

12/08/2002

Not Relevant

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MAFF0036/02CS

**Eradication of the Exotic Seaweed Caulerpa Taxifolia
from the Port Adelaide River
APPROVED**

All Ministers

Not Relevant

CABINET COVER SHEET

1. **TITLE** ERADICATION OF THE EXOTIC SEAWEED CAULERPA TAXIFOLIA FROM THE PORT ADELAIDE RIVER
 2. **MINISTER** Hon Paul Holloway
MINISTER FOR AGRICULTURE, FOOD AND FISHERIES
MINISTER FOR MINERAL RESOURCES DEVELOPMENT
 3. **PURPOSE** To advise Cabinet on the invasion of the Port River and West lakes by the exotic seaweed *Caulerpa taxifolia*.
To seek Cabinet approval for use of \$0.6 million from the PIRSA Bio-security fund to conduct an eradication program in the Port River.
 4. **RELATIONSHIP TO GOVERNMENT POLICY** The proposal is consistent with State government policy relating to the eradication of pest species and use of the Bio-security fund.
 5. **RESOURCES REQUIRED FOR IMPLEMENTATION** \$0.6 million from PIRSA Bio-security fund.
 6. **FINANCIAL IMPACT STATEMENT** Nil.
 7. **OTHER MAJOR IMPACTS** Failure to eradicate *Caulerpa taxifolia* will result in a significant impact to marine biodiversity and fisheries in South Australia.
 8. **CONSULTATION** Emergency Management Committee established across relevant government agencies, Environment Protection Authority and Charles Sturt Council.
Public meetings and letter drops to raise community awareness of exotic pest issue and management.
Cabinet were provided with a verbal briefing on Monday 5 August 2002.
A verbal briefing was provided to Cabinet on 5 August.
 9. **URGENCY** Urgent. The Premier is due to announce the Governments response to the Port River infestation on 14 August 2002.
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10. RECOMMENDATIONS

It is recommended that Cabinet:

- 4.1 Note the invasion of the exotic seaweed *Caulerpa taxifolia* into the Port River and West Lakes and:
- the serious implications of the spread of this seaweed into other South Australian marine waters,
 - some of the weed has become established in the upper reaches of the Port River but remains confined to the area between Birkenhead Bridge and Bower Rd;
 - suction hand-dredging is the recommended strategy to eradicate *Caulerpa taxifolia* from the Port River; and
 - eradication of the weed from West Lakes may require treatment of the lake with copper sulphate and this proposed action is being pursued further in consultation with the Environment Protection Authority.
- 4.2 Approve the use of up to \$600,000 from the PIRSA Bio-security fund for the eradication of *Caulerpa taxifolia* from the Port River.
- 4.3 Agree in principle to the provision of additional funding of \$600,000 (less any Commonwealth contribution to reimburse the PIRSA Bio security fund for these costs should it be needed to meet future unforeseen incidents which may arise such as fruit fly, locusts or grasshopper outbreaks.

SIGNATURE OF MINISTER:



PORTFOLIO:

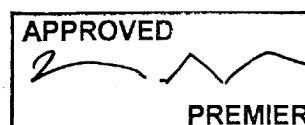
MINISTER FOR AGRICULTURE, FOOD AND FISHERIES
MINISTER FOR MINERAL RESOURCES DEVELOPMENT

DATE:

8/8/2002

In Cabinet

12 AUG 2002



TO: THE PREMIER FOR CABINET

RE: ERADICATION OF THE EXOTIC SEAWEED *CAULERPA TAXIFOLIA* FROM THE PORT ADELAIDE RIVER

1. PROPOSAL

It is proposed that Cabinet:

- 1.1 Note the invasion of the exotic seaweed *Caulerpa taxifolia* into West Lakes and the upper reaches of the Port River.
- 1.2 Note the implications to our marine ecosystems of the establishment of the seaweed and in turn to South Australian marine waters and associated industries
- 1.3 Note that suction hand-dredging of the Port River to remove the seaweed is proposed at a cost of \$600,000.
- 1.4 Note that the cost of eradication in the Port River will be funded from the PIRSA Bio-security fund.
- 1.5 Note that the recommended option for eradication of the seaweed from West Lakes is treatment of the lake water by sections with copper sulphate, subject to further consultation and advice from the Environment Protection Authority.

