Conservation Council of South Australia Inc

Submission on the Port Stanvac Desalination Plant EIS

Submission to Department of Planning and Local Government

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Conservation Council of SA Inc
CCSA
1/157 Franklin St
Adelaide
SA 5000

p: (08) 8223 5155
f: (08) 8232 4782
e: general@ccsa.asn.au
www.ccsa.asn.au

The **Conservation Council of South Australia Inc (CCSA)** is the peak conservation body for South Australia, representing over 55 of the State's environment and conservation organisations.

CCSA is an independent non-profit, non party-political, community based organisation which provides resources, advice and representation for the SA environment movement, and which leads many of the key conservation campaigns in SA.

CCSA is known for its success in developing long term community development, education, and on-ground environmental restoration programs.

CCSA regularly liaises with Local, State and Federal Governments, Government agencies, media, educational institutions, NGOs, unions, industry, business and other groups on matters relating to the environment and social justice.

As a community organization, much of what CCSA achieves is through a large network of skilled volunteers from all walks of life – for its office, on-ground, governance and campaign activities.

CCSA Is committed to a healthy environment for South Australia.

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Executive Summary

The **Conservation Council of South Australia (CCSA)** is the peak environment and conservation body in South Australia. It represents over 50 member groups and has had a long standing interest in the health and wellbeing of the State's ecosystems and biodiversity.

CCSA has a number of concerns regarding the proposed desalination plant and the Environmental Impact Statement (EIS). CCSA thinks that desalination is an option of absolute last resort. A report published this year (Sustainable Focus, 2008) demonstrated that increased use and efficiency of alternative measures could provide Adelaide with more than its current water use.

CCSA refers only to energy and marine impacts in this submission. A summary of recommendations is provided here:

- The ADP must be zero net emissions on a life-cycle basis covering construction, operation, chemicals and consumables for all aspects of the project, including its delivery infrastructure.
- This must be achieved via the use of real renewable energy for these things, rather than black power offset via 'thin air reverse logic' carbon pollution permits.

- This renewable energy must be additional, i.e., it would not have been generated without the project.
- No dredging during neap tides because they have too little tidal movement to adequately disperse the sediment plume.

- The use of the guidelines in the *EPBC Policy Statement 2.1 – Interactions between offshore seismic exploration and whales* (Australian Government, 2008) is strongly recommended.

- With reference to marine mammals and noise/vibrations in the water, CCSA would recommend a 2 km stop work zone based on the EPBC guideline, rather than only a 500 m stop work zone.

- Marine mammal observation data be provided to the Whale and Dolphin Conservation Society, who undertake long-term research into Adelaide's dolphin population.

- Adding two additional species of concern to the list on p. 57 (Chapter 7). These are *Caulerpa racemosa* and *Musculista senhousia* both of which are monitored by Reef Watch's Feral or In Peril program

- With regard to the management and mitigation strategies for vessels, CCSA recommends using the ANZECC Antifouling Code of Practice in addition to the other strategies.

- A chemical emergency response plan to prevent accidentally large amounts of chemicals entering the marine environment.

- That the recommendations of the Environment and Resources Development Committee Interim Report into desalination be implemented.

- That further brine dispersion modelling, as recommended by Kaempf (2008), be carried out before construction.

Introduction

Firstly, CCSA would like to introduce this submission by stating that desalination should be an option of last resort. As demonstrated in the report, *Sustainable Water Options for Adelaide* (Sustainable Focus, 2008), desalination is not necessary to meet all of Adelaide's water requirements. Adelaide's current water use, according to the report, is 216 GL per year. The use of increased and more efficient demand management, stormwater harvesting and other measures could provide up to 227 GL per year, without the use of desalination.

Due to time limitations, CCSA has not had the opportunity to wade through the large amounts of data presented in the Appendices. However, the public should not have to wade through the Appendices to find data that should be in the main bulk of the EIS, such as a list of the species tested for ecotoxicology studies. The proposed desalination plant raises issues of concern with regard to energy use, waste disposal, water and the marine environment. However, time limitations have also limited our submission to only dealing with issues about energy use and marine impacts.

With regard to energy use there are concerns regarding carbon neutrality and the use of **new** renewable energy rather than the idea that whatever renewable energy production or offsetting is done in the name of carbon neutrality must be a result of the project in question. It is well known that desalination plants use a very large amount of energy, therefore use of large amounts of new, renewable energy would give South Australia a major boost towards renewable energy use targets.

