

WILSON INLET NUTRIENT REDUCTION ACTION PLAN



SUMMARY DOCUMENT

PREPARED FOR

**WATER AND RIVERS COMMISSION
WILSON INLET CATCHMENT COMMITTEE
WILSON INLET MANAGEMENT ADVISORY GROUP**

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The Wilson Inlet Nutrient Reduction Action Plan was prepared by a Steering Group comprising representatives from the Wilson Inlet Management Authority, Wilson Inlet Management Advisory Committee, Water and Rivers Commission, Department of Agriculture, Wilson Inlet Catchment Committee and Shire of Denmark.

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Jean Webb and Geoff Evans, **Wilson Inlet Catchment Committee**
Simon Neville, **Ecotones**
Graham Wright, **Water Corporation**
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Abbreviations used in this document

DA:	Department of Agriculture and Food WA
WRC:	Department of Water
DPI:	Department of Planning and Infrastructure
Fisheries:	Department of Fisheries
LGA:	Local Government Authority
WC:	Water Corporation
WICC:	Wilson Inlet Catchment Committee
WIMAG:	Wilson Inlet Management Advisory Group

Further Details

Comments are invited on the plan. Comments or further enquires should be directed to the Water and Rivers Commission, at 55 Strickland Street, PO Box 353, Denmark WA 6333 or by telephoning 98481866.

Collaborative Support

The following groups and agencies endorse this plan, and will continue to work cooperatively to implement its actions as a means of improving the condition of Wilson Inlet.

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Summary

The overall objective of this Action Plan is to reduce algae coverage in the Inlet, through a 5 year program of nutrient reduction.

The Wilson Inlet Action Plan takes a pragmatic approach. Its focus is on work that has the greatest level of community support and likelihood of implementation, and that provides the best environmental benefits for the resources used. Should the condition of the Inlet not be sufficiently improved by this work, then the community and agencies are in a better position in the future to examine other work or alternative strategies that may have greater risks and costs attached.

1. Wilson Inlet: A Place of Beauty and Concern

Wilson Inlet is a place of beauty, highly valued by visitors and local residents alike. Surveys have shown it is appreciated most for its natural beauty, recreational opportunities and fishing.

However, the same surveys have shown the condition of the Inlet is a matter of concern. Once white sandy areas are at times covered with algae, and the Inlet's seabed has areas of black ooze. Decaying algae also gets washed up on sections of the Inlet's shoreline, and the stench of rotting algae causes offence to foreshore users and residents. Boating access can be difficult with the algal growth.

Compared with many other waterways Wilson Inlet is still in good condition. However, there is a concern the Inlet's condition could deteriorate and further reduce its value to the community.

Surveys have shown the community's vision for Wilson Inlet is for its unique natural beauty to be maintained, with clean water, controls on development and pollution, with opportunities for recreational use and fishing, and for the Inlet to be set within a prosperous catchment. This Action Plan has been guided by this vision.

2. Options for Management

There is general agreement that the cause of the excess algae is nutrient inputs, particularly from agricultural areas. There is less agreement on what should be done to improve the condition of the Inlet.

Over the past 10 years various options have been put forward by sections of the community to address the Inlet's problems. Changing the location of the sandbar's opening (which is artificially breached each year), the dredging of major channels through the sand delta at the mouth of the Inlet, and the construction of a permanent opening to the Southern Ocean, have all been put forward as solutions to the Inlet's environmental condition.

Each of these proposals have been put forward as a means of 'flushing' out the build-up of algae from the Inlet, by increasing water exchange between the Inlet and ocean.

Community support for each of these options is divided. Studies have questioned the environmental benefits of major channels, as water exchange is more altered by rainfall and tides than likely by dredged channels, and dredging is costly to implement and maintain. A permanent channel would achieve substantial exchange of Inlet and ocean water, but is costly, has environmental risks and would transform the nature of the Inlet. The major works appear at odds with the natural beauty so valued by the community.

For the long-term none of these options can be entirely dismissed. A deteriorating Inlet condition may, subject to community support and agreement, necessitate the high cost and risk of undertaking such options.

The latest research indicates there is hope for the Inlet without resorting to major engineering solutions. Reductions in nutrient inputs, particularly phosphorus, could lead to a decline in algae coverage within a period of a few years. The challenge is whether these nutrient reductions can be achieved.

While a return to pristine conditions would seem impractical, a reduction in acceptable levels of algae is considered a realistic goal that satisfies the community's expectations of both the Inlet and its catchment.

3. The Favoured Option: Nutrient Reduction

Nutrient reduction is the favoured option for improving the condition of the Wilson Inlet over the next 5 years. By tackling nutrient inputs the cause of the algal growth is being addressed, whereas other options are only tackling the symptoms. Reducing nutrients will not impair but only add to the Inlet’s natural beauty. It provides the option with the greatest level of community support. It is the only option that guarantees “action on the ground” in the short term.

Although there has been commendable work done to date on nutrient reduction, the scale of this has not been sufficient to make a noticeable difference to the condition of the Inlet. Indeed, evidence suggests nutrient inputs to the Inlet may be rising. What is required is a plan of action that extends the work of all parties, attracts greater funding and aims for a big enough reduction to make a difference. The Wilson Inlet Nutrient Reduction Plan aims to achieve this.

