

Flora and Fauna Background Paper

Prepared for the Stokes Inlet Steering Group March 2007
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Introduction

A management plan is being prepared for Stokes Inlet to ensure that its high environmental, social and economic values are managed sustainably into the future.

The Inlet is highly valued by the community for its scenic beauty and natural environment.

This background paper has been prepared to discuss the information available on flora and fauna at Stokes Inlet, to determine information gaps and to make recommendations. The Department of Environment and Conservation (DEC), Department of Fisheries and the Esperance Bird Group have contributed to the preparation of this paper.

Background

There is little recent information available on flora and fauna in or around the Inlet. Much of the work that has been done was carried out in the late 1980s.

The area around the Inlet and some of the estuarine reaches of the rivers flowing into the Inlet are vested with DEC. Specific recommendations relating to the terrestrial landscape will be considered through the DEC planning processes. An Esperance District Coastal Reserve Management Plan (EDCRMP) is being prepared at present and there will be opportunities to feed into that plan through DEC's representation on the Inlet steering group and through submissions to the planner responsible for compiling the plan.

Issues

Below in italics are the questions that were raised in reference to flora and fauna at the Inlet. The questions arose from an issues paper which was prepared to reflect the priority issues and associated knowledge gaps for the Inlet. The questions are answered and recommendations are suggested where appropriate.

What information presently exists about the Inlet's aquatic vegetation and invertebrate populations and the foreshore vegetation values? (species, distribution and condition)

A literature review has been prepared as part of the planning process for the Inlet and provides information and full references for all the documents that could be found that relate to Stokes Inlet. Hodgkin and Clark (1989) completed a study of Stokes Inlet and reported that the fringing vegetation

around the Inlet was: Saltwater paperbarks form a continuous fringe band around the estuary with sedges / samphire along the water or low sandy beach ridges. Where the groundwater is less saline the low lying areas are colonised by the sedges with beaded grasswort common along the north and north-western shores of the Inlet, associated with other common salt tolerant spp. Behind these on slightly higher ground, there is either *Isolepis nodosa* and *Euphorbia* or *Juncus kraussii* and *Baumea juncea*.

And according to Bradby and Newbey (1989), on the west side of Inlet there was; sedgeland, paperbark and shrubland slopes of *Acacia Cyclops* to 3m over very dense shrubland dominated by *Spyridium globulosum* and high incidence of introduced spp.

Vegetation change from 1988-2004 (Land Monitor) indicates that the fringing vegetation on the western side of the estuary was declining and improving on the eastern side. Hodgkin and Clark commented in the 1980s that campers have already seriously damaged paperbark trees on the estuary shores.

Hodgkin and Clark (1989) also reported that the aquatic plants were dominated by three salt-tolerant spp. A small green alga (*Polyphysa peniculus*) grows in shallow water throughout the Inlet, sometimes forming continuous cover both on sand and rock. Seagrass (*Ruppia megacarpa*) is sometimes abundant, even on the eastern shallows of Stokes Inlet when they are flooded, and it also grows in the riverine reaches of the estuary. A species of stonewort (*Lamprothamnium papulosum*) also grows in the shallows.

Phytoplankton samples have been collected more recently by the Department of Water (DoW) and results are included in the inlet condition report.

Although few studies have focused on invertebrates of Stokes Inlet, Hodgkins and Clark 1989, observed the presence of the copepod species, *Gladioferens imparipes* and *Acartia clausi* (?tranteri). Bottom fauna are predominately estuarine species tolerant of a wide range of salinities. Marine species maybe introduced into the Inlet when the sandbar breaks and in the past has included juvenile prawns (*Penaeus latisulcatus*), mussels (*Mytilus edulis*) and blue manner crab (*Portunus pelagicus*) and small jellyfish. These species often grow rapidly until they die in the retreating shallow water that evaporation has made too saline. Sometimes millions of small salt lake snails (*Coxiella*) that feed on microscopic plants on the salt flats while these are still moist.

DEC commented that there was limited information available and that this was an area where further work was needed.