The marine environment, even in Gulf St Vincent, is a large unknown. An intense amount of modelling has been focused around this proposal and there seem to be large discrepancies between modelling undertaken for the EIS and modelling done independently. It would seem prudent to undertake further modelling studies before construction begins.

CCSA has concerns about several aspects of the EIS, including a lack of details throughout Chapter 7. The public consultation time of six weeks was inadequate for such a large EIS and the timing of release with a closing date of 24th December is very poor timing, given that a large amount of people go on holidays at this time.

There seem to be a number of guidelines and standards that have not been mentioned in the EIS. For example, with regard to ballast water management, the Ballast Water Decision Support System and the International Maritime Organisation standards are not referred to. In addition, the ANZECC guidelines with reference to vessel anti-fouling are not mentioned, but need to be adhered to.

All monitoring and research data must be made publicly available, as well as all the management plans that are proposed.

CCSA's recommendations are summarised on page 12.

Energy and Greenhouse Issues

1.1. The State Government has made a commitment that the Adelaide Desalination Plant will be 'carbon neutral' but notes that "standards for achieving carbon neutrality and voluntary mechanisms that will complement the Federal Government's proposed Carbon Pollution Reduction System … are not yet confirmed"[1].

1.2. In the meantime, the eligibility requirements of the Federal Government's National Urban Water and Desalination Plan, which is funding the ADP on condition of its carbon neutrality, provide some guidance. To be eligible for funding under the Plan, a project must 'source 100 per cent of its energy needs from renewable sources or fully offset the carbon impact of the project's operations'[2].

1.3. This seems to imply that claims of carbon neutrality will be satisfied by the operations of projects being renewably powered or offset, not the construction and other energy requirements. Furthermore, the Federal Government's use of the term 'operations' is vague when applied to desalination: does this include energy required for pumping, chemicals and membranes, or purely the energy used to actually desalinate water?

1.4. The EIS does indicate that energy for pumping will be included, and claims that the "greenhouse gas emissions associated with the operation of the Desalination Plant and the Transfer Pipeline, make up approximately 90% of the ADP's potential greenhouse gas emissions footprint"[3].

1.5. However, it would appear that Table 6.3 only provides estimates of energy requirements for the 50GL pilot plant. It does not provide estimates for the power and embodied energy to construct a 75GL or 100GL plant, as has been done for the operating energy of these elsewhere in the EIS. It is therefore unclear how much construction energy may contribute to the total if a larger plant does go ahead.

1.6. Whatever the case, CCSA considers it misleading to describe a project as carbon neutral if not all of its true energy costs have been included. This view is echoed by the ACCC in its publication *Carbon claims and the Trade Practices Act*:

> Carbon neutral may be taken by consumers as an absolute term, that is, it may suggest to consumers that the equivalent of all the CO2-e emissions of a business have been eliminated through emissions reductions and offsets. Similarly, when applied to a product, the term may create an impression that emissions from the complete lifecycle of the product have been taken into account. If this is not the case, you should explain exactly what is covered by your claim of carbon neutrality to avoid the risk of misleading consumers.[4]

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[1] *Proposed Adelaide Desalination Plant Environmental Impact Statement* Chapter 6 - Energy, Sustainability and Climate Change, p 16.
[2] *National Urban Water and Desalination Plan Implementation Guidelines*, p 4.
[3] *Proposed Adelaide Desalination Plant Environmental Impact Statement* Chapter 6 - Energy, Sustainability and Climate Change, p 15.
[4] Australian Competition and Consumer Commission, *Carbon claims and the Trade Practices Act*, p 10.

1.7. This same document points out that a basic premise of carbon neutrality is the assumption of 'additionality' – the idea that whatever renewable energy production or offsetting is done in the name of carbon neutrality must be a result of the project in question. If the renewable energy activity or offsetting was already in existence, would have occurred anyway, or has already been counted elsewhere, it is quite misleading to count it again.

1.8. Given the drastic situation we are facing from human-induced climate change, it would be deeply inappropriate for any Government to approve such an energy-intensive project unless it is genuinely carbon neutral. This is particularly so when much lower-energy water supply options are available, as CCSA believes to be the case.