2. BACKGROUND

- 2.1 On Monday 18 March 2002 researchers from the South Australian Research and Development Institute (SARDI) tentatively identified a specimen of marine algae (seaweed) from West Lakes as *Caulerpa taxifolia*.
 - 2.2 Samples of the seaweed were sent to the Royal Botanical Gardens in Sydney and were formally identified as *Caulerpa taxifolia*. Samples were also sent overseas for DNA testing. The results of these tests, reported on 22 April 2002, indicated that the seaweed could not be distinguished from the Mediterranean "aquarium" strain.
 - 2.3 Species background
 - 2.3.1 *Caulerpa taxifolia* is a tropical species found through much of the world. It is a highly invasive and hardy species, characterised by a rapid growth rate and dense bed formation. The seaweed is distasteful to fish and therefore preferred for use in aquariums. The so-called
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“aquarium strain” was developed in Europe and it is believed that this strain was inadvertently released into the Mediterranean Sea.

2.3.2 The seaweed has dominated large areas in the Mediterranean, displacing local species. Because of its vigour and distastefulness to fish and other marine species, biodiversity has been dramatically reduced wherever the seaweed has become established.

2.3.3 Because *Caulerpa taxifolia* is an alga, not a plant, it does not require a root system. Hence it overgrows not just sand or mud but also rocks and reefs. It reproduces vegetatively and a new plant may grow from pieces as small as 1 to 2 mm. Parts of the plant remain viable for up to 10 days out of water.

2.3.4 Within Australia there are some populations in Queensland and the species has invaded some areas of New South Wales. This species has not been recorded in South Australia before and likely introduction vectors include the aquarium trade or recreational craft such as canoes, windsurfers, small yachts etc.

2.3.5 This species poses a significant threat to biodiversity and fisheries production in South Australia, especially to Gulf St Vincent and Spencer Gulf. In other areas that have been invaded entire fisheries have been decimated

2.4 Distribution in South Australia

2.4.1 Surveys by SARDI and Fisheries staff have found that *Caulerpa taxifolia* has spread throughout the West Lakes system. Based on discussions with people who use the West Lakes area and the extent of the weed it is likely that the weed has been in that area for as much as four or five years.

2.4.2 Extensive diver surveys have been undertaken throughout the Port Adelaide River, North Arm, Barker Inlet, St Kilda, Outer Harbour, North Haven and offshore from the metropolitan area of Adelaide.

2.4.3 *Caulerpa taxifolia* has been found in the upper reaches of the Port River between the Bower Rd Causeway and immediately north of the Birkenhead Bridge. The densest growth is in the vicinity of the Jervois St Bridge and only small patches have been found in the remaining area. This distribution makes the seaweed amenable to physical removal (Attachment 1). Dredging operations are expected to commence in early September 2002.

2.5 Incursion response

2.5.1 PIRSA is the lead agency for marine pest issues and a range of other agencies have interests in this issue. On 25 March 2002 a response group of key agencies was formed with the Director, Fisheries Policy

as Chair. (Attachment 2). It was agreed that given the aggressive nature of this pest, every attempt should be made to eradicate it from West Lakes.

2.5.2 The Minister for Agriculture, Food and Fisheries is the lead Minister for this issue and PIRSA the lead agency.

2.5.3 West Lakes was closed to all activities for an initial period of two weeks. Subject to a risk assessment process and issue of permit existing uses of the Lake were allowed with the exception of line fishing. The closure has since been extended until 30 September 2002.

2.5.4 Line fishing remains prohibited in the upper reaches of the Port River.

2.5.5 Flows into and out of West Lakes have been minimised to reduce the risk of translocation. The capacity of West lakes is being managed at about 70% water volume.

2.6 Research – laboratory trials

2.6.1 A number of research trials were undertaken by SARDI to determine a preferred option for eradication of *Caulerpa taxifolia* from West Lakes. The trials were carried out in tanks in a purpose built facility at the Port Adelaide Wastewater Treatment Plant. The trials included the use of copper sulphate, a known algicide and one which has been extensively used to treat algal growth in reservoirs. Chlorine, herbicide, high salinity and differing concentrations of freshwater were also tested.