It is recognised the community’s vision for the Inlet and the protection of its values cannot be solely addressed through a nutrient reduction plan. Other strategies and plans will need to be used. The following table shows the benefits of a nutrient reduction plan, and how it complements other existing plans.

3.1 SCOPE OF WILSON INLET NUTRIENT REDUCTION ACTION PLAN

Community values for Inlet	Potential threats to values	How threats can be managed.
Natural beauty of Inlet and foreshore.	Algal growth and decay. Destruction of fringing vegetation. Unplanned development of aquaculture. Inappropriate design/siting of development on foreshore.	Nutrient Reduction Action Plan. Foreshore Management Plan. Aquaculture Development Plan. Town Planning Scheme/ Foreshore Management Plan.
Recreational use – boating, swimming, bird-watching, walking.	Obstruction on boating access due to algal growth. Smell of rotting algae. Uncontrolled recreational use. Inadequate recreational facilities. Inappropriate development restricting access/enjoyment.	Nutrient Reduction Action Plan. Nutrient Reduction Action Plan. Foreshore Management Plans. Foreshore Management Plans. Town Planning Scheme.
Fishing Commercial/Recreational	Over-fishing. Anoxic water conditions or toxic algal blooms. Excessive algae restricting hauling of nets/boat access.	South Coast Estuarine Fishery Policy/Recreational bag limits. Nutrient Reduction Action Plan. Nutrient Reduction Action Plan.

4. Implementing the Nutrient Reduction Plan

The actions in the plan have been developed after extensive consultation. Each has a measurable outcome, time period for implementation and lead agency named, so that progress can be monitored.

The actions are not easy, or have a guarantee of success. They have been set at a level to stretch the capabilities of landowners, agencies and groups, because only in that way will the maximum reduction in nutrients be achieved.

Each year an operational plan will be prepared, detailing the work to be implemented that year. Annual reports on achievements will be reported to the community and the Shire of Denmark.

The Action Plan's implementation will be overseen by the Water and Rivers Commission, and the two community organisations responsible for managing the Inlet and catchment, the Wilson Inlet Management Advisory Group and the Wilson Inlet Catchment Committee.

5. Measuring Performance

As it has been impossible to predict the percentage reduction in nutrients required to achieve the desired level of algae reduction, the Action Plan has to be flexible and be combined with monitoring of the Inlet's condition. Monitoring will also gauge whether nutrient inputs to the Inlet are reducing or increasing.

Increasing trends in nutrient inputs or deterioration in the Inlet's condition will lead to a review of the Action Plan, and further consideration of other options. A review of the Plan will in any case occur after 5 years, to ensure the Plan is kept up to date and maximum effort is being made on nutrient reduction.

Targets will be set for each Action in the plan. In addition, some overall targets have been developed to judge the longer term performance of the plan. These are as shown in the following table.

Target	How measured	Agency Responsible	Target date
Reduction in average nitrogen and phosphorus concentrations from Sunny Glen, Cuppup, and Sleeman to achieve downward trend.	Monitoring of nutrient concentrations at bottom of catchments. Use of target concentrations	WRC	2010
All Water Corporation drains fenced to prevent livestock access	Inspection and mapping	WC/WICC	2007
30% increase in fencing of Sleeman and Cuppup Rivers	Comparison with 1999 Survey	WICC	2007
All licensed premises to be in compliance with nutrient management conditions	Annual audit	WRC	2005
Inlet floodplain to be incorporated into land use planning guidance	Review of Local Planning Strategies and Schemes	DPI/LGA's	2005

The target of the plan is to achieve a reduction of algae and ultimately the success of the actions contained in the plan will be best judged by longer term changes in the abundance of algae in the Inlet.

6. SUMMARY OF ACTIONS

The Action Plan identifies three necessary strategies to improve the condition of Wilson Inlet. These are:

A) Reducing nutrients from the catchment

Nutrient inputs need to be reduced from all sources, urban and rural, with an emphasis on the main sources and where the greatest reductions can be achieved with the available resources. Unless nutrient levels are reduced from all sources there is a real risk excess macroalgal growth will continue and phytoplankton blooms may become worse in terms of amount and distribution. Reducing nutrient inputs should bring about a reduction in algae growth.

B) Managing the Inlet to maximise nutrient processing and export.

It is considered that the Inlet's ability to process and export nutrients will be assisted by controlling development in the Inlet's floodplain, encourage revegetation of this floodplain, maximising Inlet water levels, and providing consistent bar opening locations.

C) Monitoring and reporting to guide the effectiveness of management.

Better information is needed to determine the impacts of certain land uses, and to judge the effectiveness of management methods. Monitoring is needed to determine whether the Inlet's condition is improving or worsening.

A. Reducing Nutrients from the Catchment

(i) Intensive Rural Land Uses

Intensive rural land uses includes intensive animal husbandry (such as dairies, feedlots and piggeries) and horticulture (including vineyards and potato growing). At the time of preparing this plan (2002) there were 4 dairies and 1 piggery in the catchment, several hundred hectares of vines and approximately 100 hectares of potatoes. Although limited in size and number, these operations can produce considerable amounts of nutrients, yet little information presently exists on current management practices and their impact on nutrient export rates.