CCSA Energy Recommendations

1.9. The ADP must be zero net emissions on a life-cycle basis covering construction, operation, chemicals and consumables for all aspects of the project, including its delivery infrastructure.

1.10. This must be achieved via the use of real renewable energy for these things, rather than black power offset via 'thin air reverse logic' carbon pollution permits.

1.11. This renewable energy must be additional, ie, it would not have been generated without the project.

Marine Environment Issues

Potential Construction Impacts

Removal, Damage and Disturbance to Marine Habitats and Species

2.1. Full Tunnel Option – CCSA supports the development of the Full Tunnel Option due to its overall lower detrimental impacts on the marine environment. No blasting is required, and dredging and entrenchment are minimised. CCSA would strongly opposed the use of the Hybrid Tunnel Option.

2.2. All management plans, including a Dredge Management Plan, Marine Management Plan, Ballast Water Management Plan, Spill Management Plan, Emergency Response Plan, Environmental Management and Monitoring Plan, Construction Environment Management and Monitoring Plans, and Operational Environment Management and Monitoring Plan must be public documents.

2.3. All monitoring programs must be publicly available for scrutiny.

Sediment and Debris in the Marine System

2.4. Although the EIS states that dredging 'should be avoided during dodge tide events' (p.54, Chapter 7), CCSA would also recommend no dredging during neap tides because they have too little tidal movement to adequately disperse the sediment plume. In addition, the wording of the above quote should be changed to '**must** be avoided' rather than 'should' to create a stronger commitment.

2.5. It has been suggested on p.55 (Chapter 7) that monitoring criteria values for suspended solids and turbidity levels be taken from a document by McArthur et al. (2004). However, the guidelines in this document are based on coral reef research, which are tropical ecosystems. Tropical marine ecosystems are very different from temperate marine ecosystems particularly with reference to the level of suspended solids in the water column. Temperate marine ecosystems may need a different set of guidelines.

Noise/Vibration Impacts During Construction

2.6. p.56 Management and Mitigation Strategies for reducing noise and vibration impacts in the marine environment. 'Explosive work should only be conducted during periods when fish and/or marine mammal activity or sensitivity is lowest…' This statement should be altered to state 'Explosive work **must not** be conducted' to create a stronger guideline.

2.7. The use of the guidelines in the *EPBC Policy Statement 2.1 – Interactions between offshore seismic exploration and whales* (Australian Government, 2008) is strongly recommended. This includes not only the use of marine mammal observers, but also the use of a scout vessel and aerial surveys. They also recommend a 2 km 'low power' zone for seismic surveys, and CCSA would recommend a 2 km stop work zone based on this guideline, rather than only a 500 m stop work zone.

2.8. To whom will the records of marine mammal sightings be provided? CCSA recommends that this data be provided to the Whale and Dolphin

Conservation Society, who undertake long-term research into Adelaide's dolphin population.

Potential for Introduction of Marine Pest Species

2.9. CCSA recommends adding two additional species of concern to the list on p. 57 (Chapter 7). These are *Caulerpa racemosa* and *Musculista senhousia* both of which are monitored by Reef Watch's Feral or In Peril program.

2.10. With regard to the management and mitigation strategies for vessels, CCSA recommends using the ANZECC Antifouling Code of Practice in addition to the other strategies.

2.11. Ballast water should be managed not only in accordance with the Quarantine Act, but also with reference to the Australian Government Ballast Water Decision Support System. CCSA supports the development of a Ballast Water Management Plan, as ballast water is a significant source of introduced marine pests. The plan should be consistent with the International Maritime Organisation ballast water management standards.

2.12. On p.59 the EIS states that 'routine monitoring' of vessels or equipment will be undertaken. We support this, but this is lacking in details as to what 'routine' refers to. Routine could mean regularly on an annual basis, or it could be once a week. Please provide details of 'routine monitoring'.

Potential Spillages During Construction

2.13. Although bentonite is explained in some detail, the EIS states that 'these water-based drilling fluids have low toxicity and only small areas of seabed would be affected'. In what way is bentonite toxic and to what? How would the seabed be affected?