A spreadsheet provided by DEC which is being used in their planning process listed a number of flora and fauna species that exist in or near the Park and included the Specially Protected Australian sea-lion (declared under the Wildlife Conservation Act), the Priority 4 (not considered threatened or in need of special protection but could be if present circumstances change) Kwoora, two P4 birds the Australian bustard and the Square tailed kite as well as a number species that are endemic to the south west of WA.

The spreadsheet also provided information on the conservation flora found in the Park, which includes:

- Eucalyptus preissiana subsp. Lobata (P4)
- Eucalyptus semiglobosa (P3)
- Leucopogon blepharolepis (P3)
- Lissanthe pleurandroides (P2)

Of the vegetation associations represented around the inlet only one has less than 50% of its pre-European extent remaining (Shepherd et al., 2002). The association consists of tallerack mallee-heath shrublands which are found mostly to the north of the Park.

Rare and Priority flora identified around the inlet identified from a DEC dataset (from 2002 include a Priority 2 Leucopogon pleurandroides found in the bay of Moir's Inlet, a Priority 3 Leucopogon blepharolepis found north of Fanny Cove and an unsubstantiated report of a declared rare Anigozanthos ~700m west of south camp.

Based on Salinity Investment Framework (SIF) analysis, it has been determined that of the top ten biodiversity assets at risk from salinity between the Ravensthorpe to Cape Arid agricultural zone, two fall within the Stokes Inlet catchment and are the Upper Lort River Corridor (3) and the Lower Young River Corridor (4) as they represent a major component of the states species assemblage richness within priority sub-catchment for the SCRIPT region.

Why have mussels declined in the Inlet?

There is no answer to this question. Some people suggest increased salinity but it may be a number of things related to water quality. As far as is known there has been no study into this question.

Is there a need for further mapping of vegetation/fauna values? In what areas?

As no information exists on either the flora or fauna at the Inlet since the late 1980's any biological survey at the Inlet would be valuable. Of particular interest would be a vegetation foreshore survey to determine the condition of the fringing zone and what impact future changes in recreation, water level and salinity may have on it. This is important as the foreshore provides an essential component of the aesthetic beauty of the Inlet and is most impacted by recreation on the western side of the Inlet. An aquatic invertebrate survey would be valuable to provide baseline information which may be used to assess the health of the system.

DEC commented that they could see benefit in implementing a survey around the estuary and up the two river corridors.

Recommendation 1: an assessment of the Inlet (and estuarine reaches of the rivers) foreshore vegetation to be undertaken to determine type, condition and optimal environmental conditions for the vegetation.

Recommendation 2: a survey of aquatic invertebrates to be completed for the inlet and estuarine reaches of the Young and Lort Rivers.

As recreational pressure is greatest along the foreshore near camping areas and near roads, have surveys of vegetation values been undertaken in these areas? Information below was provided by the Department of Environment and Conservation (DEC):

- The only survey of vegetation values that DEC is aware of in Stokes National Park is a biological survey report completed in September 1989 by Brenda Newby & Keith Bradby. This report covered both flora and fauna of Stokes National Park. The flora survey focused on 12 different sites on the northern & western edges of the inlet including areas close to South & Fisherman's Camp, Stokes Inlet Road & Young River Track.
- The primary aim of the survey was to "collect and present as much data as possible on the occurrence & distribution of vascular plants in the park." Some 456 species were identified during the survey, involving 68 plant families, therefore it can be concluded that this was a comprehensive survey.
- 9.3% of plant species were recorded as introduced.
- The survey concluded that whilst the bulk of the park was in a relatively natural state, some stock grazing had occurred.
- The Newby & Bradby survey made no attempt to evaluate flora species for rarity. *Anigozanthos bicolor* Subsp minor (small two coloured kangaroo paw) is the only endangered native plant mentioned. The report says the plant may be located south west of South Camp, approximately 900 meters from the inlet edge. There is some doubt regarding this – it was not formally identified but there is a reference to it occurring at that location.
- From the 1880s to the early 1970s this area was part of the Fanny Cove/ Young River leasehold land and as such was grazed intermittently by sheep & cattle. Clearing of the land to the north of the park boundary commenced in the 1960s & peaked in the early 1980s when Young River Station was being developed for broadscale grazing & cropping. The combined effects of grazing on the lease country, the near proximity of the developed Young River Station & more recent recreational infrastructure developments i.e. road & campsites on the western edge of Stokes Inlet, have seen a proliferation of weed species such as Bridal Creeper & African Love grass.
- The fire event of November 2006 that burnt out an area adjacent to the inlet resulted in most of the native vegetation & weed biomass being destroyed. Now, in March 2007 the native vegetation has barely started to recover but introduced weeds such as Bridal Creeper have thrived and are threatening to stifle any new native regrowth.
- To reassess and quantify any net loss or improvements in the flora, now may be an opportune time to revisit the Newby & Bradby work. The recent fire provides an opportunity to compare burnt and unburnt areas, and to monitor regrowth.