Action IR 1: New intensive rural land use activities should only be located in areas where nutrient export can be effectively managed. Intensive rural land uses with the potential to export significant levels of nutrients should require approval under Town Planning Schemes. Approval should not be provided where nutrient export cannot be managed (eg flood risk areas, land with low Phosphorus Retention Index). Mapping of land with a low capability to retain nutrients to be undertaken and provided to local government authorities. The mapping of Agricultural Priority Areas in Local Planning Strategies should have regard for nutrient export.

Lead agencies-DPI, LGA's, DA, WRC.

Time period- ongoing.

Measurable outcome/s-Policies included in updated Town Planning Strategies.
Map of low capability land provided to 3 local government authorities.

Action IR 2: Applications for intensive rural land use activities should consider nutrient export and demonstrate how this will be effectively managed. Applications should demonstrate compliance with available and endorsed Industry Codes of Practice. Nutrient and Irrigation Management Plans should be prepared with advice from WRC. All new applications will be expected to provide no net nutrient inputs to waterways.

Lead agency LGA's, WRC

Time period – ongoing.

Measurable outcome/s-All new developments to be compliant with Codes of Practice

Action IR3: Existing intensive rural land use activities need to be mapped, existing nutrient and waste management methods documented and where practical improved. Confirmation of locations and management practices for intensive animal husbandry and horticulture to be undertaken immediately. Management plans need to be developed for sites with the greatest risk of nutrient loss, and partnerships with the industry promoted to access funds, technical help and reduce risk of nutrient export.

Lead Agency – WICC, Industry, DA, WRC,

Time Period– 2 years.

Measurable outcome/s-Digital mapping of horticultural areas, piggeries and dairies completed. Plans prepared for priority sites. Works undertaken to reduce nutrient loss on at least 3 sites.

Action IR4: Monitoring of intensive rural land use activities to be undertaken to determine nutrient hazard. Priority land use to be monitored is potato cultivation. Monitoring to be developed and implemented with industry.

Lead Agency-Industry, WRC, DA

Time Period- 2 years

Measurable outcome/s- Report on water quality as consequence of potato production presented to Wilson Inlet Catchment Committee and affected landowners

(ii) Drainage Management

The Lake Sadie, Cuppup and Sleeman drainage networks have catchments that have the highest level of nutrient export (per hectare) in the Wilson Inlet catchment. The proximity to the Inlet, the level of inundation, type of land use and drainage design all contribute to higher levels of nutrient export. The drains are managed by Water Corporation or are in private ownership. The Water Corporation has a responsibility to ensure flooding does not adversely impact landowners.

Action DM1: New drains connecting into the Water Corporation's drainage network should be designed to minimise the risk of nutrient and sediment export. Water Corporation have approval powers for all new drains connected to their drainage network. This approval will only be given for drains designed to minimise nutrient and sediment export. As a minimum this will require fencing and vegetation of the proposed drain.

Lead Agency-WC

Time Period – ongoing.

Measurable Outcome/s- All new drains connecting to WC drainage channels to be fenced and vegetated.

Action DM2: Examine how environmental considerations can be incorporated into the management of water levels in the Albany Drainage District. Presently there is only a statutory obligation for the Water Corporation to consider the interests of landowners affected by flooding in the design, management and operations of the drainage network. This needs to be reviewed to consider incorporation of environmental considerations. As an example, the operating licence may enable changes in water level if agreements are reached with landowners.

Lead Agency-WC, WRC.

Time Period-2 years.

Measurable Outcome/s-Written advice provided on how environmental considerations can be included in operating licence, and implemented.

Action DM3: Existing Water Corporation managed drains to be slashed rather than sprayed for vegetation control, where not cost prohibitive. Ideally, vegetation control should be by slashing only, rather than sprays that could encourage destabilisation of banks. Consideration to be given to allowing native vegetation to grow unrestricted on one side of drainage reserve, where practical. Review of procedures to begin immediately.

Lead Agency-WC

Time Period- ongoing.

Measurable Outcome/s-Kilometres of drainage reserves slashed rather than sprayed.

Action DM4: Fencing and planting of native vegetation to be promoted alongside private and Water Corporation drains. Priorities to be guided by existing foreshore surveys. Surveys to be completed for remaining drains. It is realistic to expect stock exclusion from Water Corporation drainage reserves within 5 years.

Lead Agency-WC, WRC, landowners.

Time Period – 5 years

Measurable Outcome/s- Kilometres of fenced drainage reserves.

Action DM5: Best Management Practices to be incorporated into drainage network to reduce sediment and nutrient export. Constructed wetlands, re-contouring and riffle work has been recently completed at demonstration sites. These need to be maintained, and further sites identified to trial methods of minimising nutrient transportation. Priority works and sites need to be identified and endorsed. A program of 2/3 sites a year is suggested, for a 5 year program.

Lead Agency- WC, WRC

Time Period – 5 years.

Measurable Outcome/s-number of best management practices (eg riffle work) constructed in drainage channels.

Action DM6: Monitoring to be undertaken to determine effectiveness of best management practices for drains. Monitoring to determine effectiveness of new management practices, with initial focus on riffle work and wetlands. Monitoring to include sediment removal, maintenance costs, photographic records.

Lead Agency-WRC, WC.

Time Period-5 years.

Measurable Outcome/s-Reports detailing nutrient removal achieved from wetland, sediment removal from riffle works.

(iii) Rural Catchment Management

Broadacre farming plays an important role in nutrient discharge to the Inlet. There is a need to develop more environmentally sustainable farming systems, including grazing.