2.6.2 The tank trials indicated that *Caulerpa taxifolia* would be completely killed, within 48 hours, by the application of 2 parts per million (ppm) of copper sulphate. It was also susceptible to a reduction in salinity to 10 parts per thousand and an increase to 85 parts per thousand. This constitutes a reduction of salinity of approximately 70% below the present salinity of West Lakes or an increase of 250% above normal seawater salinity, respectively.

2.7 Research – field trials & EPA requirements

2.7.1 A series of in-field trials were then undertaken using large polythene enclosures to contain the copper sulphate and freshwater. As copper is a known toxicant to fish, emergency exemptions were required under the Environment Protection Act. These exemptions were conditional upon the containment of water until copper levels fell to 0.05ppm.

2.7.2 The Environment Protection Authority has deemed that the release of water from West Lakes, with levels exceeding 0.05ppm copper will cause unacceptable environmental harm. Large scale treatment of the lake may necessitate holding the water in the lake until copper levels fall below 0.05ppm. This view is not shared by the Emergency

Management Committee, as the upper reaches of the Port River already have high metal levels and the release of water with low levels of copper sulphate is unlikely to impact further on this degraded environment. Discussions are continuing with the EPA concerning the use of copper sulphate.

- 2.7.3 Freshwater was not effective in killing *Caulerpa taxifolia* in-situ. Salt water intrusion into the enclosures prevented an adequate reduction of salinity. It appears that the source of the saline water was the saturated sediments underlying the enclosures.
- 2.7.4 Copper concentration within the enclosures fell from 2ppm to 1ppm within 48 hours. However, after a further 7 days copper levels were still above 0.5ppm. Calculations indicate that the "stabilisation" rate is such that it may take several months before levels will fall to 0.05ppm.
- 2.7.5 Within 72 hours the dead *Caulerpa taxifolia* began to decay and over 7 days the water within the enclosure became anoxic, black in colour and highly odorous. All fish within the enclosure were killed.
- 2.7.6 Separate studies on fish in tanks indicated that all fish are killed within 24 hours by copper concentrations of 0.5ppm.

3 DISCUSSION

3.1 Implications of research trials

- 3.1.1 Application of copper sulphate at a concentration of 2ppm will eradicate *Caulerpa taxifolia* from West Lakes.
 - 3.1.2 The treatment of *Caulerpa taxifolia* will result in the death of all fish within West Lakes, irrespective of size or species. Deaths not caused by direct copper toxicity will almost inevitably result from the subsequent deterioration of water quality in the lake and lack of oxygen in the water.
 - 3.1.3 Following treatment, copper concentrations will fall to 1ppm within 48 hours but are unlikely to fall below 0.05ppm for an extended period.
 - 3.1.4 Within 7 days following treatment, water quality within West Lakes will dramatically deteriorate. The decomposition of the dead *Caulerpa taxifolia* and other life forms, may result in anoxic conditions such that the water will turn black in colour and become highly odorous.
 - 3.1.5 EPA requirements in relation to the release of treated water however mean that there may be no release of water from the lake during a prolonged period following treatment. This will exacerbate any odour problems. Options to mitigate odours and allow for earlier release of treated water are being pursued with the EPA.
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3.1.6 The EPA does not currently agree to the use of copper sulphate for a variety of reasons and would like further scientific investigation prior to considering a formal application from PIRSA. Therefore, treatment of West Lakes is being postponed to allow further consultation with the EPA.

3.2 Risk Assessment

3.2.1 PIRSA has undertaken a detailed risk assessment of the implications of taking no action to eradicate *Caulerpa taxifolia*. The risk assessment clearly indicates that failure to act to eradicate the *Caulerpa taxifolia* poses an unacceptable risk to the marine environment of South Australia and its associated industries and uses.

3.2.2 Because it is a tropical species, *Caulerpa taxifolia* does not grow well in South Australia during the winter months. However, with the onset of spring and early summer it begins rapid growth hence there is a need to act before the onset of spring. Delays beyond this time will add to the risk of further spread of the seaweed.

3.3 Social implications

3.3.1 Activities in the Port River between the Bower Road Causeway and the Birkenhead bridge will have to be restricted during the hand dredging operation.