Potential Operational Impact

Intake of Seawater

2.14. There is an assumption in this section (7.4.3.1.1) that larvae and other plankton will mainly be sourced from the local sandy benthic area. For example, the penultimate paragraph on p.60 states that the intake zone will be located in sandy habitat and that this habitat is low in species richness. On p. 61, under management and mitigation strategies there is the statement that 'locating the intake structure within this zone will reduce the entrainment of species associated with the reefs'. In both of these statements there is the underlying assumption that plankton such as eggs and larvae will be local to the parental habitat. However, it is well known that many marine organisms have larvae that travel hundreds of kilometres out to see before returning to the adult habitat to settle out and metamorphose into the adult life form. Although not documented, this may well be the case for some reef and sandy habitat species. Marine species rely on seasonal triggers and oceanography for timing and dispersal. Thus it is plausible that eggs, larvae and other plankton will travel long distances from the parental habitat, and in the course of their travels may well come into the intake zone of the intake structure and be entrained. So the assumption that the position of the intake structure both high in the water column and at some distance from the shore will mitigate any impact on the entrainment of plankton.

2.15. The results of the larval study must be made public.

2.16. The grill spacing of 75 mm is quite large and CCSA would suggest a smaller grill spacing of at least 40 mm.

Discharge of Saline Concentrate

2.17. The EIS states that the 'high salinity concentrate produced by a seawater RO desalination plant poses the greatest toxicity potential to the marine environment' (p.63, Chapter 7). As salinity is the 'primary driver of potential effects on marine ecosystems' (p.64, Chapter 7), this is of great concern to CCSA. The EIS states that the modelling in Appendix D2 demonstrated that the 'dilution was greater than 50:1 within 30 metres of the diffuser ports' (p.64, Chapter 7). However, other parts of the EIS (e.g. p.66, Chapter 7) state that the 50:1 dilution will be reached by the time the concentrate reaches the seabed, which is only 1 m from the discharge ports. This is a major discrepancy in the distance required to reach the target of 50:1. Whilst time limits our ability to critically examine all aspects of the EIS, is the 30 metre result of the modelling due to resolution limits, or does the model demonstrate a lower level of dilution at 1 metre from the ports? This information (p.64) is confusing and conflicting and needs to be clarified.

2.18. Referring to Kaempf (2008), it would seem that there are problems with the assumptions made in the modelling by Pattiaratchi in Appendix D1. Kaempf states that 'the volume over which the brine concentrate is instantaneously distributed in the model ("instant mixing zone") was unrealistically large and that this has led to a significant overestimate of dilution' (p.25). The major differences in the findings of the independent modelling include 'near-field salinity anomalies between 2 and 5 ppt above ambient levels', which is significantly higher than the 0.6 ppt suggested by the EIS. The independent modelling also found that when considering the 'zone of dilutions less than 50:1' the mixing zone increased to an area between '400 ha and 500 ha during dodge tides', which is far in excess of acceptable values.

The independent modelling by Kaempf (2008) also found that 'dodge tides support pooling of desalination brine over distances of several kilometres from the discharge' (p.26). This is of serious concern as pooling of the concentrate will increase the time that marine organisms are exposed to potentially toxic chemicals, increased levels of salinity, and lowered levels of dissolved oxygen. Kaempf (2008) states that:

> If the model predictions presented here are realistic, … risks of brine discharge on water quality must be classified as "high" with major/severe consequences and almost certain likelihood. (p.26)

Kaempf suggests a potential solution (p.26):

> spread [the] discharge over a larger distance along the coast. In order to come closer to the dilution target of 50:1, I recommend consideration of a discharge design that is composed of three or more separate diffuser lines each of a length of 150 m. To avoid interference of adjacent brine plumes, the distance between adjacent diffuser lines should be at least 2 km which is the tidal excursion during spring tides.

2.19. The near-field model only takes into account brine dispersion over a timeframe of minutes, but during a dodge or neap tide there will be higher salinity water

still around from previous minutes/hours and there is no statement about the cumulative impacts of this.

2.20. P.64 refers to some ecotoxicological testing, but does not provide any results. These results are critical to a transparent process with regard to the concentrate. In addition the number of species tested is barely enough to meet the National Water Quality Guidelines. If the acute tests are discounted, then there are not enough species used. The acute tests should be discounted because the ration used to convert acute to chronic is not consistent with the Guideline default of ten.