Fertiliser Management

Department of Agriculture research has identified how large numbers of fertiliser applications are made independently of soil test results, increasing the risk of incorrect applications and possible wastage. Apparent improvement in pasture may be the result of sulphur in superphosphate. Very little is known of fertiliser use and management, except that it is influenced by the economics of specific agricultural enterprises.

Action FM1: Undertake assessment of current fertiliser use and management. Use questionnaire to examine use and factors influencing use.

Lead Agency-WICC, DA.

Time Period-2 years.

Measurable Outcome/s- Report detailing results of survey presented to WICC.

Action FM2: Conduct extension programme to promote ‘best practice’ fertiliser management. Encourage soil testing prior to application, through targeted soil testing. Provision of advice on suitable type and timing of fertiliser application to promote land capability and productivity components.

Lead Agency-DA

Time Period-2 years

Measurable Outcome/s-Number of farmers advised on ‘best practice’ fertiliser management.

Action FM3: Organise workshops to discuss uptake of ‘best practice’ fertiliser management. Workshops to include fertiliser companies, catchment groups and agencies. Barriers to uptake of ‘best practice’ to be determined and initiatives to be put forward that may tackle these barriers.

Lead Agency-WICC,

Time Period -2 years.

Measurable Outcome/s-Workshop held and lessons learnt provided to landowners by WICC.

Stream Rehabilitation and vegetation protection

Riparian vegetation can provide a valuable nutrient filter, bank stabilisation as well as habitat. Surveys have shown riparian vegetation has been lost or degraded for many of the catchment's creeks. Damage by livestock is a particular concern, as livestock can destabilise banks and deposit waste in streams. Subdivision, with fencelines, firebreaks and vehicle access can lead to a loss of riparian vegetation if inappropriately located. Financial incentives have been used in the past to encourage fencing of stream vegetation. To date fencing and revegetation has concentrated on larger streams rather than the smaller, occasional flowing streams, yet the latter may have a greater impact on managing nutrients than the former. Research indicates nitrogen export can be reduced by a third through riparian vegetation restoration, and sediment transportation can be reduced by 90%. Loss of remnant vegetation can lead to increased catchment discharge rates, erosion and sediment transportation into rivers and the Inlet.

Action SR1: Continue to implement existing stream foreshore survey report's recommendations and undertake new surveys for priority sub-catchments.

New surveys to include first and second order streams.

Lead Agency-WICC, catchment groups, WRC.

Time Period-3 years.

Measurable Outcome/s-Review of foreshore survey recommendations undertaken and incomplete works described in report. New surveys completed.

Action SR2: Continue to fence and rehabilitate stream foreshores. Priority areas include Sunny Glen Creek, Sleeman River and first and second order streams. Replanting and alternative watering points to be funded with fencing. Long term funding, using more diverse range of sources and sponsorship, to be provided as a matter of urgency.

Lead Agency-Catchment groups, WICC, WRC, LGA's

Time Period – ongoing.

Measurable Outcome/s- Kilometres of watercourse fenced/revegetated along Sunny Glen Creek, Sleeman River and first and second order creeks.

Action SR3: Fencing and rehabilitation of streams to be encouraged as a condition of Rural and Special Rural subdivision. New lots should be aligned to assist in the protection and rehabilitation of creeklines. A condition of subdivision should be the fencing of riparian vegetation, where appropriate.

Lead Agency-DPI, WRC

Time Period– ongoing.

Measurable Outcome/s- Kilometres of fencing implemented as condition of subdivision.

Action SR4: River restoration projects to be recorded, mapped and reported to the community. Fencing and restoration projects need to be mapped and maintained in a Geographical Information System. Photographic records of sites need to be kept, and sites revisited to audit performance.

Lead Agency-WICC, WRC

Time Period – ongoing.

Measurable Outcome/s- All river restoration sites to be digitally mapped.

Action SR5: Proposals for native vegetation clearing in the Wilson Inlet catchment to be assessed with consideration of their potential impacts on Wilson Inlet, within the context of legislation and guidelines. The extent this can be applied is dependant on legislation that is presently being revised. Opportunities may exist for planting of similar areas nearby to balance impacts of any approved clearing.
Lead Agency- Dependant on legislation review at present.
Time Period-Ongoing.
Measurable Outcome/s- All clearing assessments undertaken in catchment to include consideration of impact on Inlet.

Water Management

Water drained from rural properties can pick up nutrients and sediment, and transport these directly into streams. Agroforestry, dams or vegetated swales can all reduce water flows into streams. Aquaculture in streams can directly diminish water quality through feed wastage and faeces.

Action WM1: Support proposals that demonstrate an ability to retain water on rural properties, and which are consistent with other environmental objectives. Promote Farm Water Grants Scheme in catchment. Use best practice demonstration sites and field tours to disseminate knowledge.
Lead Agency-DA, WICC, WRC
Time Period – ongoing.
Measurable Outcome/s- Percentage of landowners aware of Farm Water Grants.

