of implementation.

Reporting

Reporting progress on the plan and any changes to the inlet's condition will be an important role for the project manager. Annual reports to the community are expected. These reports will need to consider the management action targets and the long-term targets.

The project manager will need to provide updates to the Stokes Inlet Management Group at each meeting and complete the required reporting to any funding body.

As well as reports, other means of communication will be used to inform the community on the progress of the plan. These means will be detailed in the communication plan, and take into account the diverse range of inlet users and dispersed population in the area.

7 Measuring progress

To measure the progress of the implementation phase, several management action targets have been selected to broadly cover the main work areas in the plan. Completion of these targets will indicate the plan is being implemented successfully.

Management Action Target	**Reason chosen**	**How it will be measured**
MAT 1 Appointment of a project manager to coordinate implementation of the plan by December 2008.	Relates to Action 1. Most important overarching action in the plan.	Based on appointment. Determined by the Stokes Inlet Management Group.
MAT 2 Completion of a waterway nutrient and salinity snapshot in the catchment by December 2009.	Relates to Action WQ2 in Strategy 1. Relates to gathering information and monitoring.	Presentation of results to the Stokes Inlet Management Group by the Department of Water.
MAT 3 Fencing 20 km along the lower Young and Lort rivers, including tributaries, by December 2011.	Relates to Action WQ13 in Strategy 1. Relates to implementation of on-ground works.	Fencing subsidies organised through Esperance Regional Forum and Department of Water, with work inspected on site.
MAT 4 Workshop held to determine the condition of the inlet and priority areas for on-ground works by December 2010.	Relates to Action WQ11 in Strategy 1. Relates to monitoring and evaluating as well as planning on-ground works.	Report from the workshop organised by Stokes Inlet Management Group.
MAT 5 Education program initiated to share information about the fishery with the community by June 2009.	Relates to Action F1 Strategy 2. Relates to communication.	Media article, brochure or presentation completed. Information provided by the Department of Fisheries.

8 Useful references and further reading

Bancroft, KP, Deeley, DM & Paling, EI 1997, South Coast Terrestrial and Marine Reserve Integration Study. A review of estuaries and their catchments between Broke Inlet and Israelite Bay. Report to the Marine Conservation Branch, Nature Conservation Division, Department of Conservation and Land Management. Marine and Freshwater Research Association, Murdoch University MAFRA Report No 97/9.

Birds Australia WA 2001, Birds of the Esperance Shire, Number 32b in a series of Bird Guides of Western Australia.

Brearley, A 2006, Swanland: Estuaries and coastal lagoons of south-western Australia, UWA Press, pp 485-491.

Colman, JG 1997, South Coast Terrestrial and Marine Reserve Integration Study. National Reserve System Co-operation Program. Final Report to Environment Australia. Marine Conservation Branch, Department of Conservation and Land Management.

Department of Agriculture 2001, Lort and Young Rivers Catchment Appraisal. Resource Management Technical Report No 231. Compiled by Jamie Bowyer for the Esperance Catchment Support Team.

Department of Conservation and Land Management 1992, South Coast Region Regional Management Plan.

Department of Conservation and Land Management 1994, A Representative Marine Reserve System for Western Australia. Report to the Marine Parks and Reserves Selection Working Group.

Department of Fisheries 2005, South Coast Estuarine Fisheries Management Plan, Department of Fisheries, Western Australia.

Esperance Regional Forum 2006, Young River Catchment Plan 2006. Prepared for the South Coast Regional Initiative Planning Team Implementing Working Group.

Esperance Regional Forum 2007, Young River Background Document and 2 Year Implementation Plan 2007 / 2008. Prepared for the South Coast Regional Initiative Planning Team Implementing Working Group.

Fletcher, WJ & Head (eds) 2006, State of the Fisheries Report 2005/06, Department of Fisheries, Western Australia.

Forbes, V 2007, Stokes Inlet Condition Statement, Department of Water, WA.

Gee, ST & Simons, JA 1997, Catchments of the Esperance Region of Western Australia. Technical Report No 231, Department of Agriculture and Food, WA.

Gunby, C, Arrowsmith, N & Bryant, J 2004, Southern Prospects 2004–2009, South Coast Strategy for Natural Resource Management. Background Paper 4, Water Resources in the South Coast. Prepared for the South Coast Regional Initiatives Planning Team.

Green, B 2001, Southern Shores 2001–2021. A Strategy to Guide Coastal and Marine Planning and Management. South Coast Management Group, Western Australia.

Hodgkin, EP & Clarke, R 1989, Stokes Inlet and other estuaries of the Shire of Esperance. An inventory of information on the estuaries and coastal lagoons of south Western Australia, Estuarine Studies Series no. 5. Environmental Protection Authority, WA.

Hodgkin, EP & Hesp, P 1998, Estuaries to salt lakes: Holocene transformation of the estuarine ecosystems of south-western Australia. Australian Journal of Marine and Freshwater Research 49, 183–201.

Hoeksema, SD, Chuwen, BM, Hesp, SA, Hall, NG & Potter, IC 2006, Impact of environmental changes on the fish faunas of Western Australian south-coast estuaries. Project No. 2002/017 Fisheries Research and Development Corporation Report.