2.21. CCSA is also concerned that the dense concentrate plume will 'move offshore into deeper water' (p.64, Chapter 7). There is an assumption that just because the seabed gets deeper it becomes less valuable – the 'out of sight, out of mind' attitude. The marine habitats of the deeper areas of Gulf St Vincent are just as valuable as shallower areas and also provide ecosystem services that are extremely valuable. To assume that because the concentrate plume will move into deeper water, things will be ok, is an assumption that needs to be addressed in the management and mitigation strategies, but is not.

2.22. How will the chemicals used in the membrane CIP system be 'neutralised' prior to transportation offsite? No details are provided.

2.23. The EIS states 'Only the flocculant and membrane cleaning chemical had reported toxicity values below 1 mg/L, with some values lower than 50 µg/L. Having such high toxicity the presence of these chemicals in desalination plant discharges could be detrimental and would need to be managed carefully.' CCSA agrees that these chemicals could indeed be very detrimental and require careful management, but there are no details as to how this would be achieved. The presence of these chemicals could have severe impacts in a cumulative scenario.

Also, what emergency procedures will be put in place for unplanned events such as accidental overdosing of these chemicals? CCSA recommends a chemical emergency response plan to prevent accidentally large amounts of chemicals entering the marine environment.

2.24. The EIS has not considered either bioaccumulation or bioassimilation of any of the chemicals from the concentrate. Either of these processes could be extremely damaging to marine organisms.

<u>Potential for Reduction in Dissolved Oxygen Levels</u>

2.25. Monitoring data will be required to back up the claim that the hydrodynamic modelling demonstrates sufficient concentrate dispersal, that even in a dodge tide, it will not lead to a significant reduction of dissolved oxygen at the seabed.

<u>General Operational Performance Monitoring</u>

2.26. Resources will need to be allocated to support Feral or In Peril monitoring, as stated on p. 70 (Chapter 7).

2.27. The paragraph referring to Reef Watch surveys needs to be amended thus:

> Feral **or I**n **P**eril surveys of the subtidal reef will continue as a precautionary approach in assessing whether **introduced marine** species have been

introduced into the region due to the construction of the proposed Desalination Plant. **These surveys will also monitor whether species of conservation concern are in the area. A Western Blue Devil was observed in the area and these surveys will monitor whether more of this species are in the area**.

2.28. The EIS states that '*in situ* monitoring will be conducted at sites west, north and south of the diffuser'. However, it gives no detail as to the distances at which the monitoring devices may be placed, or how many of these instrument packages may be used. CCSA suggests that many of these monitoring instrument packages be used at set distances from the point source of the diffuser up to 400 m from the diffuser.

CCSA Marine Impact Recommendations

1. All management plans, including a Dredge Management Plan, Marine Management Plan, Ballast Water Management Plan, Spill Management Plan, Emergency Response Plan, Environmental Management and Monitoring Plan, Construction Environment Management and Monitoring Plans, and Operational Environment Management and Monitoring Plan must be public documents.

2. The results of the larval study must be made public.

3. All monitoring programs must be publicly available for scrutiny.

4. No dredging during neap tides because they have too little tidal movement to adequately disperse the sediment plume.

5. The use of the guidelines in the *EPBC Policy Statement 2.1 – Interactions between offshore seismic exploration and whales* (Australian Government, 2008) is strongly recommended.

6. With reference to marine mammals and noise/vibrations in the water, CCSA would recommend a 2 km stop work zone based on the EPBC guideline, rather than only a 500 m stop work zone.

7. Marine mammal observation data be provided to the Whale and Dolphin Conservation Society, who undertake long-term research into Adelaide's dolphin population.

8. Adding two additional species of concern to the list on p. 57 (Chapter 7). These are *Caulerpa racemosa* and *Musculista senhousia* both of which are monitored by Reef Watch's Feral or In Peril program

9. With regard to the management and mitigation strategies for vessels, CCSA recommends using the ANZECC Antifouling Code of Practice in addition to the other strategies.

10. A chemical emergency response plan to prevent accidentally large amounts of chemicals entering the marine environment.

11. That the recommendations of the Environment and Resources Development Committee Interim Report into desalination be implemented.

12. That further brine dispersion modelling as recommended by Kaempf (2008) be carried out before construction.

Conclusion

In conclusion, CCSA thinks that a desalination plant is an option of last resort and that all other water saving and collecting options have not been explored.

There are many gaps in the EIS that need addressing in the response document. Further modelling is required, in addition to adherence to a variety of national and international guidelines and standards.