Recommendation 1, above, could cover the work mentioned above. Perhaps the foreshore vegetation survey could focus on the areas impacted by recreation (western side of the inlet) and the estuarine reaches of the Young and Lort Rivers.

What information is available on bird populations at the Inlet? (species, distribution and numbers)

From the literature review completed the following information was obtained: The DEC NatureBase website mentioned that at least 29 waterbirds species have been observed including large numbers of Australian shelduck, grey teal, little black cormorants, black swans and chestnut teal. Migratory species include the common sandpiper and red-capped plover. Australasian grebes, Australian pelicans, little pied cormorants, white-faced herons, great egrets and pied oystercatchers also visit the inlet. Records for the National Park list more than 50 species which are likely to use the Inlet.

Information from Birds Australia mentioned that Hooded Plovers were bathing, feeding and sheltering at the mouth of a creek entering the inlet. Bird lists for the Esperance Shire are available and include Stokes Inlet and a list for a ~20km radius from Stokes Inlet is available from the Atlas of Australian Birds (Birds Australia 1998-2004) and included 58 species in February 2007.

Information provided by the Esperance Bird Observers Group includes a list from a two hour survey carried out over a 500m section of the foreshore at the Inlet by the bird group in April 2005 and includes 33 species. Another list was provided which included bird data collected at the Inlet between 1998 and 2002. None of the above observations included bird counts and at this time none have been located.

Some of the bird species that seem to be of interest include Fairy Tern breeding pairs, Chestnut Teals and Carnaby's Cockatoo.

Is the Inlet an important breeding ground, feeding ground or habitat for birds? Inspection notes completed by a DEC officer noted that the Inlet provided important waterbird and waterfowl habitat, particularly on the riverine delta, mudflats, and shallows.

The Esperance Bird Observers Group response to this question is below: Without reservation this area is important to birds on all accounts. Bush birds recorded in the proximity of the inlet would be taking advantage of the food sources (insect activity associated with water) and strong vegetation (other food sources, cover and nesting). Water birds and Waders, of course, rely on the inlet for their food source and close vegetation provides resting and nest sites for some of the species.

With a diversity of 170 species recorded in this area it must be considered as important.

What can be done to enhance experience for bird watching? (eg bird hides)

The Esperance Bird Observers Group response below:

It would be desirable to have a walk path around the entire Inlet with rest points, information and hides at strategic sites. This would be of benefit to

others as well as bird watchers such as flora people and those looking for healthy exercise. On the eastern side of the Inlet there are wetlands that when the conditions are right accommodate many water birds and waders. Access to this area could be made easier.

DEC commented that this is an EDCRMP plan issue – this suggestion if deemed appropriate could be addressed via that mechanism.

Discussion point: developing bird hides around the Inlet. Perhaps incorporated into the walk trail?

What are the optimum environmental conditions (water levels etc) for birds at the Inlet?

The Esperance Bird Observers Group response is below:

It is assumed that the water levels are **unnaturally** high for long periods, due to land clearing producing excessive run off in the catchment areas. This has had the effect of reducing the beach and shallow feeding areas which are important to attract waders and some non-diving bottom feeding water birds to the Inlet.

High water levels in the surrounding vegetation for long periods has a devastating effect on the trees eventually killing them causing loss of habitat.

Providing another access to the beach and discontinuing the traffic along the Inlet shore line would also be beneficial to bird life in that area.

Discontinued use of powerboats on the Inlet would lower the disturbance factor on the water and the wake effect on the shore line. Maybe low powered electric boats allowable.