Action WM2: Ensure aquaculture ponds are located ‘off-stream’, out of a stream channel and floodway. Through Planning Approval and Fisheries licencing, aquaculture ponds can be required to locate away from stream and floodwaters. Fisheries and Water and Rivers Commission policy is to generally not support aquaculture proposals located in-stream. Best practice management methods to be developed for location and design of aquaculture ponds and macrophyte ponds for water treatment.
Lead Agency-Fisheries, WRC, LGA
Time Period- ongoing.
Measurable Outcome/s- Number of new aquaculture developments located ‘off-stream’ and out of channel-floodway. Guidance note on macrophyte prepared for proponents.

Perennial Pasture

Perennial pasture can provide greater soil stability, and reduce erosion and nutrient loss. Perennial pasture can lead to significant decreases in nitrogen loss, yet also provide productivity gains. Annual pastures currently cover a third of the catchment, and modelling suggests it provides two thirds of the nutrients entering the Inlet.

Action PP1: Promote perennial pasture in targeted areas. Seek funding to provide free seed to targeted landowners. Priority areas at a sub-catchment scale to be determined by Department of Agriculture research on nutrient ‘hot spots’ and management. Perennial pasture to be promoted alongside first and second order creeks as an alternative to annuals.
Lead Agency-WICC, DA.
Time Period – ongoing.

Measurable Outcome- Hectares of annual converted to perennial pasture due to provision of free seed.

Catchment Support

The Wilson Inlet Catchment Committee manages many landcare initiatives in the Wilson Inlet catchment, and employs two part-time Federal Government funded Catchment Coordinators that successfully implement on ground works. Natural resource management groups, as well as individual landowners, also implement landcare initiatives using funds from a range of sources.

Action CP1: Provide support for catchment groups working on implementation of this Action Plan. Maintaining a Catchment Coordinator is a priority, as is the establishment of sub-catchment groups for the Sunny Glen, Sleeman, Cuppup and Scotsdale River catchments. Seek funding to maintain the catchment coordinator positions and the group activities.

Lead Agency-WICC, WRC, DA.

Time Period – Ongoing.

Measurable Outcome/s- Active catchment groups for catchment and for Sleeman/Cuppup area..

Action CP2: Lobby for external funds to implement catchment works recommended in the Action Plan. Make joint applications for funding, to assist catchment groups in delivering recommendations of the Action Plan.

Lead Agency-WICC, WRC, DA

Time Period - ongoing.

Measurable Outcome/s- Number of applications made and sum of additional funds obtained.

Action CP3: Undertake educational activities to improve community understanding of the Wilson Inlet catchment, nutrient sources and their management. Undertake field tours, exhibitions and promote activities that bring together upper and lower catchment communities.

Lead Agency-WICC, WRC.

Time Period – ongoing.

Measurable Outcome- Number of exhibition or field tours organised involving upper/lower catchment.

Action CP4: Use signage on major transport routes to identify the Wilson Inlet Catchment. Signs to link catchment to Inlet, and importance of landcare.

Lead Agency -WICC, WRC.

Time Period -2 years.

Measurable Outcome/s-Signage installed on major highways at catchment boundary.

(iv) Urban Sources

The urban area of Denmark townsite occupies only 0.1% of the Inlet's catchment, and probably contributes only a small percentage of nutrients. Little measured information exists on real nutrient loss, although per hectare this loss is likely to be greater than general rural areas, and may affect nearby Inlet areas. Septic tanks, urban stormwater and landfill are the main urban sources of nutrients, but urban development can also lead to loss of remnant and riparian vegetation, so changing stream hydrology and increasing erosion and nutrient loss.

- Action US1: Domestic on-site effluent disposal to be compatible with Department of Environmental Protection guidelines.** These guidelines relate to set-backs from streams and density of units. The guidelines should be noted in proposed Scheme Amendments and subdivisions and compliance confirmed. Failure to meet these guidelines will be used to recommend refusal of the proposal.
Lead Agency-LGA, DPI, WRC.
Time Period-ongoing.
Measurable Outcome/s- Number of new domestic effluent waste systems complying or not complying with guidelines.
- Action US2: Generally, new residential development will be expected to connect to sewer, and should be located to accommodate this requirement.**
Lead Agency-LGA, DPI, WRC.
Time Period – ongoing.
Measurable Outcome/s- New residential development connected to sewer.
- Action US3: Reticulated sewer should service urban areas presently utilising on site effluent disposal systems in close proximity to Wilson Inlet.** Areas such as Weedon Hill, Minsterley Road, Inlet Drive and area east of Denmark River to be given a high priority in the Government’s Sewer Infill Program.
Lead Agency-WC, DPI, Shire of Denmark
Time Period-5 years
Measurable Outcome/s- Reticulated sewer provided to targeted areas.
- Action US4: Educational material to be provided highlighting the importance of urban stormwater and its impact on Wilson Inlet.** Leaflets, letters, stencilling of drain grates along Strickland Street are means of communicating the role of urban stormwater.
Lead Agency-Shire of Denmark, WRC.
Time Period – 1 year.
Measurable Outcome/s- Stencilling of drains on Strickland Street undertaken.
- ActionUS5: Urban stormwater best management practice to be promoted.** New development will be expected to comply with the Water and Rivers Commission’s urban water sensitive design manual. Major developments should prepare stormwater management plans as a condition of Scheme Amendment, subdivision or development. Retrofitting of existing urban drains, such as with the use of constructed wetlands, needs to be promoted through funding applications. Direct discharge of stormwater to the Inlet or rivers will generally not be supported for new development.
Lead Agency-LGA, DPI, WRC.
Time Period – ongoing.
Measurable Outcome/s- Number of stormwater plans prepared for major developments.
- ActionUS6: Generally, future urban areas should be located so as to minimise the clearing of native remnant and riparian vegetation.** The existence of native vegetation should be identified and considered when future urban areas are identified in Planning Strategies, Structure Plans or Scheme Amendments. Development should be set-back from riparian vegetation, consistent with WRC guidelines. Management of foreshore areas should be undertaken in a manner sympathetic to riparian vegetation protection.
Lead Agency-LGA, DPI, WRC.
Time Period – ongoing.