CCSA has serious concerns regarding the carbon neutrality of the proposed plant and its effects upon the marine environment.

References

Australian Government, Department of the Environment, Water, Heritage and the Arts (2008) EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales.

Kaempf, J. (2008) Review of the Environmental Impact Statement with a focus on marine modelling studies and including findings of additional independent modelling studies. Draft. Expert witness statement. Prepared for Onkaparinga City Council.

McArthur, C., Ferry, R. and Proni, J. (2004). Development of Guidelines for Dredge Material Disposal Based on Abiotic Determinates of Coral Reef Structure. In "Dredging 2002 – Key Technologies for Global Prosperity". 3rd Speciality Conference on Dredging and Dredged Material Disposal. Editor Stephen Garbaciak Jn. May 5th -8th 2002, Orlando Florida USA. Published American Society of Civil Engineers.

Sustainable Focus (2008) *Report on Sustainable Water Options for Adelaide*.

Appendix 1 CCSA Submission to the Environment Resources Development Committee On Desalination

The introduction of additional salts and chemicals into the marine environment.
An article published in the *Australian Marine Science Association Bulletin*[5] states that any of the following could potentially be included in desalination brine:

- Chemicals from pre-treatment of the feedwater; these may include NaOCl (sodium hypochlorite) or free chlorine, used for chlorination to prevent biological growth (anti-fouling) on infrastructure
- $FeCl_3$ (iron chloride) or $AlCl_3$ (aluminium chloride) used for the flocculation and removal of suspended matter from the water, H_2SO_4 (sulphuric acid) or HCl (hydrochloric acid) used for pH adjustment to increase membrane efficiency
- Sodium hexa-meta-phosphate $(NaPO_3)_6$ or similar, to prevent scale formation on the pipes and on the membranes
- Sodium sulphite ($NaHSO_3$) used in order to neutralise any remains of chlorine in the feed water
- Chemicals used in flushing the pipelines and cleaning the membranes in reverse osmosis plants; these may include sodium compounds, hydrochloric acid, citric acid, alkalines, polyphosphate, biocides, copper sulfate, and acrolein
- Chemicals used to preserve the reverse osmosis membranes (e.g. propylene glycol, glycerine, or sodium bisulphite)
- Organics and metals that are contained in the feedwater and concentrated in the desalination process
- Metals that are picked up by the brine in contact with plant components and pipelines;

The brine may potentially have a salt concentration 1.3 to 1.7 times that of the original seawater (seawater salt concentration is about 35 parts per thousand (ppt); desalination plants discharge brine with 46 to 60 ppt).

Salt concentrations may be reduced by mixing desalination plant discharges with other discharges, such as treated wastewater. However, using treated wastewater as an alternative water source for agriculture, as is currently the case with water from the Bolivar wastewater treatment plant, is preferable.

The adequacy of tidal movements to disperse brine and chemicals
Questions surrounding the adequacy of tidal movements are discussed in some detail in the draft paper by Kaempf, *et al* [6]. The modelling undertaken by Kaempf's team clearly shows that the upper reaches of either gulf are the most unsuitable places for placing desalination discharge outlets.

Although the Port Stanvac development is not proposing to discharge in the upper reaches of Gulf St Vincent, the modelling shows that there is still the potential for an

[5] Winter, 175, 2007, pp. 22-24
[6] Kaempf, *et al* 2008), in review.

increase in the concentration of the discharge (by 8%) and an increase in salinity (of 3 ppt) in the vicinity of the discharge area.

The potential impact on a range of marine flora and fauna

The potential impacts on marine flora and fauna are significant.

It is known that small amounts of copper can negatively affect the reproductive capabilities of marine phytoplankton[7], the basis of marine food webs.

Whilst we cannot comment specifically on the actions of any of the chemicals listed above, it is clear that the potential build up of any chemicals to levels above background levels will have an impact on the marine environment.

Marine organisms are evolved to cope with a range of environmental variables, such as temperature, salinity and exposure to air/sunlight. However, changes in salinity levels outside of the average range within which organisms normally cope will be detrimental to their survival.

There is the potential for metals from the discharged brine to bio-accumulate up the food chain and harm top predators. This has been seen in many examples around the world but close to home, the Port Adelaide dolphins have a significant heavy metal loading[8], which may be contributing to the high infant mortality rate amongst the population – the highest in any known dolphin population in the world.