3.4 Media and public consultation

3.4.1 PIRSA has developed a media and consultation strategy aimed at maintaining community support and cooperation from local residents and other users.

3.5 Approval by the Environment Protection Authority

3.5.1 The EPA has given in-principle agreement for the suction dredge method proposed by PIRSA, but a formal public application is required to use the dredge under the EP Act. This process will take a minimum of 2 weeks.

3.6 Economic, financial and budget implications

3.6.1 The cost of eradication of *Caulerpa taxifolia* from the Port River is estimated to be \$0.6 million.

3.6.2 Costs will be met through the use of the PIRSA Biosecurity fund in the first instance. The Biosecurity Fund was established in May 1997 to fund responses to outbreaks of fruit fly, plague locusts and other biological threats, which come within the responsibility of PIRSA. The fund is managed as a tied line with funds strictly quarantined for the

use of emergency bio-security incidents or outbreaks which cannot be foreseen and which meet relevant criteria.

3.6.3 Net expenditure above appropriation from the Biosecurity Fund for the last four years has been:

01-02	00-01	99-00	98-99
\$1.535m	\$3.306m	\$2.191m	\$2.615

Given that the average call on the fund has been around double the Funds available and the trend in relation to frequency and severity of incidents, it is exceedingly unlikely that there will be spare capacity to fund the *Caulerpa Taxifolia* eradication program in 2002-03. However, it is proposed to draw funds in the first instance from the Biosecurity Fund and for additional funds to be sought from the budget as they are required for incidents such as fruit fly, locusts, grasshopper outbreaks.

3.6.4 PIRSA will seek to recover the majority of costs through the joint funding agreement from the national Coordinating Committee on Introduced Marine Pests Emergencies (CCIMPE). Until the committee can approve the operational plans by South Australia no decision can be made on joint funding. However, the committee and the Commonwealth have indicated that joint funding is likely to be supported.

3.15 State development, social, environmental and other impacts

3.15.1 Failure to eradicate *Caulerpa taxifolia* from the Port River and West Lakes poses a serious risk to the sustainability and future development of the State's commercial and recreational fishing activities and has the potential to seriously disrupt aquaculture activities.

3.15.2 The short term legal and social impacts of treating West Lakes are potentially significant but are not long term impacts, regardless of the treatment option applied. Further advice on the treatment of West lakes is required from the Crown Solicitor and the EPA.

3.15.3 There are no perceived family or competition impacts inherent in this submission.

3.16 Staffing Implications

3.16.1 Nil for the Port River eradication program.

3.17 Consultation

3.17.1 Significant consultation has taken place across the relevant agencies, in particular The Department for Environment and Heritage, Environment Protection Authority, Transport SA and the Marine Managers Forum. Public consultation meetings have been conducted and key stakeholders, including the City of Charles Sturt have been

closely involved with the Emergency Management Committee in the development of treatment options.

3.17.2 The EPA is a member of the EMC Steering Committee

3.18 Executive Council

3.18.1 This proposal does not require the endorsement of the Governor in Executive Council.

4. RECOMMENDATION

It is recommended that Cabinet:

4.1 Note the invasion of the exotic seaweed *Caulerpa taxifolia* into the Port River and West Lakes and:

- the serious implications of the spread of this seaweed into other South Australian marine waters,
- some of the weed has become established in the upper reaches of the Port River but remains confined to the area between Birkenhead Bridge and Bower Rd;
- suction hand-dredging is the recommended strategy to eradicate *Caulerpa taxifolia* from the Port River; and
- eradication of the weed from West Lakes may require treatment of the lake with copper sulphate and this proposed action is being pursued further in consultation with the Environment Protection Authority.

4.2 Approve the use of up to \$600,000 from the PIRSA Bio-security fund for the eradication of *Caulerpa taxifolia* from the Port River.

4.3 Agree in principle to the provision of additional funding of \$600,000 (less any Commonwealth contribution) to reimburse the PIRSA Bio security fund for these costs should it be needed to meet future unforeseen incidents which may arise such as fruit fly, locusts or grasshopper outbreaks.