Measurable Outcome/s- Areas of remnant vegetation identified in all new Local Planning Strategies. Policies in Strategies promoting protection of remnant vegetation.

Action US7: Rural Residential development should be sited and designed to reduce the potential of nutrient loss. Scheme provisions will be required to protect existing vegetation, fence and rehabilitate streamlines, manage stormwater and effluent management, set-back development from streams and manage nutrient sources eg horticulture.

Lead Agency-LGA, WRC, DPI

Time Period – ongoing.

Measurable Outcome/s-Land capability study undertaken for each new Rural Residential development.

B. Managing the Inlet to Maximise Nutrient Processing and Export

(i) Protecting and Re-establishing the Inlet's Floodplain

An estuary's floodplain is important in assimilating nutrients. Naturally the Wilson Inlet floodplain would have been extensive, covering land to over 2m AHD. Artificial breaching of the sandbar has lowered Inlet levels and reduced the size of the floodplain. The present floodplain has development and land uses that are not compatible with nutrient assimilation. Potato cultivation in particular has the potential to export significant concentrations of nutrients to the Inlet. Little knowledge exists of the impacts of land uses in the present floodplain, or even the extent of the floodplain. The Shire of Denmark has a Town Planning Scheme Provision controlling development below 2.5m AHD, but no similar provision exists for the City of Albany which contains the majority of the Inlet's floodplain.

Action IF1: The Wilson Inlet floodplain to be mapped. The floodplain should include land subject to inundation at present bar opening levels (approximately 1m AHD), and extended to take into account possible higher bar opening levels. Floodplain mapping between 1m and 2.5m AHD is recommended to guide future management and land use decisions.

Lead Agency-WRC, WIMAG, WC.

Time Period – 1 year.

Measurable Outcome/s- Map produced of floodplain for intervals of 1-2.5m AHD.

Action IF2: Land use planning strategies and approvals to recognise the importance of the Wilson Inlet floodplain, and ensure future development is compatible with conservation of the Inlet. New development should only be permitted within the floodplain if it can demonstrate no increase in nutrients will occur, and the development is compatible with nutrient assimilation. Clearing of native vegetation within the floodplain should generally not be permitted. The floodplain should be shown as a Special Control Area within the Regional and Local Planning Strategies, and Town Planning Schemes provisions used to ensure new development meets these objectives. The Shire of Denmark's general restriction on development of land up to 2.5m AHD should be adopted in the City of Albany.

Lead Agency-LGA's, DPI, WRC.

Time Period – ongoing.

Measurable Outcome/s- New Shire of Denmark's and City of Albany's Local Planning Strategies and Planning Schemes to contain Special Control Area for Inlet floodplain.

Action IF3: Undertake monitoring to determine nutrient export from land uses in the Wilson Inlet floodplain. Land uses need to be mapped and risk of nutrient release documented. Monitoring to establish significance of individual land uses, with a priority being potato farming. Monitoring to be undertaken with the industry. Modelling to be used where measurement impractical.

Lead Agency-Industry, WRC.

Time Period – 3 years.

Measurable Outcome/s- Report on nutrient loss from different landuses in floodplain to be prepared.

Action IF4: In partnership with landowners undertake works to minimise nutrient export from existing land uses in the Wilson Inlet floodplain. Management plans and corrective work to be undertaken in partnership with industry and landowners. Potato cultivation is considered a high priority for consideration of changes in management practices. Options to be explored include raising of levee banks, soil testing and amended fertiliser application, environmental conditions on cropping lease on Crown land or non-renewal of lease, and possibility of land acquisition through Regional Planning Scheme.

Lead Agency-Industry, WRC, WIMAG, WICC.

Time Period-3 years.

Measurable Outcome/s- changes to farming practices. Area of floodplain with new landuse with less risk of nutrient loss.

Action IF5: Encourage protection and enhancement of the Inlet's fringing and floodplain native vegetation. Protection to be enabled through implementation of State clearing controls and through local government development approval process. Rehabilitation to be encouraged by education and grant assistance to landowners.

Lead Agency-WRC, LGA, landowners.

Time Period-ongoing.

Measurable Outcome/s- Increased area of native vegetation in floodplain.

(ii) Maximising Water Levels in the Inlet

The Water Corporation artificially breaches the sand bar when the Inlet reaches approximately 1m AHD. Under the Rural Land Drainage Act the Water Corporation has a responsibility to ensure landowners are not unreasonably affected by flooding. Higher water levels may impact on landowners and existing development, but the impacts are not quantified. Naturally, Inlet levels would have reached above 2m AHD before breaching of sandbar. Higher water levels may encourage better scouring of channels and removal of sediment from the Inlet.