Discussion point: steering group to discuss the points above, which include the discontinued use of powerboats, closing the track along the western shoreline, maintaining the water level so it does not get too high.

Are starlings a threat to the Inlet? DEC commented that starlings did not pose a threat to the Inlet itself but certainly did to the surrounding environment including the National Park and farmland.

What are the optimal environmental conditions for health of the Inlets flora/fauna values (water level, sediment, salinity, nutrients etc)?

It is difficult to determine the optimum condition for all of the flora and fauna in the Inlet especially given the limited information available. DEC inspection notes made the comment that the natural assemblages of plants and animals found within the Inlet are adapted to the natural variability of the estuary's water chemistry and are probably unaffected by recent modifications brought on by land clearing, this should lead to long-term viability. This may well be the case provided the alteration in conditions is not too extreme.

It is however likely that the optimal environmental conditions for flora and fauna in the inlet are those that existed pre-clearing which would have included variable water and salinity levels.

What are key threats to the flora and fauna (ferals, weeds, salinity etc)? What is being done to manage these threats? and what can be done in the future?
The information below was provided by DEC:

Key Threats to Flora from Weeds

- Encroaching feral plants outcompete and smother native plants and provide abnormal fire fuel loadings so that fire events are more intense than natives are adapted to.
- Vectors for invading weeds include vehicles dropping mud and soil containing weed seeds. Birds carry in seed from infected areas. Winds blow seed in from neighbouring farming country. Creeks carry mud and soil in from outside the Park. Soil disturbance from recreation site and road building activities can allow weeds to establish before natives can re-colonize.
- Weeds which appear to be having the most detrimental effect on native flora values include, in order, Bridal Creeper, African Love Grass, Scotch Thistle, African Box Thorn & Victorian Tea Tree.
- Control methods for the above weeds usually involve opportunistic spraying or pulling. Bridal Creeper is by far the most prolific and widespread weed, and is tackled using the biological control methods of Rust and Aphids. In a two pronged attack over the last 5 years this has significantly reduced the bridal creeper infestations in Stokes to the point where native vegetation has regained dominance in what was originally some of the worst Bridal Creeper areas.
- The fire event of November 2006 unfortunately has swung the pendulum back in favour of the Bridal Creeper, which, if left unchecked will smother the emerging native vegetation and get a firm foothold once again. Preventive measures are being put into place to spray the emerging bridal creeper where possible. While this will not remove the bridal creeper totally, it will buy time (up to 6 months) for the native vegetation to get a start. In addition, the aphids and rust should begin to build up again with the onset of winter and higher humidity levels.
- Biological control of Bridal Creeper does work and will in time reduce this weed to low levels. From time to time chemical intervention will be required to help out the biological control methods. Bridal Creeper is unlikely to ever be totally eradicated from the Park.

Key Threats to Flora from Feral Animals

- The feral rabbit is the only feral animal causing harm to native flora in the Stokes Inlet area. Its population rises & falls with seasonal conditions. The population is kept in check by outbreaks of the Myxomatosis virus & to a lesser extent by Calicivirus which are both spread by mosquitoes.
- Invariably rabbit numbers rise rapidly after spring or summer rain events that cause a fresh flush of growth. This is usually followed by an equally rapid crash in rabbit numbers.
- Rabbit numbers are always at a level to cause damage to the native vegetation. The rabbits either focus on the native plants for food or don't consume feral plants at the same intensity, thus allowing the weeds to gain further advantage over the native flora.

- Baiting for rabbits using one shot 1080 oats has been used in the past along Stokes Inlet Road where it interfaces with the private property. This may have to be considered again as a method of rabbit control, particularly in the area affected by the recent fire event.

Key Threats to Flora from Salinity

- DEC has no knowledge about the effects of the extreme range of salinity that occurs in the inlet on estuarine plants. Salinity does not appear to be a major issue on terrestrial plants in the Park.
Rising ground water in some of the lower lying areas near the estuary appears to be the cause of some native vegetation deaths. Whether this is because the watertable is bringing up dissolved salts from below or it is just the fact that some of the native vegetation is unable to cope with waterlogging has yet to be ascertained. These vegetation deaths have been sampled for dieback but proved negative and other causes such as frost were also ruled out.
- A worthwhile project would be to install some bores around these low lying areas and monitor these areas for rising groundwater and salinity levels.