SIGNATURE OF MINISTER:



PORTFOLIO:

MINISTER FOR AGRICULTURE, FOOD AND FISHERIES
MINISTER FOR MINERAL RESOURCES DEVELOPMENT

DATE:



Attachment 1

Removal of *Caulerpa taxifolia* from the Port Adelaide River – plan of operations

Operational Plan for Treatment of Port River populations of *Caulerpa taxifolia*

Situation

Caulerpa taxifolia has been located in the Port River from the Bower Rd Causeway to immediately north of Birkenhead Bridge. The major patch is located in the vicinity of the Jervois Bridge and south towards the railway bridge. Material located north of this patch are mostly fragments that have fallen to the sea floor with only four plants located.

Caulerpa taxifolia is capable of regenerating from pieces as small as 1 mm to create a new plant. Care is required to ensure that the removal process does not spread the infestation over a greater area.

Response

The operation will be undertaken in two main components:

- treatment of heavily infested areas, and
- treatment of the sparsely infected areas.

Heavily Infested Areas

Commercial divers will use a commercial airlift (a device that uses airflow to suck water and material from the seafloor) to remove material in the heavily infested areas. The airlift will lift water, sediment and *Caulerpa* to a large barge (approximately 27 m long).

This material will be filtered on the barge through a series of five screened hoppers and the water returned to the Port River system. The barge will be mounted with two series of the hoppers to enable a more streamlined operation and the collection of additional material. Each hopper will hold approximately 5,000 litres of water, sediment and seaweed. Collected sediment will be disposed to landfill in an EPA approved manner.

It is estimated that 36 cubic metres a day will be collected for disposal using the airlift system.

A 300 metre semipermeable screen will be constructed and used to seal areas in the heavily infested zone. This will enable large scale treatment with minimal risk for the transfer of pieces of *Caulerpa* to other parts of the River. The screen will be cleaned on a regular basis to remove any loose seaweed and sediment build-up.

To ensure that divers clear areas effectively, weighted lines will be used to mark quadrats and scientific divers will survey each quadrat after treatment to ensure that they are clear.

It has been estimated that 80 days of dive operation are likely to be required, though this figure will not be confirmed until initial work has been undertaken.

Lightly infected areas

During the commercial operation on the heavily infected areas scientific divers will be undertaking further surveys of other areas and removing (or treating) any other located material.

The use of scientific divers to treat the less dense infections will allow for an increased rate of treatment and concentrate the large scale removal operations on dense patches.

Risk Assessment and Minimisation

Operational Success

Keys risks relate to the potential for survival of existing material and possible translocation through the removal operation.

Risks of survival of existing material will be minimised through treatment of marked areas and inspection to ensure that they are clear. It is possible that physical removal may prove inadequate and other techniques, such as treatment with rock salt may need to be considered.

Risks relating to translocation will be minimised through the use of the screens and through treatment of all equipment with freshwater and a bleach solution before relocation to uninfected areas.

Risks of reinfection will be minimised through the treatment of the prime infection source (West Lakes) and ongoing management of the aquarium trade.

Occupational Health and Safety

The commercial dive operation and management of the barges will be undertaken by private contractors who are leaders in their field. The contractors will manage risks associated with these operations.

Prime risks to PIRSA staff relate to standard diving and marine operation risks. These will be minimised through adherence to standard protocols. The area poses additional risks to divers due to potentially polluted water, restricted environments and limited visibility. These risks will be reduced through the use of full face masks and communications equipment to improve diver contact with surface support. Buoys will be used to mark diver location in areas where this does not pose an additional entanglement risk.

[Note that this plan is a living document that will be updated and reviewed as additional information becomes available and the operation proceeds.]

Attachment 2

Membership of the Emergency Management Committee and Response Group

***Caulerpa taxifolia* Steering Committee**

Chair

Executive Director Food & Fibre PIRSA

Members

Director Fisheries Policy PIRSA

Emergency Management Coordinator PIRSA

Deputy Director National Parks & Wildlife SA

Environment Protection Authority

Emergency Management Committee

Chair

Mr Will Zacharin Director Fisheries Policy

Members

PIRSA Fisheries Compliance

PIRSA Fish habitat program

PIRSA Media & Communications Unit

PIRSA Emergency Management Coordination Unit

SARDI

EPA

SAHC

TSA

City of Charles Sturt

DEH