Both proposed desalination plants will need to take in large quantities of seawater (in the case of the Point Lowly plant, up to 290 megalitres per day). This will contain significant quantities of plankton, much of which is the eggs and larvae of a wide variety of marine organisms. Plankton is the basis of all marine food webs and as such is a significant food source that goes largely unrecognised and unvalued. If there is a significant reduction in plankton biomass, it will have effects that will ripple throughout food webs within both gulfs, both in terms of a reduction of recruitment into populations (from reduced egg/larvae numbers) and a reduction of populations from a potential reduction in a vital food source.

Port Stanvac

The intertidal zone at Port Stanvac was recently surveyed by Dutton and Benkendorff (2008), who found thirteen rare species of molluscs that were recorded for the first time on South Australian intertidal reefs. They also found that 'eight mollusc species were only recorded within the Port Stanvac fenced area'[9]. Three species of red algae (seaweed) recorded at the Port Stanvac area have not previously been recorded along the Fleurieu Peninsula in similar surveys. The report highlights the Port Stanvac area as a regional biodiversity hotspot and therefore, extra measures must ensure the protection of both the intertidal and marine areas.

The jetty at Port Stanvac provides ideal habitat for members of the *Syngnathidae* family (seahorses, pipehorses and seadragons). Due to diving prohibitions in this area the presence of these animals around the jetty cannot be confirmed, but is highly likely. Members of this group are Matters of National Environmental Significance, being listed

[7] Brand *et al*, 1986
[8] EPA, 2005
[9] Dutton & Benkendorff, 2008, p.13

marine species under the *Environment Protection and Biodiversity Conservation Act (1999)* and therefore, caution must be exercised with reference to any action that may cause them disturbance, or disturbance of their habitat.

Point Lowly

It is well known that the marine area immediately adjacent to Point Lowly is used by thousands of giant Australian cuttlefish (*Sepia apama*) each winter (May – August) for breeding and egg laying, forming densities up to 85 animals per 100 m^2. This phenomenon is unique in the world and is therefore a major tourism attraction for Whyalla during the winter months when tourism would otherwise be very low. Recreational divers travel from around the world to observe the cuttlefish displaying and breeding. The area is significant for this species in the Spencer Gulf, as there are relatively few other rocky areas where the females can attach their eggs – this is thought to be the main reason why the cuttlefish gather in this area.

Genetic and morphological studies with sampling taken from the southern Australian temperate zone, have shown five distinct sub-species populations of this species[10]. The scientists undertaking this research state that 'within South Australia, the breeding aggregation in the upper Spencer Gulf forms a separate population, with minimal interbreeding with the lower Spencer Gulf and Gulf St Vincent population'. This implies that the upper Spencer Gulf population is in essence trapped, due to ecological and other differences. Therefore, it is particularly vulnerable to changes in habitat and environmental parameters and requires separate management from other populations of this species.

Another vulnerable aspect of this species is that '*S. apama* only lives for one to two years before breeding and dying, reducing overlap and gene flow between generations'. The success of each generation is totally dependent on the previous generation. Therefore a sudden and 'dramatic decrease in the standing biomass of the breeding aggregation could be devastating for the upper Spencer Gulf population'.

A Flinders University honours student recently conducted a series of experiments on embryonic *S. apama*[11] . The results showed that at a salinity of 45 practical salinity units (psu) the embryos showed a significant decrease in both length and weight and a couple were malformed. At salinities of 50 psu and above there was 100% mortality of embryos.

Other impacts in this region, including a very large new jetty for cape-size vessels, will compound the disturbance and impacts on this significant species.

The potential impact on commercial and recreational fishing sectors

Given the potential for detrimental impacts on marine organisms there would be concomitant flow-on effects for commercially and recreationally fished species. The impacts may vary depending on the trophic level of the species, i.e. its position in marine food webs. As previously mentioned, the large intake of eggs and larvae in

[10] Gillanders & Donellan, 2008

[11] Dupavillon, 2008

plankton may substantially reduce populations, including species such as the Western King Prawn (*Melicertus latisulcatus*), a particularly valuable commercial species in the Spencer Gulf. This may have substantial economic impacts as well as ecological ones that may be unforseen until it is too late.