Action WL1: Identify impediments to maintaining and increasing water levels in Wilson Inlet, and provide costs and benefits of removing these impediments. It is suggested that this exercise be undertaken for water levels up to 1.5m AHD, to determine the practicality of increasing Inlet levels. This information to be presented to WIMG and LGA's.

Lead Agency – WRC, WC, WIMAG, LGA's.

Time Period – 2 years.

Measureable Outcome/s- Report on landuses in floodplain at various levels, and costs of removing barriers to increased water levels.

Action WL2: Increase height of levee banks to ensure timing of potato sowing does not require early opening of sandbar. Potato sowing was initially a major justification for a planned early opening of the sandbar in 2001. Such circumstances may occur again and can be avoided through raising levee bank heights. The main levee bank is also a local road.

Lead Agency-Industry, City of Albany.

Time Period – 2 years.

Measurable Outcome-Levee bank constructed or increased in height.

(iii) Location of Sandbar Openings

Artificial breaching of the sandbar has occurred in various locations, with most recent openings located within 100m of the western cliffs. Research indicates bar opening location has no overall impact on Inlet condition, but there is evidence to suggest consistent bar openings assist in establishing and scouring defined channels in the Inlet. There is most community support for a 'western' opening.

Action SO1: Continue to artificially breach the sandbar within 100m of the western cliffs.

Exact location to be determined through site inspection, in agreement with Water Corporation and Wilson Inlet Management Advisory Group.

Lead Agency-WC, WIMAG, WRC.

Time Period - ongoing.

Measurable Outcome/s- Artificial breachings of Inlet sand bar to be within 100m of western cliffs.

(iv) Dredging of Channels through Inlet delta

Various proposals for dredged channels have been put forward to 'flush' Wilson Inlet, to reduce nutrient and sediment build-up, or restore historical channels in the Inlet. Most significant is the proposal put forward by the Wilson Inlet Restoration Group in 1994 for a channel from Poddyshot to the sandbar.

Research managed by the Water and Rivers Commission indicates most nutrients are not lost through the sandbar, but are taken up in seagrass, algae or sediment, or lost through a variety of processes to the atmosphere. Seawater intrusion varies greatly from year to year, based on natural processes including sea level, magnitude of astronomical and barometric tides and amount of river flow. These natural processes provide greater variation in water exchange than can be achieved through any dredged channel.

Hydraulic modelling has indicated minor dredging of the Inlet's existing delta, at key 'pinch points', would provide the greatest increase in water exchange for the lowest cost and allow the risks to be managed. The Wilson Inlet Management Authority, Shire of Denmark and Water and Rivers Commission, have already supported such works in principle. Such work could be used to evaluate the benefits of future dredging.

Any dredging has financial costs associated with it and has a risk of environmental damage. There is a presumption against dredging of estuaries without benefits being demonstrated.

In light of the research findings, the Water and Rivers Commission is presently not supportive of major channels as a means of reducing nutrients in Wilson Inlet. Community support is divided on the need for dredging or any particular dredging option.

Action DC1: Dredging in Wilson Inlet to enhance water flow and water quality to be limited to works to the existing channel.

Such works to be guided by the hydraulic modelling undertaken. A survey of the channel needs to be undertaken prior to any dredging, to establish whether deepening is already occurring as a consequence of recent regular western openings. Any dredging is dependent on community support (as reflected by the Shire of Denmark), support from the Wilson Inlet Management Advisory Group and approval from WRC.

Lead Agency-Shire of Denmark, WRC, WIMAG.

Time Period- Ongoing.

Measurable Outcome/s- Any dredging to be limited to works as described.

Action DC2: Sand accumulation at Inlet mouth to be monitored. Cost effective monitoring may include aerial photographs. Comparison with past years to be made and reported to community.

Lead Agency- WRC.

Time Period-Ongoing.

Measurable Outcome/s- Photographic record kept of Inlet delta.

(v) Permanent Opening

A permanent opening has been recently proposed for a number of economic, social and environmental reasons. A permanent opening will transform the Inlet from a semi-closed estuary to a marine dominated embayment. The proposal would be subject to an environment assessment by the Environmental Protection Authority, and approval by the Minister for the Environment. Extensive studies would be required for this assessment and approvals to be given.

A permanent opening for the Inlet has social, economic and environmental implications that go well beyond the scope of this plan. Although recognising a permanent opening may have some benefits, the Water and Rivers Commission is not supportive of the proposal as a means of improving water quality. The Inlet is not in a condition whereby such costly and irreversible measures are justified, and funding of studies into the feasibility of permanent openings are not considered a priority when compared with the reduction of nutrients entering the Inlet.

A permanent opening would bring about changes to the Inlet that are very different to the vision expressed by the community during preparation of the Action Plan, and community support for a permanent opening has not been demonstrated.

(vi) Removal of Ruppia and algae

The dredging and removal of organic material in Wilson Inlet is not considered a realistic management option as a means of improving the overall Inlet condition. Experience elsewhere has shown it to be costly and ineffective, as has the mechanical removal of algae. Such works tackle the symptom rather than the cause of the problem. The removal of *Ruppia* or algae washed up on beaches may provide short-term benefits in terms of visual amenity, smell and boating access. The algae washed up at Poddyshot is a particular concern for local residents, impeding boating access and reducing the amenity value of the foreshore.