Key Threats to Flora from Large scale wildfire events

- As demonstrated recently, a large scale wildfire in long unburnt fuel has severe consequences, not only on the flora & fauna of the local area but also on infrastructure & cultural heritage values. This situation needs to be avoided in future. Prescribed burning will need to be introduced to break the area up into different fuel ages. (Planning was under way for this at the time of the fire)

Key Threats to Fauna

- The threats to native flora mentioned above will cause both indirect effects to native fauna in the form of loss of food & habitat, and direct effects of increased predation from feral animals such as cats & foxes.
- Since 1994 the National Park, including the estuary surrounds, has been the subject of a 1080 baiting program on a quarterly basis. This program has worked well on reducing the fox numbers, but with continual recruitment from areas outside the park where systematic baiting doesn't occur; there is an ongoing requirement for baiting within the Park.
- In light of the recent fire event and in line with DEC's Nature Conservation program it has been agreed that a monthly baiting program to enhance fox control in this area will be implemented.
- Unfortunately the current fox baits are not effective for feral cat control, so other methods have to be employed to control cat numbers. This in the past has revolved around trapping the animals in a humane trap and euthanizing them. This program of trapping has been stepped up since the fire and the increased sighting of feral cats in the area. It is intended that this program continue on an opportunistic basis, until the long awaited 1080 cat bait is made available for use in the park.

Is dieback a potential threat to the Park? How is it being managed?

The information below was provided by DEC.

- Dieback fungus in its various forms, including the introduced species *Phytophthora cinnamomi* (PC), poses the greatest threat to native vegetation in Stokes National Park. The primary vectors of introduction and movement through the landscape are from moist mud or soil containing the fungus being transported to a new location and then moved around in water and by root to root contact. If established in the Park it will be impossible to remove. The likely results will be a catastrophic impact on native flora species such as the Myrtaceae & Proteaceae species (which dominate the vegetation biomass of Stokes National Park).
- A number of sampling programs have been carried out at multiple sites where suspicious vegetation deaths have occurred and all have proven negative to PC. Therefore the area surrounding Stokes Inlet appears to have escaped the ravages of this plant disease. This does not guarantee that PC is completely absent from the area, but so far we have been unable to find it. There is an ongoing sampling program in place to opportunistically send vegetation samples away for testing whenever suspicious deaths of vegetation occur.
- Armillaria Root Rot Fungus and a windborne fungus, Aerial Canker (*Phytophthora megasperma*) have been recorded in other parts of the park & adjacent nature reserves but not in the Stokes Inlet area. These diseases have an impact but are native to the landscape so not as potentially devastating as PC.
- To reduce the risk of PC being introduced into the landscape all operations are carefully evaluated for potential dieback disease impact, and all operations are undertaken with strict hygiene practices, viz: vehicles and equipment are washed down before being used in the PC free areas and any road base material sites such as gravel quarry's are pre tested to determine their PC status before using the gravel in the park on roads or walk trails.

Is there a resource condition target that can be used relating to the natural environment? DEC commented that this is an EDCRMP plan issue.

Not sure, this will need to be discussed further.

What recommendations should be included in the management plan to safeguard or enhance the natural environment?

DEC commented that a foreshore survey of the inlet should be conducted to identify flora communities and species, report on the health of these and identify impacts. The remaining recommendations and discussion points are listed below.

Actions for Draft Management Plan

- Complete a habitat survey for the estuary.
- A vegetation foreshore condition assessment should be completed for the Inlet and estuarine reaches of the rivers to determine type, condition, weed invasion and optimal environmental conditions for the vegetation. The survey could focus on the areas impacted by recreation (western side of the inlet) and the estuarine reaches of the Young and Lort Rivers.
- A survey of aquatic invertebrates should be completed for the inlet and estuarine reaches of the Young and Lort Rivers to determine presence, diversity and temporal variation.
- A survey of the birds should be completed for the Inlet including their required habitats and any threats to these.
- Bird observers should be considered during the planning of additional walking trails and look out points in the Park and be catered for, perhaps through a bird hide.

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