Any Other Matters

The potential marine impacts aside, CCSA believes the relative merits of desalination should be assessed in an open and transparent manner, utilising a commonly understood methodology. This has recently been completed by Sustainable Focus with Richard Clarke & Associates[12] utilising the following criteria:

- Reliability of service
- Affordability
- Current availability
- Human health
- Flood mitigation potential
- Upstream & in-stream environmental protection
- Downstream environmental protection
- Greenhouse emissions/ carbon intensity

This report highlighted that desalination is capable of providing a reliable source of climate–independent water, however it is a relatively expensive option. *Waterproofing Adelaide* estimates costs in the order of $1.50-$2.00/kL. This does not take into account either the capital costs for construction, or any rise in the cost of electricity due to a National Emissions Trading Scheme[13].

Whilst the Port Stanvac plant is not currently online, it could be operational in the short to medium term of a year or two. This is equivalent to some options and quicker than others, such as expanding storages in the Mt. Lofty ranges.

Both the proposed plants will be capable of providing potable water, although questions have been raised as to whether the Point Lowly site would need to treat all of its output to that standard, which would make that proportion of water cheaper in energy terms.

Unlike stormwater harvesting, desalination offers no flood mitigation benefits, nor does it reduce pollution to the gulf. Desalination has minimal benefits on the upstream environment, but with significant downstream impacts from the brine discharge and other associated chemicals.

Desalination is clearly a very energy intensive option. The Sustainable Focus report rates it as almost ten times the intensity of standard wastewater treatment and four times as intense as desalinating stormwater[14]. Whilst the State Government has said it will be carbon neutral there has been no commitment from either the Government or BHP-Billiton (the proponents of the Pt Lowly plant) to using 100% renewable energy to power it. This is especially

[12] Sustainable Focus with Richard Clarke & Associates, (2008) Report on Sustainable Water Options for Adelaide, Adelaide.
[13] Waterproofing Adelaide 2005, quoted in *ibid*, p26.
[14] Sustainable Focus, op cit, p26.

significant, given the likelihood that the Port Stanvac desalination plant could become the sixth largest electricity consumer in the State, once the energy requirements to pump desalinated water back uphill into storages located at Happy Valley and elsewhere, are factored in. Clearly any desalination plant that is not powered by renewable energy will make a significant contribution to the state's carbon footprint and make achieving the SA State Strategic Plan (SASP) targets in relation to greenhouse gas emissions much harder to achieve.

The proposal clearly runs counter to the long term aim of creating a more sustainable environment, economy and society in SA.

Recent analysis has highlighted that potable water can be obtained from a variety of sources more cheaply and less energy-intensively than via desalination[15].

Finally, CCSA has concerns that if South Australia gets locked into a fast-tracked 'design, build, maintain and operate' contract with what is likely to be a foreign consortium, we may be obliged to purchase the desalinated water whether we need it or not.

Given all of these concerns, CCSA believes that we should not consider desalination until we have exhausted the range of preferable options for our water supplies. CCSA strongly recommends that desalination be the option of last resort.

Conclusion

CCSA considers that a desalination plant is not the solution to Adelaide's water 'crisis'. In fact it may exacerbate and worsen the situation by re-directing limited funds away from more sustainable and multi-functional options such as stormwater harvesting and aquifer storage and recharge.

CCSA has raised a number of significant ecological and environmental concerns with regard to these proposals. We would urge the ERD Committee to recommend that the desalination plants currently proposed are suspended pending a full EIS on the sites proposed. An essential component of these will be comprehensive baseline monitoring being conducted prior to any development taking place.

As things currently stand, numerous issues of scientific concern have been raised without adequate explanation.

On the whole, analysis of the proposals for desalination of seawater at Port Stanvac or Point Lowly fails to pass a reasonable cost-benefit analysis on the grounds of cost, energy intensity and greenhouse gas emissions alone, excluding the impacts on coast and marine environments and ecology[16]. CCSA concludes that the desalination plants currently proposed therefore should be options of absolute last resort.

CCSA urges the ERD Committee to oppose the desalination plants as they are currently proposed and instead look to holistically address the long term sustainability of

[15] *ibid*

[16] Sustainable Focus, *op cit*, p26.

Adelaide's water supplies through alternative, lower cost and more environmentally friendly options, such as stormwater harvesting, demand management and recycling opportunities.

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