Action RP1: Build up of algae at Poddyshot and other shore locations to be addressed in consultation with local government authorities and residents. The value of the algae and seagrass as a garden mulch and fertiliser to be identified, along with any health risks. This information to be disseminated to local community. Methods of tackling algae build up to be implemented and trialed, in partnership with local residents. Ways of improving recreational use and reducing smells to be tested.

Lead Agency- WIMAG, WRC, LGA's.

Time Period – 3 years.

Measurable Outcome/s- Analysis of algae undertaken and reported to community. Plan prepared and implemented for Poddyshot.

Action RP2: Water quality to be examined in the vicinity of Poddyshot. Surface and groundwater to be monitored to investigate potential localised causes of algal growth.

Lead Agency-WRC, LGA.

Time Period-2 years.

Measurable Outcome- Report on water quality of drain entering Poddyshot completed and reported to community.

C. Monitoring and Reporting to Guide the Effectiveness of Management

Research into Wilson Inlet has been extensive but limited monitored information exists on nutrient sources in the catchments at other than a broad scale. The impacts of certain land uses needs to be confirmed, as should the benefits of certain 'best practices'. Monitoring is required to determine changes in the condition of Wilson Inlet. However, monitoring is less justified for land uses or best practices that have already been studied. A priority is ensuring information on nutrient sources and changing waterway condition is reported to the community in a form that best suites their needs.

Action M1: Monitoring of Wilson Inlet to be continued to objectively measure changes in its condition. Monitoring to directly relate to indicators of eutrophic conditions and to detect any deterioration in its condition. Factors to be monitored include increase in duration and extent of anoxic events, inlet nutrient levels in spring and summer, algal bloom frequency and duration, extent of *Ruppia*, increased occurrence of harmful phytoplankton species, increase in macroalgae abundance. Community involvement in monitoring desired, including involvement of local residents and commercial fishers. Annual reports to be trialed along with development of web site.

Lead Agency-WRC.

Time Period– ongoing.

Measurable Outcome/s-Annual report on Inlet condition.

Action M2: Monitoring and research to be utilised to determine the impact of land uses with the highest risk of nutrient export. Potato farming, vines and dairies are landuses considered the highest priority for monitoring, if sufficient information is not already available. Any monitoring to be undertaken in partnership with industry. Self-monitoring to be promoted as condition of licence for licensed premises.

Lead Agency-WRC, Industry.

Time Period – ongoing.

Measurable Outcome/s- Water quality reports completed for target land uses

Action M3: 'Best Practice' management methods to be monitored to assess their effectiveness, if not already known. Promote research through university projects. Priority best practices to be monitored include the use of constructed wetlands, riffle work and streamlining of drains. Monitoring to assess effectiveness in nutrient and sediment assimilation as well as maintenance costs.

Lead Agency-WRC.

Time Period – ongoing

Measurable Outcome/s- Reports of performance of constructed wetlands to be completed.

Action M4: River nutrient loadings into Wilson Inlet to be monitored as well as other indicators of river health. Present monitoring of nutrient concentrations and loads to be continued to establish trends over time and flow. Other monitoring, for example of macroinvertebrates, to be used to monitor river health compared with nutrient levels.

Lead Agency-WRC.

Time Period- ongoing.

Measurable Outcome/s- Annual reports on nutrient inputs compiled. Analysis of trends in nutrient concentrations made and reported at least every 3 years.

- Action M5: Implement monitoring programs to identify localised sources of nutrients at the sub-catchment scale within priority catchments.** Priority catchments are Sunny Glen, Cuppup, Sleeman and Lake Sadie. Methods to be used to cater for community involvement. Monitoring results to be mapped and used to guide management actions.
Lead Agency-WRC.
Time Period – 2 years.
Measurable Outcome/s- Maps identifying tributary water quality to be available for above targeted catchments.
- Action M6: Extent of sediment in river pools and its ability to be mobilised in peak run-off events to be estimated.** Survey to determine depth and ideally source of sediment in river pools. Changes after peak run-off events to be calculated.
Lead Agency- WRC, DA
Time Period – 5 years.
Measurable Outcome/s- Sediment in targeted river pools quantified. Estimation of material lost in peak flood made and reported.
- Action M7: Utilise decision support modelling techniques in the absence of monitored information to guide advice on land use change and management.** Existing decision support systems to be utilised and updated with field data from land uses in catchment.
Lead Agency-WRC, LGA, DA.
Time Period- ongoing.
Measurable Outcome/s- Modelling to be used to calculate impact of land use change, in land use planning for example.
- Action M8: Monitoring information to be presented to WICC, WIMAG and the local community on a regular basis.** Information to be provided in form desired by above groups. Range of styles suggested, including annual reports, maps, newspaper articles, web page, and media statements.
Lead Agency-WRC, WICC, DA.
Time Period- ongoing.
Measurable Outcome/s-Annual reports, presentations as guided by community

Abbreviations used in this document

DA	DEPARTMENT OF AGRICULTURE
WRC	WATER AND RIVERS COMMISSION
DPI	DEPARTMENT OF PLANNING AND INFRASTRUCTURE
FISHERIES	DEPARTMENT OF FISHERIES
LGA	LOCAL GOVERNMENT AUTHORITY
WC	WATER CORPORATION
WICC	WILSON INLET CATCHMENT COMMITTEE
WIMAG	WILSON INLET MANAGEMENT ADVISORY GROUP