Janicke, S 2003, State of the Lort River. Unpublished report, Department of Environment, WA.

Janicke, S & Michael, M 2004, State of the Young River. Unpublished report, Department of Environment, WA.

Janicke, S & Michael, M 2005, The Condition of Yerritup Creek. Unpublished report, Department of Environment, WA.

Johnson, SL 1998, Hydrogeology of the Ravensthorpe 1:250,000 sheet: Western Australia. Hydrogeological Map Explanatory Notes Series, Report HM 4, Water and Rivers Commission, Perth.

Leighton, S & Watson, J 1992, Save the Bush, South Coast River Corridor Project. A preliminary survey of four river foreshore reserves along the South Coast of Western Australia. Department of Conservation and Land Management, Albany (unpublished report).

Massenbauer, T 2007, Esperance (Ravensthorpe to Cape Arid) SIFIII Proposed Preliminary Biodiversity Assets. Department of Environment and Conservation, Esperance.

Mayer, XM, Ruprecht, JK & Bari, MA 2005, Stream salinity status and trends in south-west Western Australia. Salinity and Land Use Impacts Series, Report No. SLUI 38. Department of Environment, WA.

Morse, K, Wright, G, Ryan, I & Stokes, C 2007, Draft Report on the Results of a Cultural Heritage Survey of nominated areas within Stokes National Park, South Coast Western Australia. Eureka Archaeological Research & Consulting, University of Western Australia.

National Trust of Australia 2000, Moir Homestead Conservation Plan. Funded by the Lotteries Commission Western Australia.

Newbey, K & Bradby, K 1989, Stokes National Park Biological Survey Report. Report to the West Australian Heritage Commission (unpublished report).

Pearn, P & Cappelluti, T 1999, The South Coast Estuarine Fishery, a discussion paper. Fisheries Management Paper No. 126. Fisheries, WA.

Pen, LJ 1999, Managing our Rivers. A guide to the nature and management of the streams of south-west Western Australia. Waters and Rivers Commission, WA.

Simons, J & Alderman, A 2004, Groundwater trends in the Esperance Sandplain and Mallee sub-regions. Department of Agriculture WA.

Smallwood, CB & Summer, NR 2007, A 12-month survey of recreational estuarine fishing in the South Coast bioregion of Western Australia during 2002/03. Fisheries Research Report No. 159. Department of Fisheries, Western Australia.

South Coast Regional Initiative Planning Team 2005, Southern Prospects 2004-2009. South Coast Regional Strategy for Natural Resource Management.

South Coast Rivercare website www.rivercare.scric.org/infodata/catch.html; accessed 16/10/2006.

Stokes National Park 2005, Visitor Survey Program February 2005 – May 2005. A report of the findings from the visitor feedback form Department of Environment and Conservation.

Watson, J & Wilkins, P 1999, The Western Australian South Coast Macro Corridor Project – a bioregional strategy for nature conservation. Parks 9 (3), 7–16. Department of Conservation and Land Management.

Unpublished documents prepared to assist in the development of this plan are listed below and are available through the Department of Water or the author organisation:

- Literature Review of Stokes Inlet and its catchment – prepared in 2007
- Community Attitudes Towards Stokes Inlet – compilation of community and organisation questionnaire response 2006
- Issues Paper – prepared in 2007
- Background papers:
    - **Fish and Fisheries** – Department of Fisheries and the Centre for Fish and Fisheries Management, Murdoch University
    - **Management, Facilities and Access** – Department of Environment and Conservation
    - **European History** – Shire of Esperance
    - **Indigenous Heritage** – Department of Water on behalf of the Traditional Custodians
    - **Water Recreational Use** – Department for Planning and Infrastructure
    - **Groundwater** – Department of Agriculture and Food WA
    - **Flora and Fauna** – Department of Water and Department of Environment and Conservation
    - **Agricultural Land Use in the Catchment** – Department of Agriculture and Food WA
    - **Young River Catchment** – Esperance Regional Forum

Contacts

Department of Water
South Coast Region
PO Box 525
Albany, WA 6330
Phone: 98425 760

Department of Environment and Conservation
Esperance District
PO Box 234
Esperance, WA 6450
Phone: 9083 2100

Department of Agriculture and Food WA
PMB 50
Melijinup Road
Esperance, WA 6450
Phone: 9083 1111

South Coast Natural Resource Management Inc.
39 Mercer Road
Albany, WA 6330
Phone: 9845 8537

Department of Fisheries
Suite 7
Frederick House
70–74 Frederick St
Albany, WA 6330
Phone: 9841 7766

Esperance Regional Forum
PMB 50, Melijinup Road
Esperance, WA 6450
Phone: 9083 1164

Shire of Esperance
PO Box 507
Esperance, WA 6450
Phone: 9071 0666

Department for Planning and Infrastructure
PO Box 2255
Esperance WA 6450
Phone: 9071 6891

SOUTHCOAST
NATURAL RESOURCE MANAGEMENT INC.

www.water.wa.gov.au

ISBN 978-1-921468-37-7 (pbk)
ISBN 978-1-921468-38-4 (pdf)